THE ONLY PRIZE MEDAL AWARDED AT THE INTERNATIONAL EXHIBITION, LONDON, 1862, FOR A COLLECTION OF FIRST-CLASS MACHINERY FOR WORKING IN WOOD; ALSO PRIZE MEDALS AT HAMBURGH, STOCKHOLM, ANTWERP, BRUSSELS, &c., &c., ALSO AT PARIS, 1867, AND NAPLES, 1871.

POWIS, JAMES, WESTERN & CO.,

ENGINEERS, IRONFOUNDERS,

AND

WOOD WORKING MACHINISTS,

VICTORIA WORKS,

BELVEDERE ROAD, LAMBETH,

LONDON, S.E.

COMPLETE CATALOGUE.

PRICE SEVEN SHILLINGS FREE BY POST.

1873.

Part H.

[ENTERED AT STATIONERS' HALL.

M'CORQUODALE & CO., PRINTERS, 6, CARDINGTON STREET, HAMPSTEAD ROAD, N.W.

SPECIAL NOTICES.

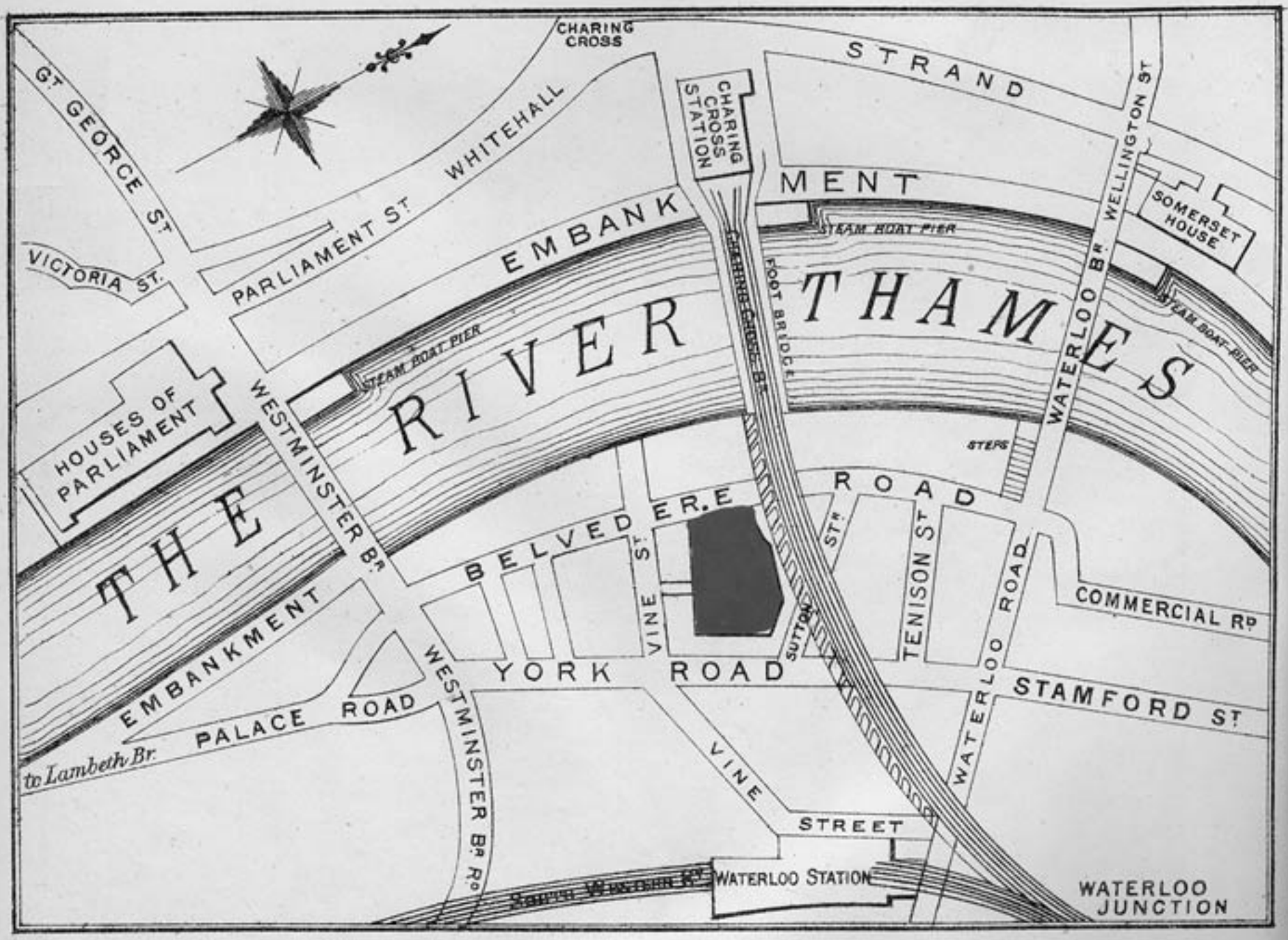
☞ **POWIS, JAMES, WESTERN & Co.**, beg to inform their Friends and the Public that **no Member** of their Firm has ever left to start another concern since its establishment in the year 1847; and having built New and more extensive Works, they are in a position to execute, with great dispatch, any Contracts, however large, for Sawing Machinery, Steam Engines, and General Contractors' Plant.

IN buying machinery much disappointment as well as serious loss often occurs to purchasers from their want of securing not only the most improved machines, but also those best suited to their own particular purpose.

IN all cases we advise our friends and correspondents to give us the fullest particulars possible of their work and the general conditions under which it has to be performed, when they may fully rely on our giving the best practical advice and suggestions for which a large experience has qualified us.

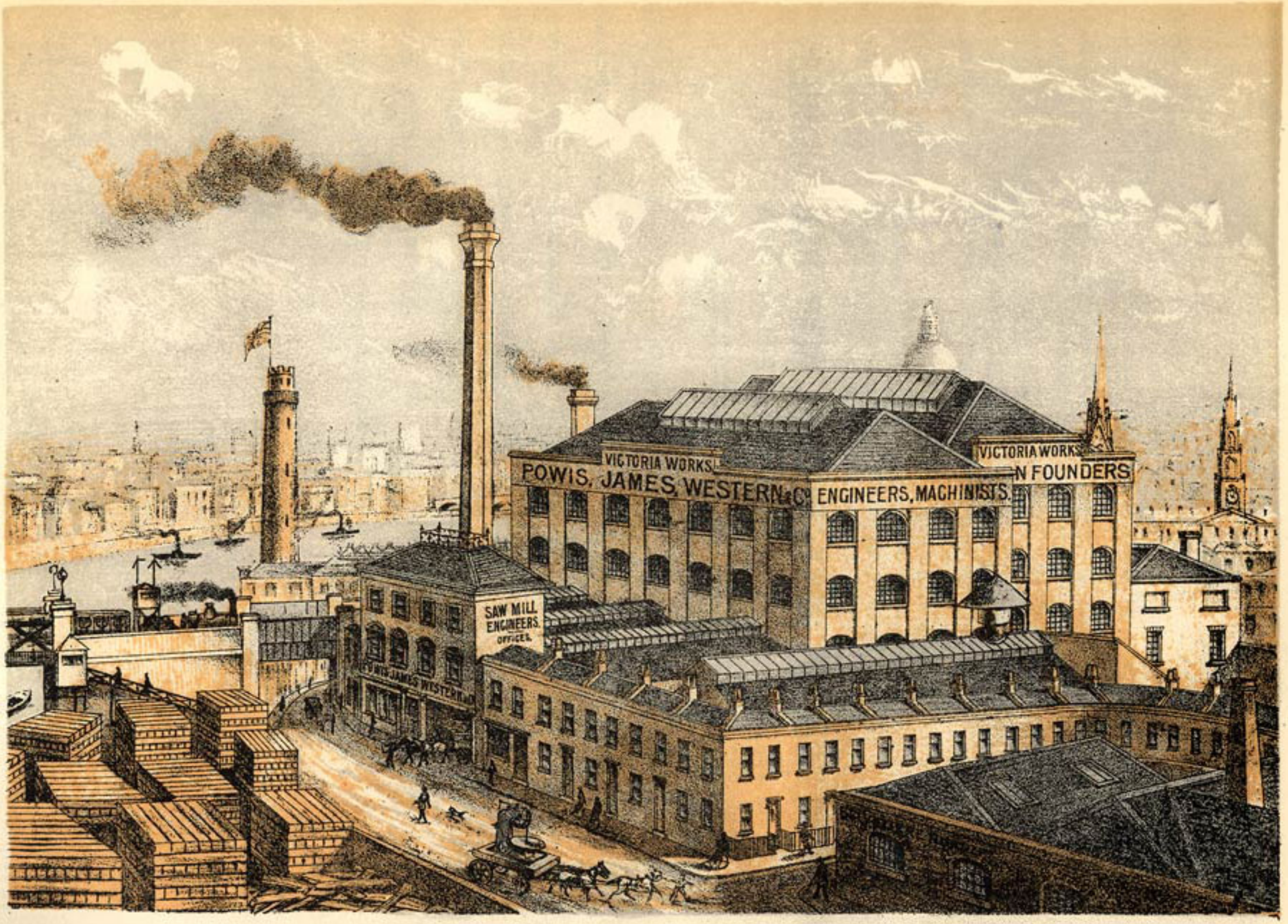
WE have set apart a portion of our additional works both for the trial of the various new machines we are constantly bringing out as well as for the regular working of those in most general demand, so that our own special improvements may be seen and their merit estimated, and at the same time much valuable information obtained as to the best modes of working each machine and their application in various trades. We cannot therefore too strongly urge upon all intending purchasers of machinery the advantages and consequent advisability of a personal visit to our works where practicable.

In the subjoined Map the Works are coloured Red.



IMPORTATION OF BEST FRENCH BAND SAW BLADES.

The superiority of French Band Saw Blades to any others has long been known. As Patentees of Improved Band Saw Machines we have always taken care to send out and recommend no others, this has necessitated our importing these Blades in large quantities, by which means we have been able to make special arrangements with the best Manufacturers, enabling us to guarantee every Saw not only to be made of the best steel, but tempered to our own standard.



VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON. S.E.

THE ONLY PRIZE MEDAL AWARDED AT THE INTERNATIONAL EXHIBITION, LONDON, 1862, FOR A COLLECTION OF FIRST-CLASS MACHINERY FOR WORKING IN WOOD; ALSO PRIZE MEDALS AT HAMBURGH, STOCKHOLM, ANTWERP, BRUSSELS, &c., &c., ALSO AT PARIS, 1867, AND NAPLES, 1871.

WESTERN & Co.

FORMERLY

Powis, James, Western & Co.

ILLUSTRATED AND DESCRIPTIVE CATALOGUE

OF

PATENTED AND IMPROVED

SAW MILL, WOOD WORKING,

STONE AND IRON WORKING, PUMPING, AND OTHER MACHINERY,
STEAM ENGINES, BOILERS, BLOWING FANS AND EXHAUSTERS,
FOR ENGINEERS, CONTRACTORS, TIMBER MERCHANTS,

RAILWAY CARRIAGE AND WAGON WORKS,

BUILDERS, WOOD & IRON SHIP BUILDERS, COACH BUILDERS,
JOINERY WORKS, CABINET AND PIANOFORTE MANUFACTURERS,
COOPERS, BREWERS, CHEMICAL WORKS, IRONFOUNDERS, &c.

VICTORIA WORKS,

BELVEDERE ROAD, LAMBETH, LONDON, S.E.

(CLOSE TO CHARING CROSS RAILWAY AND FOOT BRIDGE.)

REMOVED FROM WATLING STREET AND BLACKFRIARS ROAD.

☞ ESTABLISHED 1847,

AND HAVE NEVER BEEN CONNECTED WITH ANY OTHER FIRM.

FOR PLAN OF ROUTE TO WORKS SEE COVER.

[Part H.]

CONTENTS.

DESCRIPTION OF WORKS

AND THE RISE OF WOOD CUTTING MACHINERY.

THE accompanying view was sketched from the south-east corner of the roof of the India Government Stores, between Charing Cross and Westminster Bridges. Doubtless many of our readers will be interested in perusing a slight sketch of these Works, which will always repay them for a visit, to witness the completeness of our various mechanical appliances for reducing labour and ensuring great perfection in the quality of the work executed.

A short review also of the rise and progress of Wood-working Machinery, and our connection with it, may be interesting to our friends, many of whom will remember our original offices at 26, Watling Street, City, in connection with our late premises in the Blackfriars Road, to which we removed soon after our Establishment in the year 1847.

At this time the advantages of Wood-working Machinery had extended but little beyond the limits of Sawing and Planing Mills, and a few large Contractors' and Home and Foreign Governments' Works, which would be certainly considered very primitive at the present time.

A GREAT impetus was given to its extension by the increase of Railways, Naval and Mercantile Shipbuilding, and the gradual adoption of Steam Motive Power, so that we soon found those premises becoming too small for the execution of our orders for Home and Foreign Governments, Ship Builders, Railway Companies, Railway Carriage Builders, and many other trades into which the use of Wood-working Machinery was rapidly finding its way.

Amongst the Machines with which our names soon became especially identified may be mentioned our large Planing and Surfacing Machines, Patented Band Sawing Machines, and Large Double Tenoning Machine for Railway Carriage Soles, Heavy Log Frames, and other Saw Mill Machinery, including Floor Board Planing.

A glance at the purposes of the many new and improved machines in our large catalogue will show the rapid stride which wood-working and other allied machinery has made during the time of which we speak, and a closer perusal will serve to show to what extent we have ourselves contributed to its growth by the various improvements illustrated, as well as the new machines we have introduced and others of which we are the manufacturers only for the Patentees.

REFERRING again to the period soon after 1847, it will be seen into how many more trades machinery has since found its way and is now working profitably; also how many branches of business are now entirely dependent on machinery.

THE first step towards this result in the Building and similar trades was doubtless made by the Hand Mortising Machine—this is the first machine we patented, and since that time we have manufactured many thousands that are now working satisfactorily in nearly all parts of the world. We still find an increasing demand for these invaluable tools, notwithstanding the great extension of Steam power.

The introduction of the Band Sawing Machine was another event in the history of Wood-working Machinery and is still rapidly developing its advantages.

Our name in connection with this machine will be remembered for our Patented improvements to lessen the tension and prevent the breakage of Saws, an evil found so serious as to almost induce many persons to reject one of the best inventions of the age.

This is no longer necessary, our Patent Spring adjustment having effectually answered its design. Experience proves that our Band Saw Machines may be, and, in fact are, driven for many months without a single saw being broken.

ANOTHER important improvement is the system of casting in one entire piece the Frames of Saw Benches and other Machines, such as Band Saws, Moulding, Planing, and Trying Up, Tenoning Machines, Rack Benches, &c., &c.: this we first introduced in 1862, the year of the International Exhibition in London, and were the first in the Kingdom to do so. At this Exhibition we took the only Prize Medal awarded for a collection of first-class Machinery for working in Wood.

Many other Medals have been awarded to us, including that of Paris in 1867, and Naples 1871.

Between these periods we Patented several improvements, one of which deserves special notice for its bearing on high class ornamentation in wood. We refer to our Patented Four-

Cutter Moulding Machine, described a Pages 80 to 83, by which rich undercut mouldings can be produced with the same facility as ordinary mouldings by other machines; our improvements, too, for cheapening the production of rich and first-class circular mouldings of small or large sections has met with general favour. In Coach building and Wheel making machinery we patented the Multiple Spoke Making Machine for making four Spokes at one time and cutting with the grain; this latter improvement we have since adopted in our Single Spoke Machine, and have also patented a Machine for putting wheels together, as well as having made many other improvements in this Department of our Business.

NOT connected with wood working machinery, but deserving notice here are our Registered Fan Blowers and Exhausters, an important branch of our business, they being supplied largely for H. M. ships of war and large vessels in the Mercantile Marine, Mines, Tunnels, Engineering, Chemical, and other works.

THE Exhibition of 1862 added a fresh stimulus to our business both for home and foreign consumption; so much was this the case that our premises in the Blackfriars Road became altogether unequal to our demands; we were therefore compelled to find larger premises, and were fortunate in securing a site for our New Building having unusual advantages for land and water carriage, and great facility of access from all parts of town. It is very central, situated on the south bank of the Thames, between Westminster and Charing Cross Bridges, the entrance in the Belvedere Road nearly facing the approach to the Charing Cross Railway and Foot Bridge.

The South Eastern and South Western Railway Stations as nearly adjoin the works in the rear, as the River Thames faces them; the journey by Rail is about five minutes from either Cannon Street or Charing Cross Railway Station to Waterloo Junction. Steam-boat passengers should land at Charing Cross Pier, and then have merely to cross the river by the foot bridge.

The works consist of an extensive foundry, enabling us to give every care to all our castings; also large erecting shops; machine shops; finishing and fitters' floors; smithy furnished with steam hammer, &c.; spacious and well lighted show rooms; a large department devoted to trying machines, and to working those in most general demand.

The tools we employ and all our mechanical appliances are of the best known, specially adapted to facilitate manufacturing on a large scale, and are of the largest dimensions; they have elicited the commendations of many of the most eminent engineers of this and other countries.

It will be readily admitted by all men of any experience that every working part of a steam engine or other machine requires the nicest possible adjustment; that, in fact, the value of a machine is entirely sacrificed without this nicety of finish in the working parts; and experience always teaches that the cheapness of a working tool really lies first in its quality. The recognition of this principle has made for us the position we now hold as engineers, and induces us to spare no exertion in making the future of our trade all that our friends and supporters with ourselves would wish to see it.

Since the erection of Victoria Works in 1865 we have already made one extensive addition, and have now a second in progress, on land adjoining the South Eastern Railway; this, when complete, will make our buildings as shown in the accompanying view, the whole offering facilities in selection and comparison to buyers of machinery that cannot fail to meet the approval and secure the highest advantages of all who may favour us with a visit, and doubtless much extend our already wide connection—home, foreign, and colonial.

ENGINEERS of railways and other large works, also home and foreign government establishments, will find the magnitude of our appliances afford especial facilities for executing large orders for the heaviest class of machinery, steam engines, &c., with great despatch, combining design and finish not hitherto attainable. Similar advantages are offered to inventors and companies for the production and testing of their special patents in any class of machinery.

INTRODUCTION.

VICTORIA WORKS,
BELVEDERE ROAD, LAMBETH,
LONDON, S.E.

FORTUNATELY it is no longer a question as to whether "Machinery will pay," this has long been decided by the most complete success; it now simply remains to secure the most improved and best adapted machine for each particular class of work.

The mistake most easily made, and therefore of most frequent occurrence, is that of making machines far too complicated in character, that even where efficiency is attained this result is neutralized by unnecessarily increasing the cost of working, keeping in repair, and the amount of skill required.

We have invariably aimed at an opposite course, and have introduced the simplest possible mechanical arrangements in all working parts, taking care that the whole is rendered easy of control by the most ordinary workmen.

Another, and perhaps more serious error made in designing machinery, is the result of not accurately studying and providing for the conditions and requirements of each particular trade; hence many machines otherwise well constructed, are so designed as to be ill adapted for the special uses for which they were intended, and are therefore worked at a reduced advantage to the owner.

This is a feature to which we devote the most careful attention, and first ascertain the exact conditions to be fulfilled as regards the nature of the material to be worked, the sizes quality and quantity required. Our next object is to produce the simplest machine to secure these ends, taking care that the materials and workmanship throughout shall be first class only; this we regard as the sole means of attaining for our customers the legitimate object sought in all machinery, viz., "profit."

In our descriptions we have purposely avoided engineering technicalities as much as possible, desiring to indicate, as far as the limits of this work will permit, the proper uses and capabilities of the machine under consideration, also its relative merits as compared with other machines of a somewhat similar class, so that purchasers may have the best practical guidance in selecting those most suited to their special requirements.

In order to give still greater facilities for this object, we keep a variety of those machines in most general demand set down ready for working when required to be seen, and, as already stated, we have special arrangements for working all machines manufactured by us, so that they may be fully tested and their merits proved before leaving the Works.

We are prepared to send fully competent men to any part of the world to instruct our customers' own men in the working of any machine at a very moderate wage charge. This removes difficulties often encountered, and ensures at once the most successful results.

MACHINES FOR SPECIAL PURPOSES.

This Catalogue being only designed to illustrate those machines in most general demand, at the end will be found a list of many others manufactured by us, to which we invite perusal, and of which we shall be happy to furnish full particulars and prices on application.

We are also prepared to *design and submit Specifications and Estimates for New Machines*, required for any purpose not yet attempted, on being supplied with full particulars of such requirements. This we have done for many years with unvarying success.

PLANS AND ESTIMATES.

The large experience we have had in designing Saw Mills, Railway Carriage Works, Builders' and other Manufacturing Establishments, enables us to furnish the most complete plans for buildings and machinery to any extent. We contract for the supply of Steam Engines, Boilers, Machines, Shafting, Pulleys, Belting, Saws, Cutters, &c. Also, when required, send out competent men, whether at home or abroad, to fix, start, and instruct in the working of all machines made by us, and if necessary to superintend the erections of the buildings and foundations.

ENLARGEMENT OF WORKS.

A considerable second extension of our Works, now in course of progress, will enable us to execute all future orders with which we are favoured with greater despatch than the rapid increase of our business has hitherto rendered possible.

IMPROVED PATENT

HAND POWER MORTISING, TENONING, AND BORING MACHINES.

FOR HARD AND SOFT WOODS, DRILLING IRON, AND OTHER METALS.

INTRODUCTORY.

THE value of these Machines, and the high appreciation in which they are held, may be judged from the fact that in the last twenty years we have made many thousands, a great number of which, if not all of those first sent out, are still doing their work well; whilst many inferior Machines are worn out, past repair, in one-tenth of that time.

It is to this established reputation, both for durability and usefulness, aided by improvements we have from time to time introduced into these Machines, that the demand still continues to increase, and that we have now a larger staff than formerly employed in their manufacture.

But few Joiners' Shops would be found without one of these invaluable tools, were the experiment made of keeping a week's account of the time spent in Mortising and Tenoning by Mallet, Chisel, and Saw, then compare the cost with that of the same amount of work done by Machine.

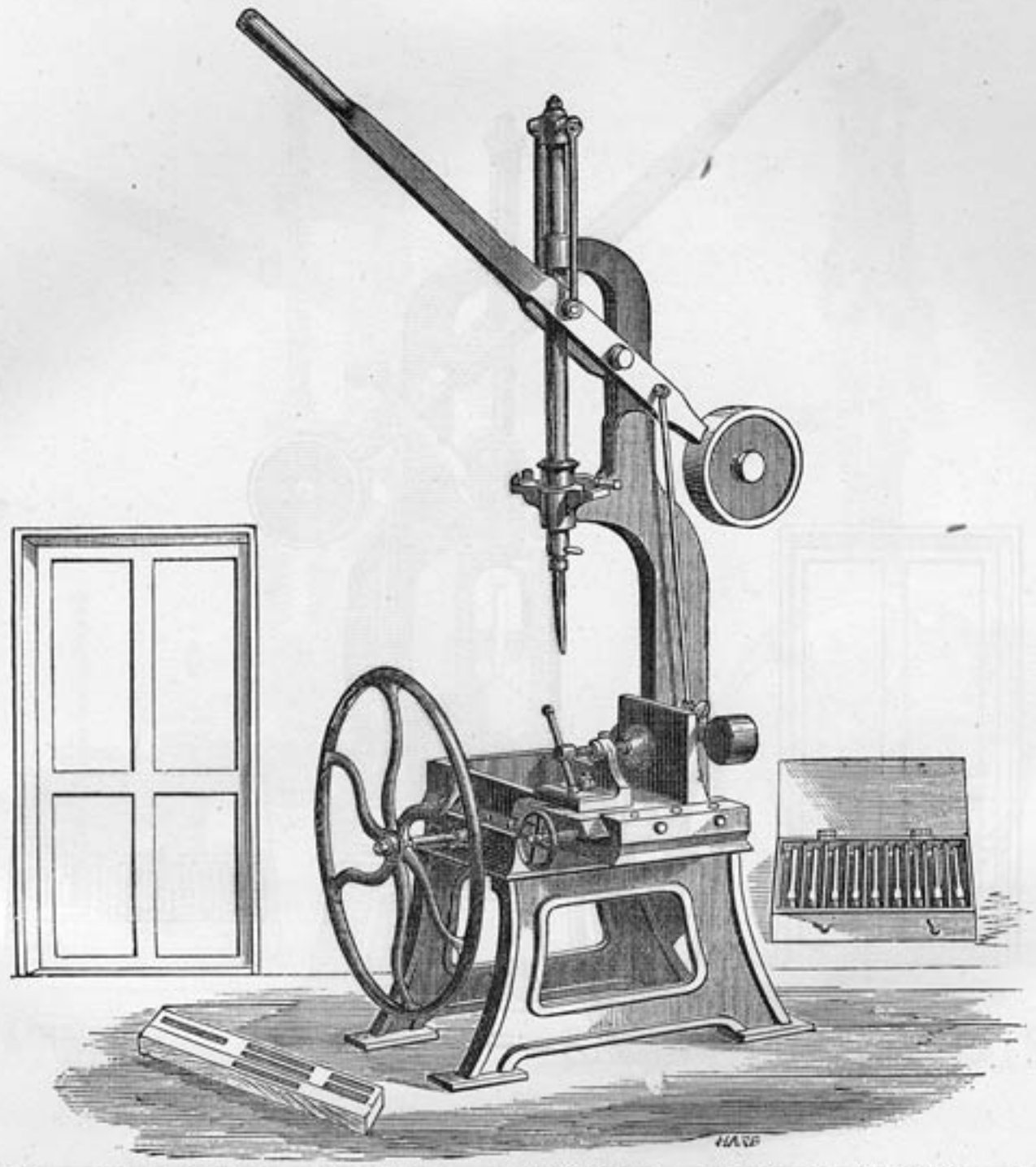
Where a Machine has been well employed, we have in many cases known the cost to be repaid in two months. An average lad can Mortise fifty Four-Panel Doors in a day of ten hours, with far less exertion than would be necessary to work with Mallet and Chisel for the same time, although only producing one-eighth of the work.

Many men will Mortise a door in six minutes, but ten minutes is known to be a fair average, or sixty Four-Panel Doors per day.

It should also be borne in mind that the work is not only done much quicker, and consequently cheaper but is also much better than hand work, whatever time may be spent upon it by the most skilled workman.

To use these Machines, skilled labour is altogether unnecessary; this is one of their great advantages. Skilled labour can be better employed where Machines are inapplicable.

In calling attention to the descriptions of the Machines on the three following pages, we advise that, whenever practicable, one man or lad only in a shop should be allowed to use them, on the simple ground that no tool used indiscriminately is ever kept in good order, therefore cannot be worked with proper advantage.



IMPROVED PATENT HAND POWER MORTISING MACHINE,

FOR HARD AND SOFT WOODS,

WITH SELF-ACTING FEED MOTION.

THIS Machine is capable of doing every description of Mortising, in any kind of Wood, for Builders, Joiners, Cabinet Makers, and others; with it a lad can do as much as eight skilled workmen with the old plan of Chisel and Mallet, and of far better quality.

With ordinary attention it is impossible to make a Mortise out of truth.

Being constructed entirely of iron, and every part of great strength, the machine cannot get out of order; its use is very simple, and will be understood at a glance.

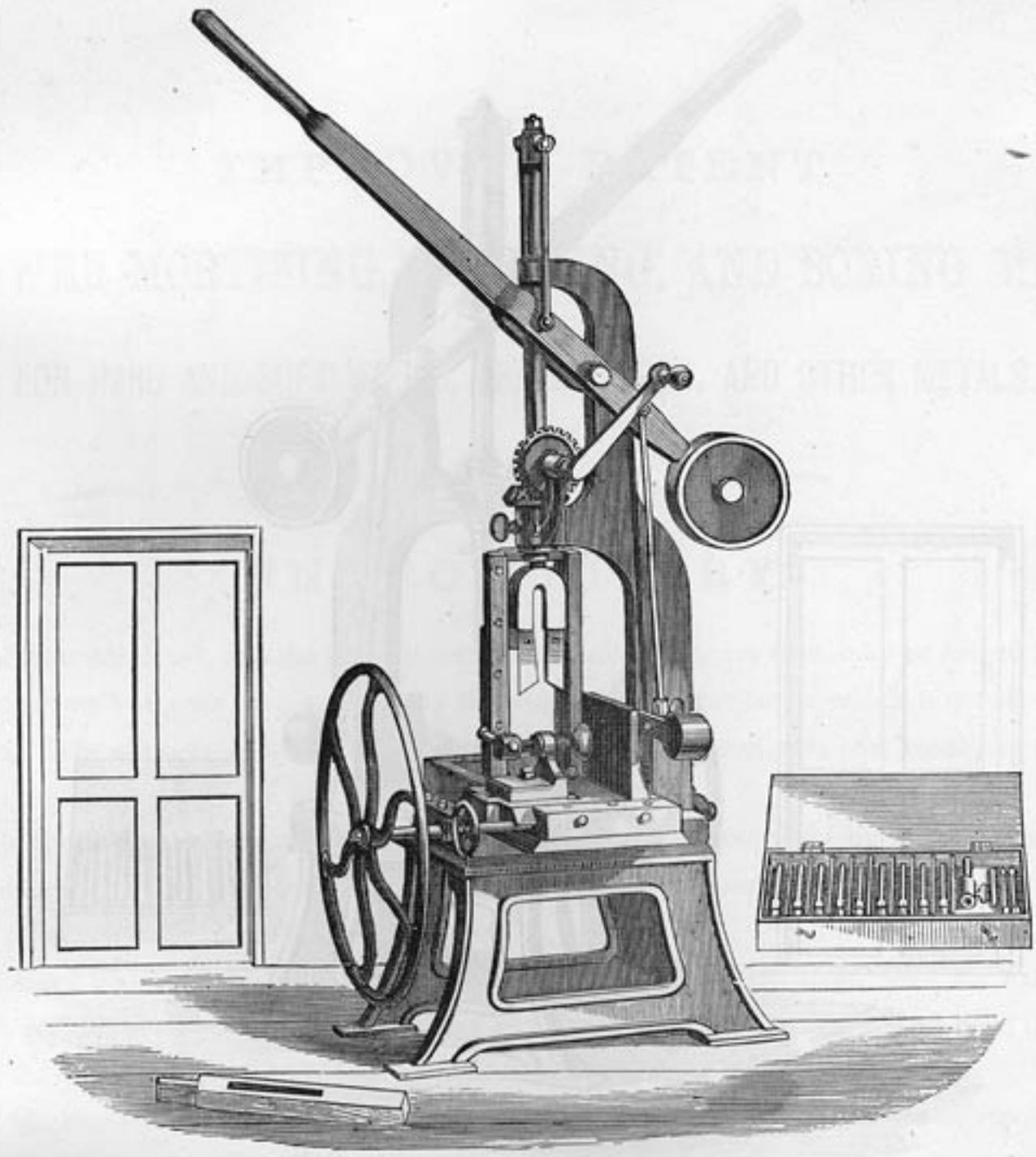
The Self-Feed Motion in heavy work enables the operator to use both hands to the Lever with great advantage; for lighter work it will not be necessary.

All Tools and parts of the Machine being fitted to steel dies and templates, they can be readily replaced at our works in case of accident or wearing out.

In fixing the chisel to start work, press it lightly up into its socket, as near square as can be judged, make a light cut, then reverse the chisel and see that it falls exactly between the gauge-strokes; once set right, it will never vary in working.

For Wedging, it is simply required to raise one end of the stile, and make the wedge-cut, before removing the wood from the machine.

The price includes all tools, consisting of eight Best Cast-steel Chisels, one Core-driver, one Drift for striking out Chisels, and two Spanners to fit all nuts.



IMPROVED PATENT HAND POWER MORTISING, TENONING, AND BORING MACHINE,

FOR HARD AND SOFT WOODS, AND BORING WOOD AND IRON,

WITH SELF-ACTING FEED.

This is the only Patent in the United Kingdom for doing these different kinds of work by one Machine.

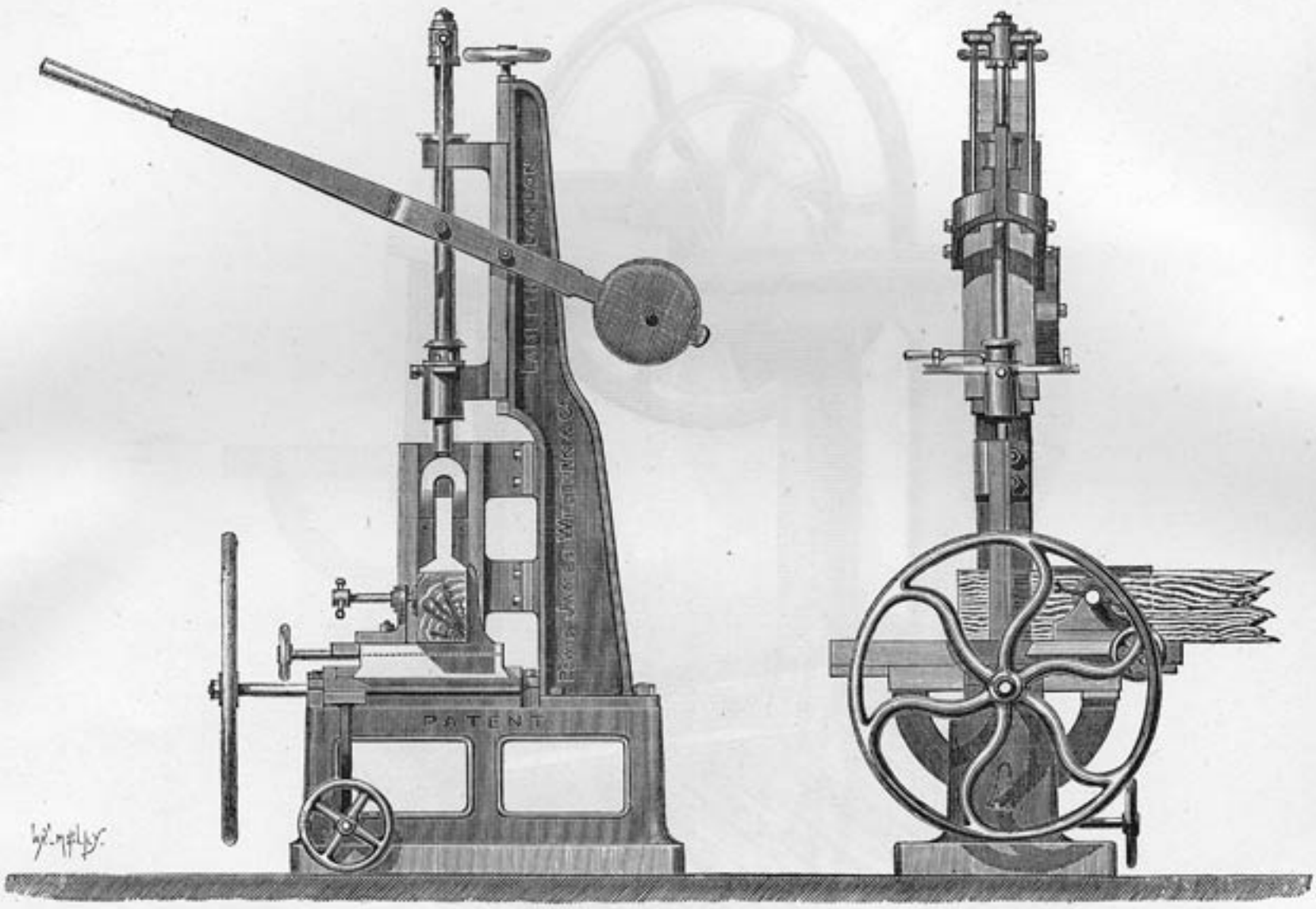
AS a Mortising Machine for Builders, Joiners, Cabinet Makers, and others, this is precisely similar to the one described on the previous page, but it has additional appliances for Cutting Tenons, and either Boring in Wood or Drilling Iron, both of which operations are performed with great rapidity and absolute truth, thereby rendering the machine increasingly valuable at a trifling extra cost; that these extra appliances are much valued may be gathered from the fact that nearly ten of these combined Machines are sold for one to mortise only. The time occupied in cutting a Tenon four inches and a half long on a $4\frac{1}{2}$-in. door rail is half a minute.

The pin of the Tenoning Knives holder fits into the Chisel Socket; the operation of Tenoning is the same as Mortising, excepting that in this case the wood is cut away on the outsides, leaving the Tenon in the centre. This operation is much facilitated by the use of the Self-acting Feed.

For Boring, the Auger or Centre-bit Head, is also placed in the Chisel Socket, the pin in front withdrawn, and motion given by the handle.

For other instructions in use, see Mortising Machine on opposite page.

The price includes a full set of Tools, consisting of eight best Cast-steel Chisels, pair of Tenon Cutting Knives to shift to any size, one Drill for Iron, one Auger, one Socket for Centre-bits, one Core-driver, one Drift for striking out chisels, and two Spanners to fit all the nuts.

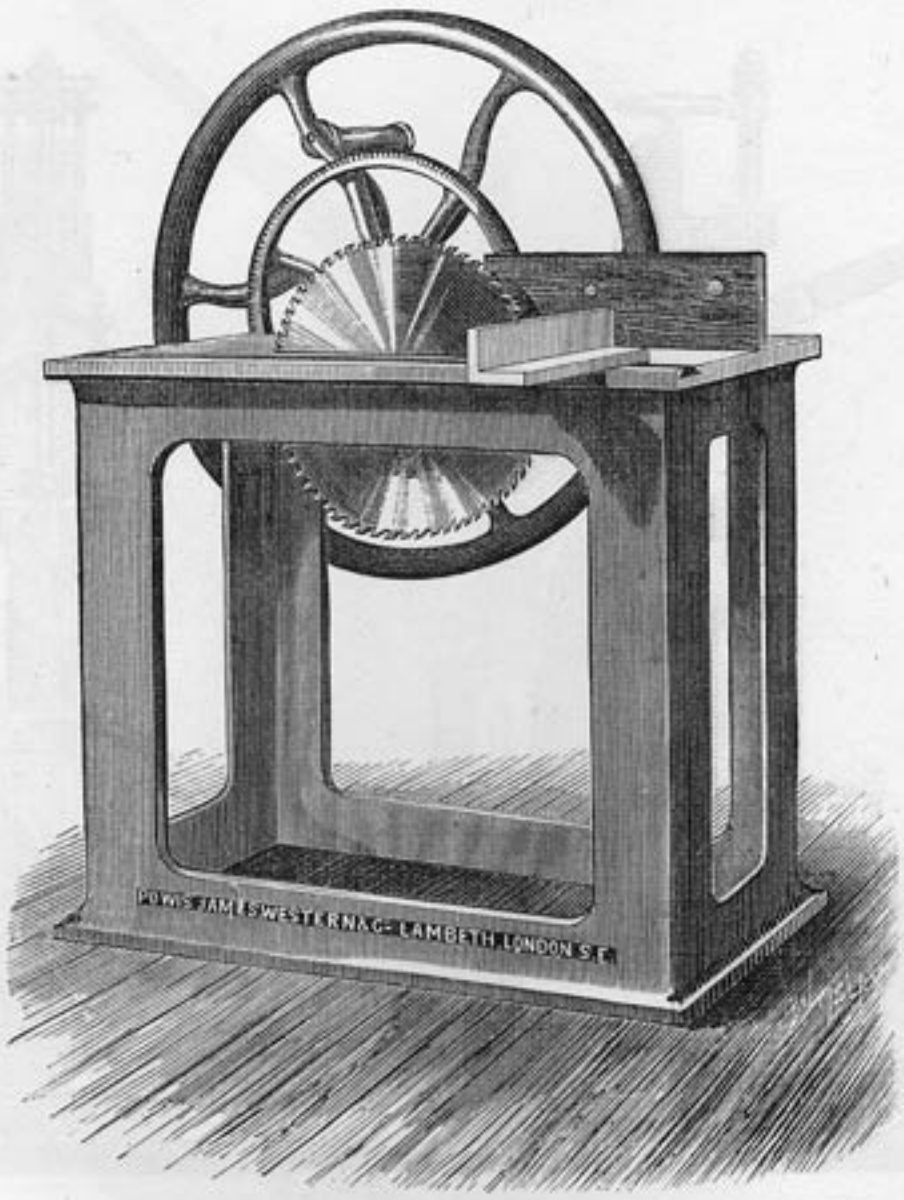


NEW PATENT HAND-POWER MORTISING, TENONING, AND BORING MACHINE,

WITH CANTING TABLE.

THIS will be found a very superior Machine for Mortising, Tenoning, or Boring by hand-power, and it is the kind we recommend to Ship Builders, Engineers, Cabinet Makers, Contractors, &c A novel and valuable feature in this machine is that means are provided for readily canting the Table, so that Mortises and Tenons can be cut and holes Bored at an angle. This can be done in either direction by simply turning the small Hand-wheel near the floor, and a steady Pin is provided to set the slide again in a true horizontal position. This arrangement saves the necessity of raising the ends of the Wood in order to make the Wedge-cuts, as in the ordinary Machines. The Lever with the Spear is carried on a Slide which is adjustable up and down by means of a Screw and Hand-wheel at top of the column, so as to suit various depths of Mortises. All the parts are made to Templates, and can be replaced at any future time.

The price includes a full set of Tools, the same as are given with the Machines on the previous pages.



HAND POWER JOINERS' AND CABINET BENCH

FOR SAWING, GROOVING, REBATING, TONGUEING, CROSS-CUTTING, MITREING, &c.

THE success of machinery, when driven by steam power, for accomplishing most of the operations required in working wood, whether for plain or ornamental purposes, has naturally led to a desire on the part of large numbers to reap all the advantages possible from machinery as far as hand power can be made available.

The results which have been so highly satisfactory in the case of our Patent Hand Power Mortising, Tenoning and Boring Machines, Mitreing Machine, &c., have until now not been attained in the case of Saw Benches.

To supply this want, we have introduced the above simple and efficient Bench for Hand Power, taking care to construct it so that a slight alteration will make it available for Steam Power.

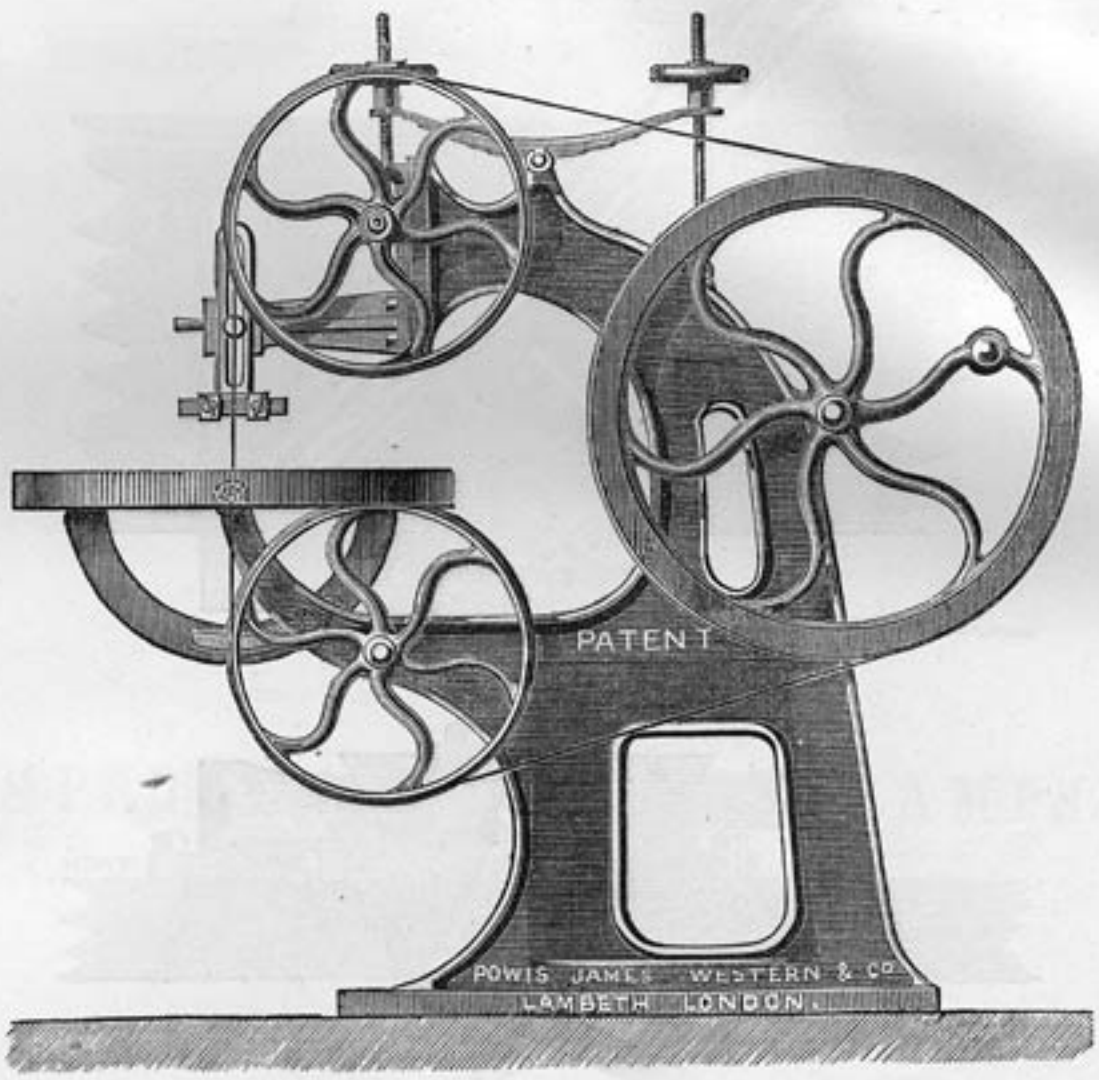
It is easy of management, and capable of doing a large amount of work with a nicety and exactness not attainable by ordinary tools, and at such a saving in cost as cannot fail to render its wide adoption certain.

The Bench being of iron and cast in one entire piece is of great durability and cannot get out of order.

It is constructed to carry a Saw up to 16 inch diameter, and each Bench is fitted with a sliding Plate with angling fence for Mitreing, &c.

No. 1.—With Fixed Spindle. Price includes one 12 inch Saw and a Double Spanner.

No. 2.—With Rising and Falling Spindle. Price includes one 12 inch Saw, and one 8 inch Drunken Saw for Grooving, and a Double Spanner.

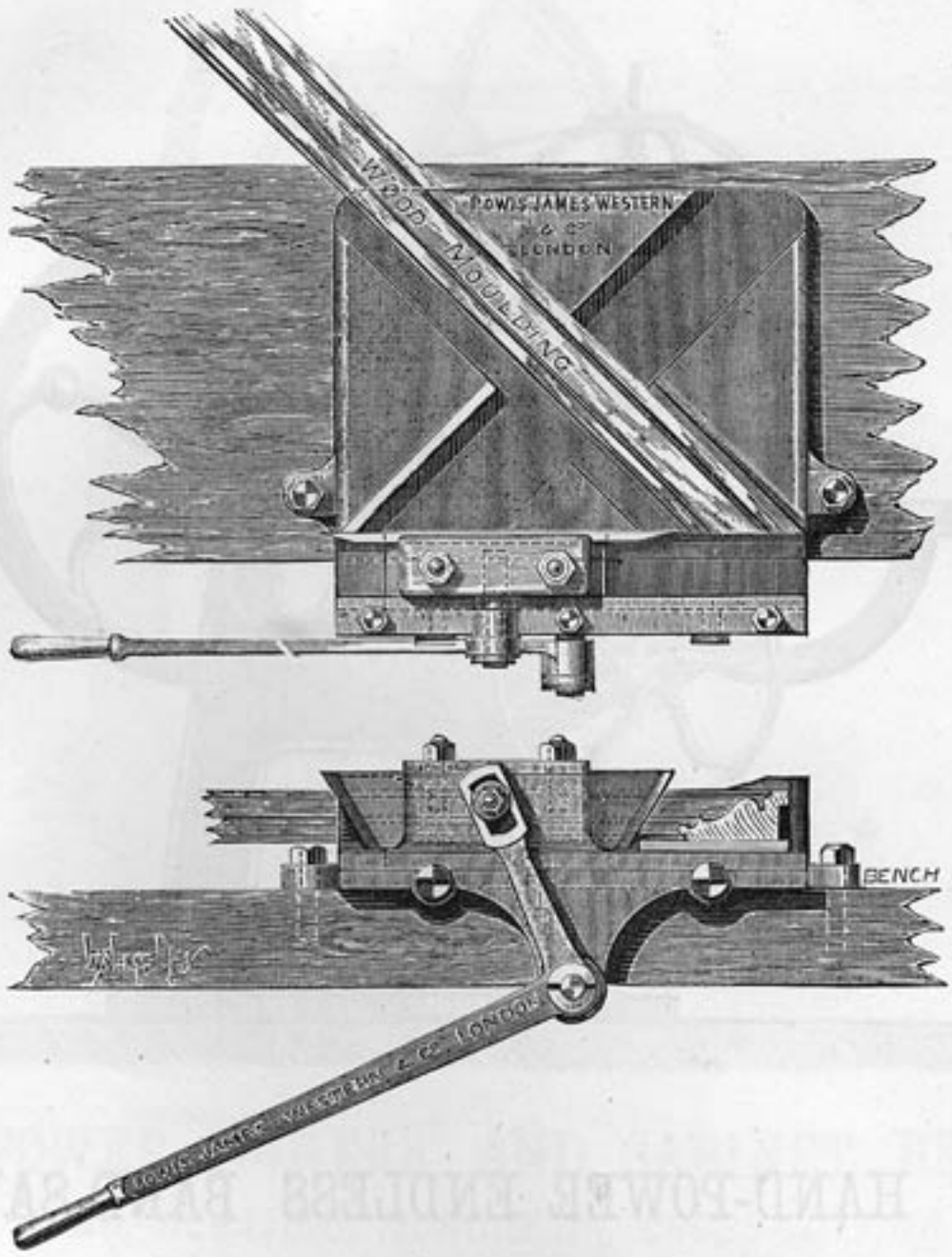


NEW PATENT HAND-POWER ENDLESS BAND-SAW MACHINE.

THIS Machine, which is specially meant for use in shops where there is no Steam, is fitted up in just the same style as the larger Machines described on pages 102 to 108; and is also supplied with our Patent Compensating Spring Arrangement for reducing the tension and preventing the breakage of the Saws. This Spring Arrangement is the more invaluable in these Hand-power Machines, inasmuch as a Machine turned by hand can never be worked as steadily and regularly as by Steam Power. The power required to work one is very small indeed, and any lad can soon learn to saw with it. It is capable of Cutting up to 4-ins. thick; and the special arrangement of the Pullies allows a large space for moving the Work about. The Table is made to cant to cut Bevelled Work.

The Machine is so constructed that, at a small cost, it can be altered to drive by Steam Power.

The Price includes two best French Band-Saw Blades and a set of Spanners.



NEW PATENT UNIVERSAL MITREING MACHINE.

THIS machine will cut mitres in wood up to 4 in. wide by 2 in. thick, and cut in either direction.

The edges of gilt, as well as the rebates in Bolection mouldings, are left perfectly clean without breakage.

The wood is easily held by the left hand, whilst the cut is made with the right.

The object of this machine is to cut a true mitre at one stroke, so that no planing or other fitting is necessary, however particular the work.

The time saved by its use is so great, that it would generally repay the cost in one month.

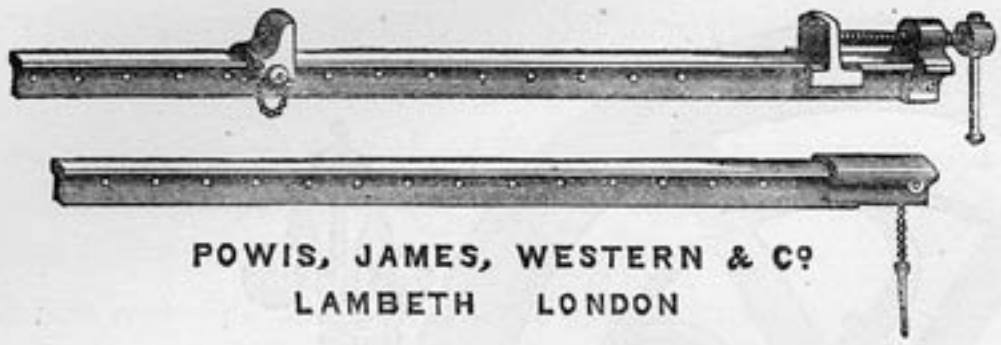
Gilt, veneered, hard wood and other mouldings cannot be cut so clean in any other way. In inlay door mouldings, as compared with a saw, half the time is saved, whilst sawn mitres are far inferior in quality and accuracy of fit, therefore the better the class of work the greater will be the advantages of the machine.

Most leading firms in town and country having adopted these machines, and the fact that no mitre is made without them when practicable, is a sufficient proof of their value.

At a small extra cost these machines are made to cut mitres at various angles.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,
VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.

IMPROVED JOINERS' DOOR AND SASH CRAMPS.

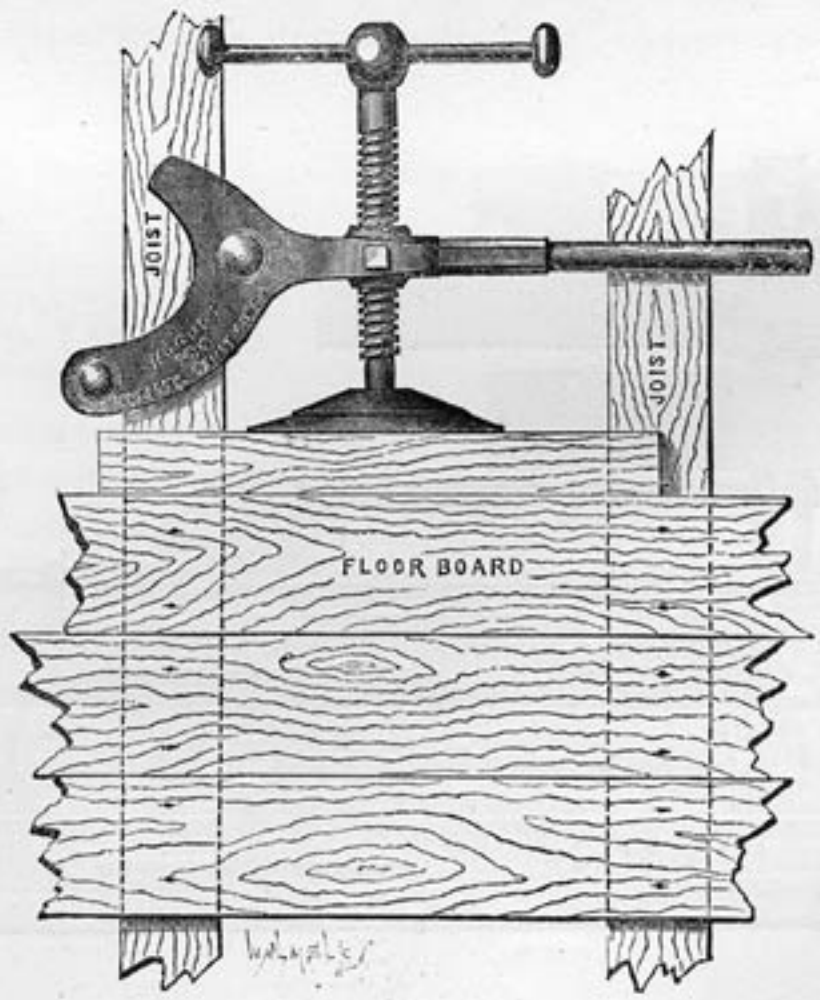


THESE Cramps are of the best and strongest description, with Gun Metal Mountings and T Shape Bars, Warranted.

4	5	6	7	8 feet.
35s.	40s.	45s.	50s.	60s.

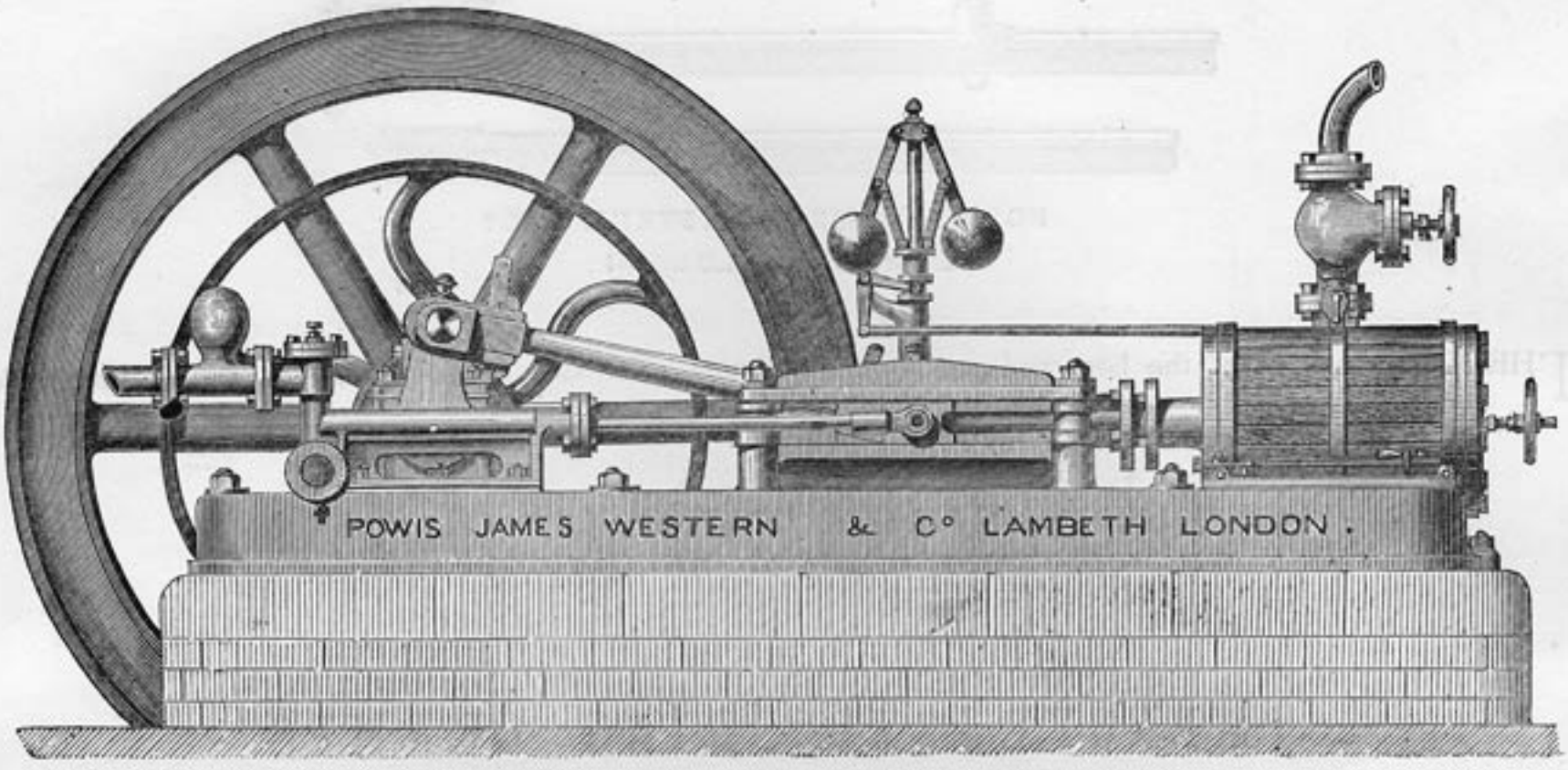
Lengthening Pieces 2s. 6d. per ft.

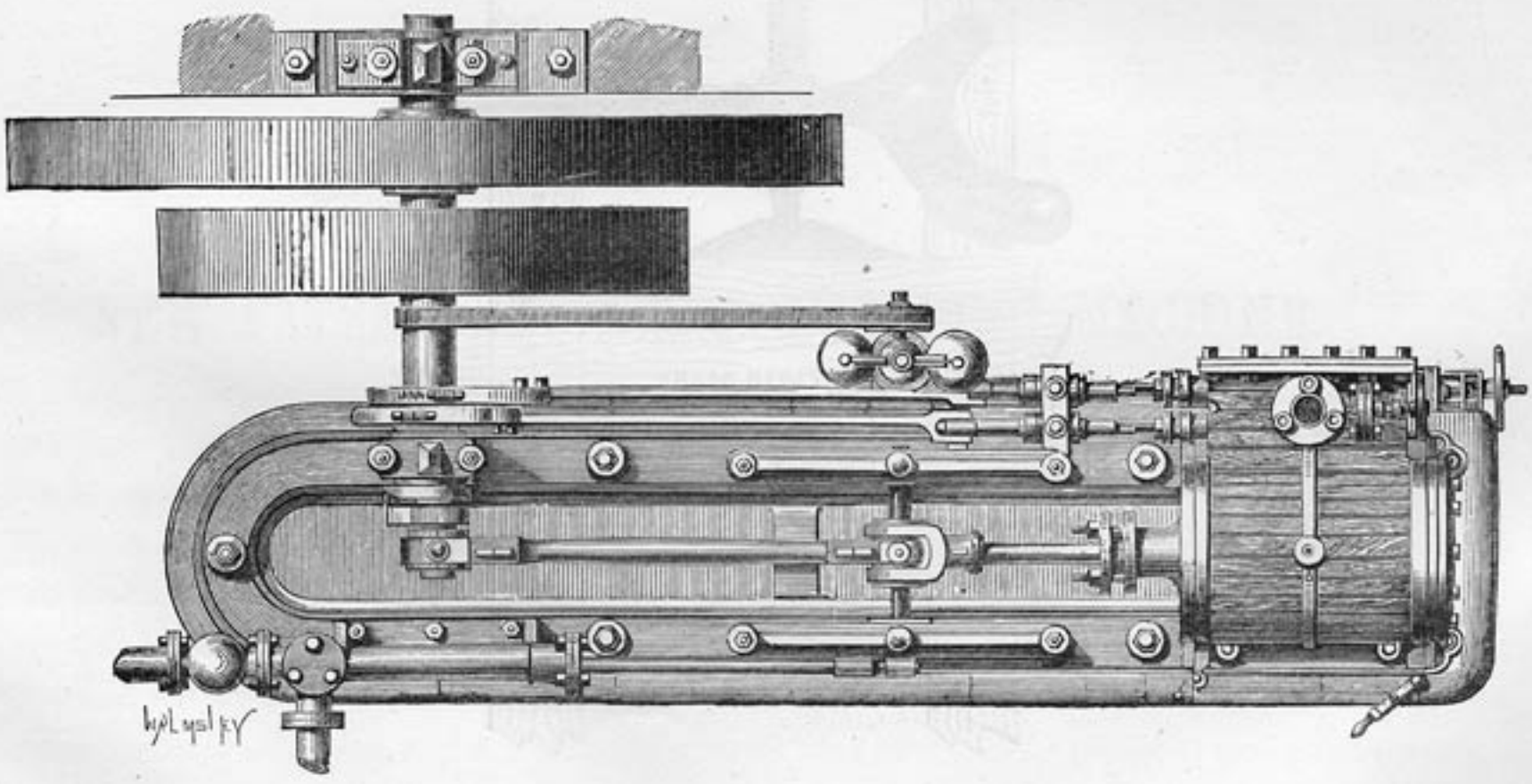
IMPROVED FLOORING CRAMPS.



THIS Cramp is universally approved, on account of its simplicity and strength.
A stock always kept on hand.

Price, per pair—Right and Left Hand .. .. .. 25s.





IMPROVED HORIZONTAL STEAM ENGINE.

IMPROVED HORIZONTAL HIGH-PRESSURE STEAM ENGINE.

THE Horizontal form of Engine possesses advantages which are fully recognised, after many years experience, by the highest authorities and the most practical men. We have therefore no hesitation in recommending it as best adapted for "Saw Mills" and general use.

The importance of design, materials, and workmanship in a steam engine cannot possibly be overrated; on these depend to a great extent freedom from repairs and stoppages which are a constant annoyance and an incalculable loss, to this must be added the unnecessary increase in the daily cost of working, which render an inferior engine dear whatever may have been its original cost.

To all these points we invariably pay the greatest attention, and invite intending purchasers to inspect engines of our construction after many years constant use, and compare them for cost in fuel with the power given out as a true, and, in fact, the only test of cheapness.

All materials used are of the best description only, and every engine is bright fitted. The Cylinder is fitted with Metallic Piston and Steel Piston Rod; the Crank Shaft and Connecting Rod are made of the best scrap iron; the pins are all of steel; the Glands are bushed with gun metal. Each Engine is complete, with Fly Wheel, Pump, Air Vessel, Governors, Throttle Valve, Starting Valve, Blow Through Cocks, Tallow Cup to Cylinder, and Lubricators to all working parts.

Where desired, Variable Expansion gear, Reversing gear, or Condensers can be added at an extra cost.

IMPROVED CORNISH STEAM BOILERS.

OUR remarks as to the great importance of securing the highest quality in a Steam Engine, apply with increased force to Steam Boilers, and cannot claim too much attention, not only property, but life itself, being at stake, where Boilers of common construction are used.

For general purposes the Cornish Boiler has not yet been superseded, whether for Safety, Durability, or Economy; many have returned to its use with advantage after trying other forms.

For Saw Mill purposes it is specially suited, as but little attention is necessary, and Wood, Chips, Shavings and Sawdust may be used for fuel in the place of Coal.

All our Boilers are made of the best Staffordshire or equal brand of Iron, except over the fire-bars, where Lowmoor, or Bowling Iron only is used, and are thoroughly stayed in the most approved and substantial manner.

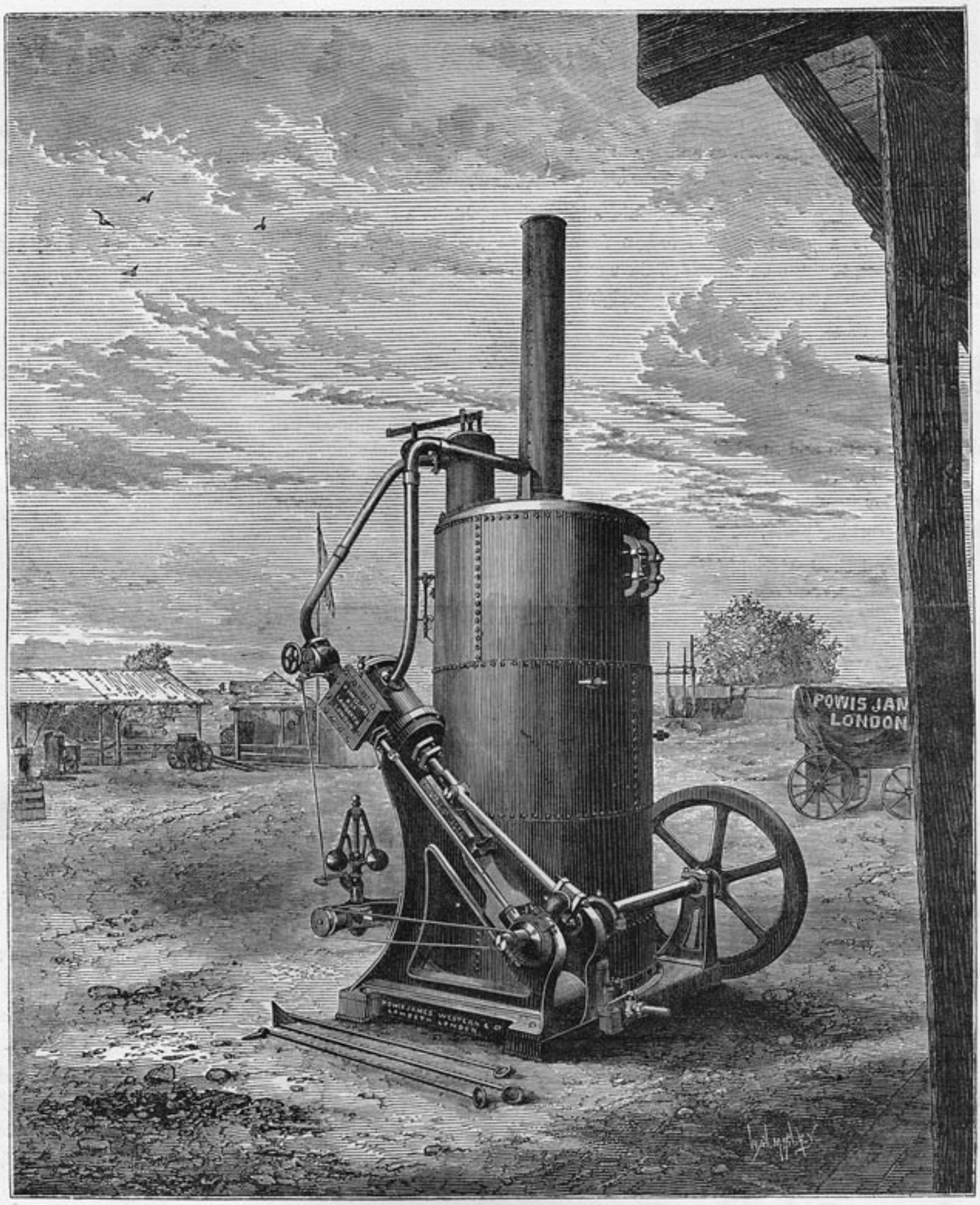
Unless specially ordered, each Boiler is calculated for working at 60 lbs. pressure to the square inch, and is tested to 100 lbs. They are of ample size and fitted with a Steam Chest, Raised Man Hole and cover, Double Safety Valves, Levers and Weights, Glass Water Gauge, Test Cocks, Blow-off Cock, Steam pressure Gauge, Foot or back pressure Valve, Steam Junction Valve, Fire Front and Door, Dead Plate, Bearing Bars and Fire Bars, Foot Plate and Frame for Under Flue, Damper, Frame, Chain, Pulley and Weight, Flue Door and Frame complete.

Locomotive, Vertical and other descriptions of Boilers will be estimated for and supplied.

For Boilers in towns, Smoke Consumers can be fitted at a small extra charge.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.



(*From a Photograph taken at the Royal Agricultural Society's Show at Wolverhampton, July*, 1871.)

NEW PATENT INCLINED HIGH-PRESSURE STEAM ENGINE AND VERTICAL BOILER.

THIS novel and more substantial form of Engine and Boiler presents many advantages beyond simplicity and strength; well worth the attention of intending purchasers.

It combines all the improvements of fixed Stationary Engines with their power and durability; will occupy less space for the same power than the Horizontal Engine, and is of a more convenient form than the Vertical Engine; little or no foundations are necessary, and when required it may be removed and re-fixed by the man in charge without the aid of an Engineer. The expense of fixing is very slight.

This, with its moderate cost, will not only ensure its extensive sale to all ordinary users of steam up to 10 or 12 horse power nominal, but will at the same time serve to greatly extend the general introduction of steam by removing most of the difficulties that has hitherto hindered its wider application.

There is a freedom from vibration not hitherto attained except in fixed Stationary Engines.

For removal or export it does not require to be taken to pieces, but may be conveniently packed with most working parts in position, so that by bolting the standard to the base plate and connecting the steam pipe, it is at once almost ready for work.

The Governors have the most complete and sensitive control over the Engine.

The exhaust is carried directly into the funnel and greatly facilitates combustion and the rapid generation of steam.

A spacious Steam Chest is provided that also reduces the chances of priming to a minimum.

Wood, Shavings, or Sawdust, may be used or fuel as well as coal.

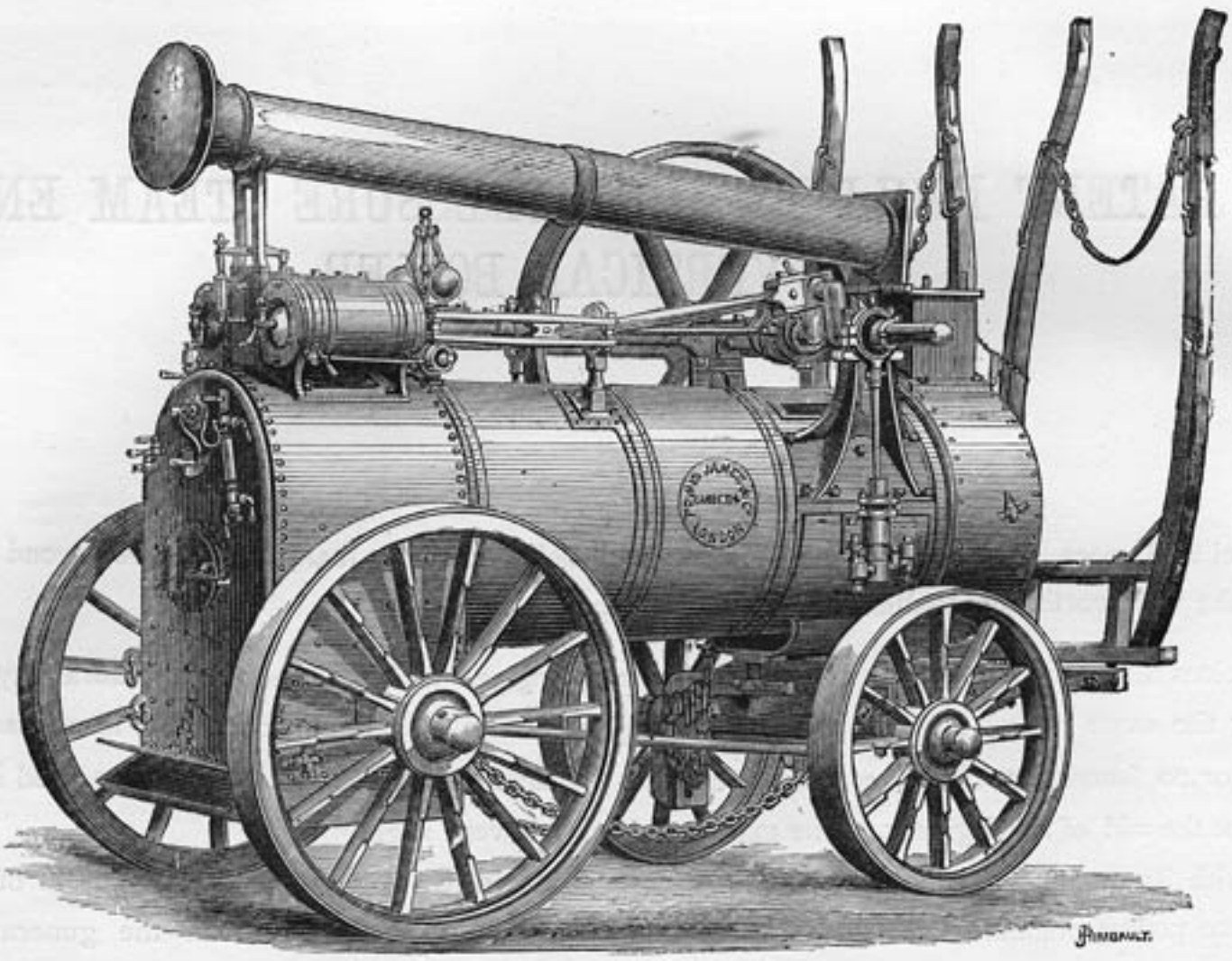
A Water Ash-Pan is contained in the base plate, so that all risk of fire is removed when the Engine and Boiler are placed on an Upper Floor or in a Joiner's Workshop.

The Flywheel is turned, so that it can be used as a driving wheel.

The full advantages of design and construction in this Engine and Boiler are further enhanced by the use of only the best materials throughout and the highest class workmanship.

Special care has been taken to render the whole exceedingly simple, so that it may be at once understood and driven with the greatest ease, and without previous experience.

The price includes all the usual Boiler and Engine Mountings, and Steam and Exhaust Pipes.



IMPROVED HIGH-PRESSURE PORTABLE STEAM ENGINE & BOILER.

THE great variety of uses to which Portable Engines are now applied, their peculiar adaptability (when well constructed) for the purposes of Builders, Contractors, and others, has led us to devote particular attention to every detail in connection with their thorough utility, durability, and economy. The important difference between our engines and the "ordinary" Portable Engines deserves especial attention for the great saving in cost of working. Each Engine is fitted with Patent Variable Expansion Apparatus, by which means the Engineer in charge is able to regulate the exact amount of power required for the work in hand, and thus effect an average saving of nearly one-third in the fuel that would be required for "ordinary" Portable Engines.

Only one Slide Valve and one Eccentric are used to prevent the liability of getting out of order.

Many other important points of superiority will be found in these Engines, each of which has—

Extra strength and size in all wearing parts;

Enlarged Fire Boxes, exclusively of Lowmoor Iron, for burning wood, sawdust, shavings, &c., as well as coal;

Spark Arresters on top of Funnel;

Simple and efficient Reversing Apparatus, so that the engine may easily be made to drive either way;

Continuous Treble Valve Force Pump, with Return Hose;

Improved Water Heater for delivering the water into the Boiler at a high temperature, and at the same time retaining the sediment;

Larger Boiler capacity, with special arrangements for preventing incrustation.

The Governors are most sensitive in action, ensuring perfect regularity of speed.

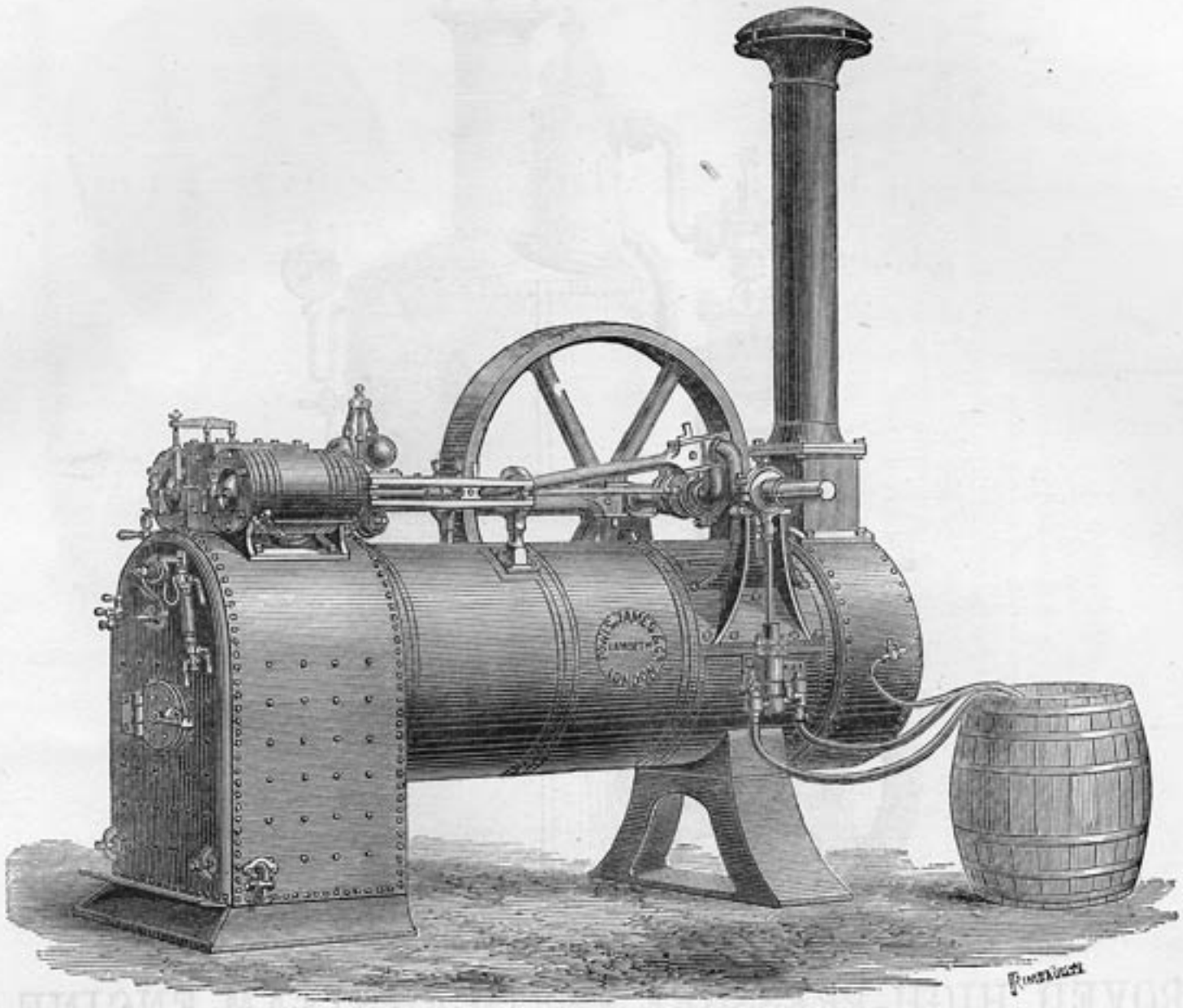
The Cross Heads are of hammered scrap iron.

All Joints, Pins, and Nuts, are Case Hardened.

Materials and Workmanship throughout are of the first class, and the finish unsurpassed.

Each Engine is supplied with Steam Pressure Gauge, Signal Whistle, Lubricators to Cylinder and all working parts, Safety Valve and Spring Balance, Second Lock-up Safety Valve, Slipper and Chain, Checking Chains, Spanners, Firing Irons, Tube Brush, Suction Return and Water-heating Pipes, Oil Can, Water Funnel, and Waterproof Cover.

When desired, Link Motion may be added at small extra cost.



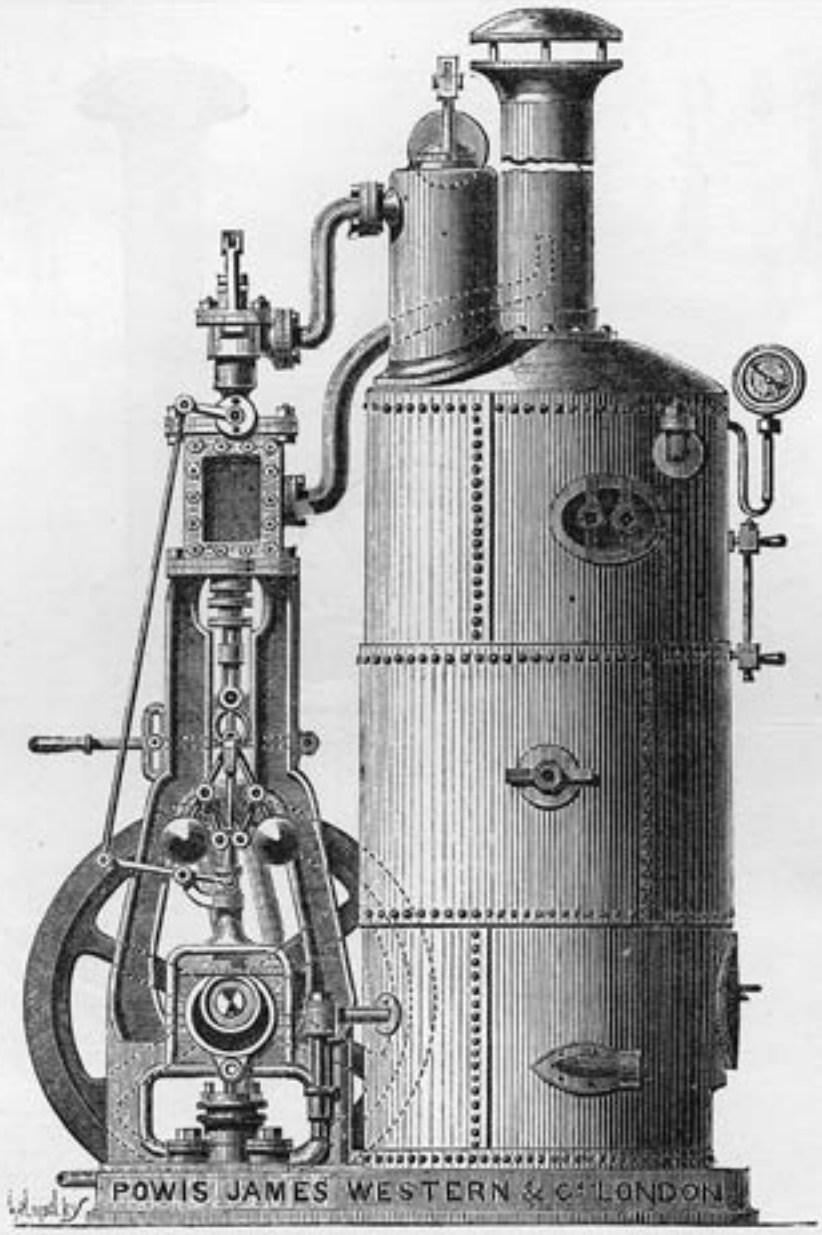
IMPROVED SEMI-PORTABLE HIGH-PRESSURE STEAM ENGINE AND BOILER.

THESE Engines are well adapted and often advantageously used in the place of Fixed Engines and Cornish Boilers, particularly where space is an object, or a removal may be contemplated. They are also fitted with Patent Variable Expansion Apparatus for Economising Fuel, and are, in every other respect, similar to the Improved Portable Engines described on opposite page, but, instead of having a Carriage and Wheels, the Engine and Boiler is mounted on Strong Iron Saddles or Pedestals; that under the Fire-Box forming a Tank for Water, so that they may be fixed on any floor with perfect safety. In other cases little or no foundation is necessary beyond a solid and level bed, which may be of any available material.

The Price compares favourably with that of Portable Engines, whilst, as in those, a double ended Crank Shaft is supplied suitable for receiving Pulleys on either end for driving any kind of machinery; the same Boiler capacity and Cylinder area is given, Water Heater, Continuous Feed Pump, and Reversing Apparatus. The Fire Box is equally adapted to burn the waste of the mill and yard. The Funnel when required may be made sufficiently long to pass out through the roof of the building where the engine is placed.

The same requisites are supplied as with the Portable Engine, excepting waterproof cover, which is unnecessary in this case.

Link Motion Gear may be added at small extra cost.



IMPROVED HIGH-PRESSURE VERTICAL STEAM ENGINE AND BOILER.

THIS form of Engine and Boiler has many advantages which renders it desirable, and we find an increasing sale from the general satisfaction given. Compared with Stationary or Portable Engines the cost is considerably in their favour; they may be fixed and started in a few hours, requiring little or no brickwork or chimney shaft. For warehouses and other places where space is an object, they are peculiarly well adapted, an eight-horse power Engine and Boiler only occupying a space of 7 feet square.

The Funnel may be directed into an ordinary house flue, or it may be made sufficiently long to pass out through the roof of the building.

For Shippers these Engines may be packed with nearly all their working parts in place, sent out, set up, and started at once, with only the trouble of making a single Steam Joint.

It is important to notice a great difference between these and ordinary Engines of this class. They are not fixed to the Boiler, but carried on separate Standards, which are firmly bolted to the Base Plate, so that the Boiler plates are free from any injurious strain, and the working parts of the Engines from expansion by heat.

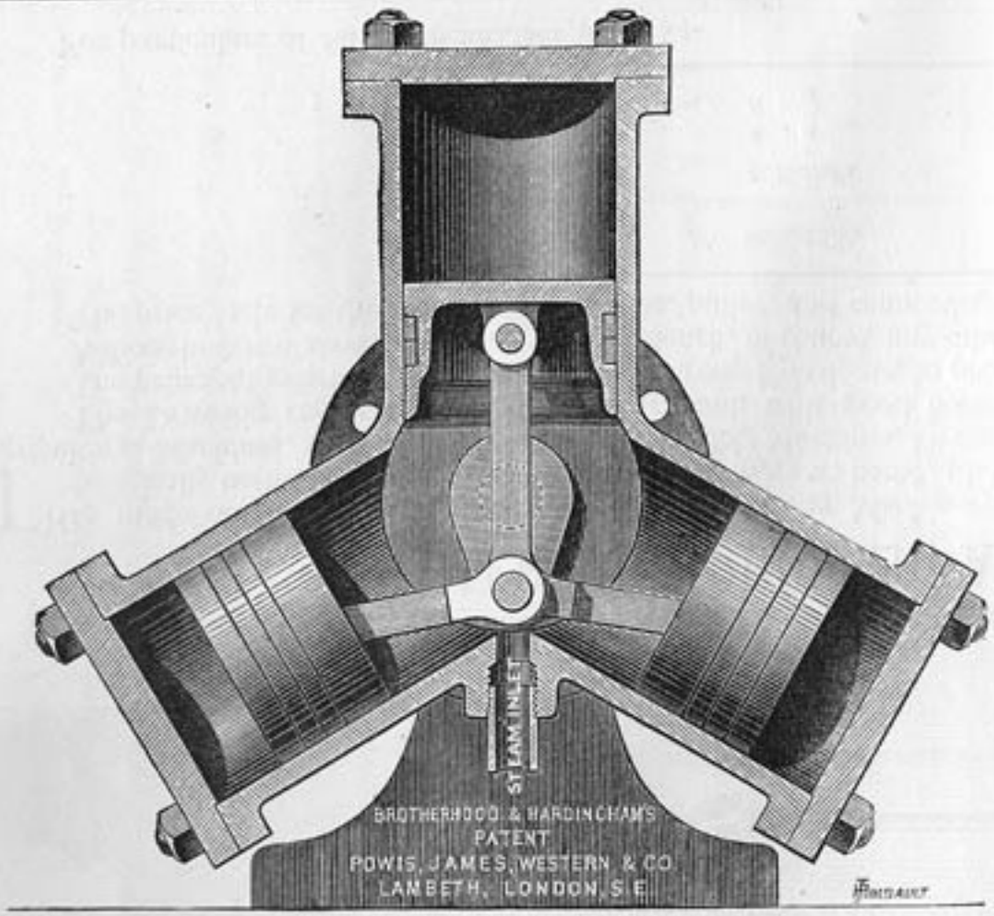
The engines are well made in every part, and of best materials. The whole is most simple, compact, direct, and efficient in action, and may be worked by a lad after a few hours' instruction.

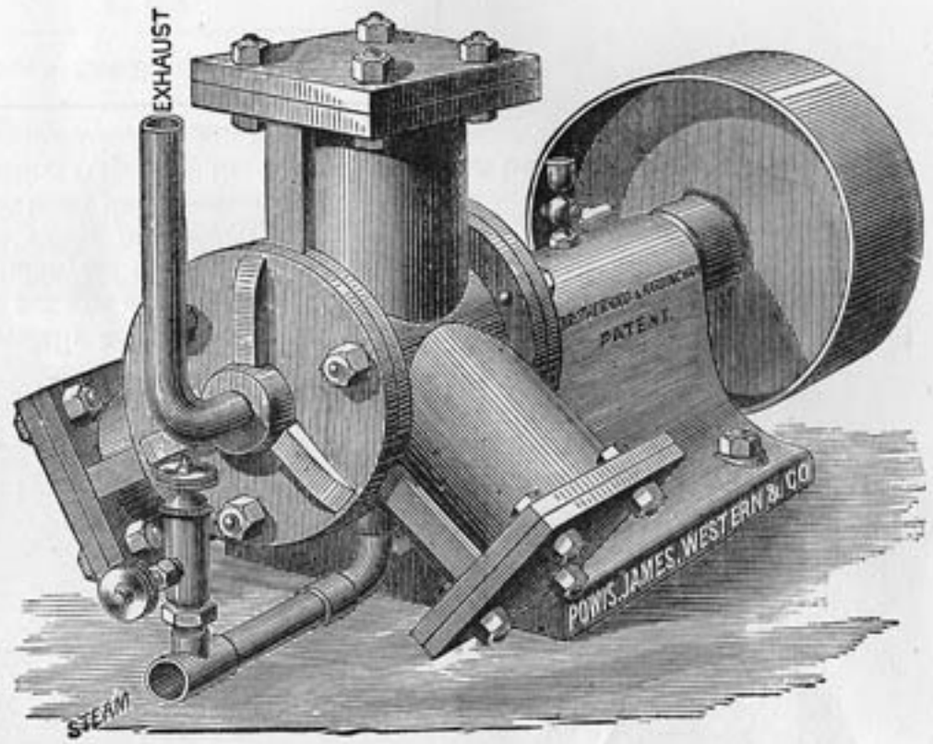
All usual and necessary fittings are included in the price—Glass Water Gauge, Pressure Gauge, Safety Valve, Gauge Cocks, Blow-off Cocks, Stoking Irons, &c.

The Fly Wheel may be placed on either side, by which arrangement an extra Pulley may be used to drive other machinery. An extra standard and bearings not shown in the drawing are supplied with the medium and large sizes, to carry the outer end of Crank Shaft.

The Boilers are of the most approved form for generating Steam rapidly with small consumption of Fuel, for which purpose Wood, Shavings, and Sawdust may be used, as well as Coal. They are tested, before leaving the Works, to double their working pressure.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,
VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.



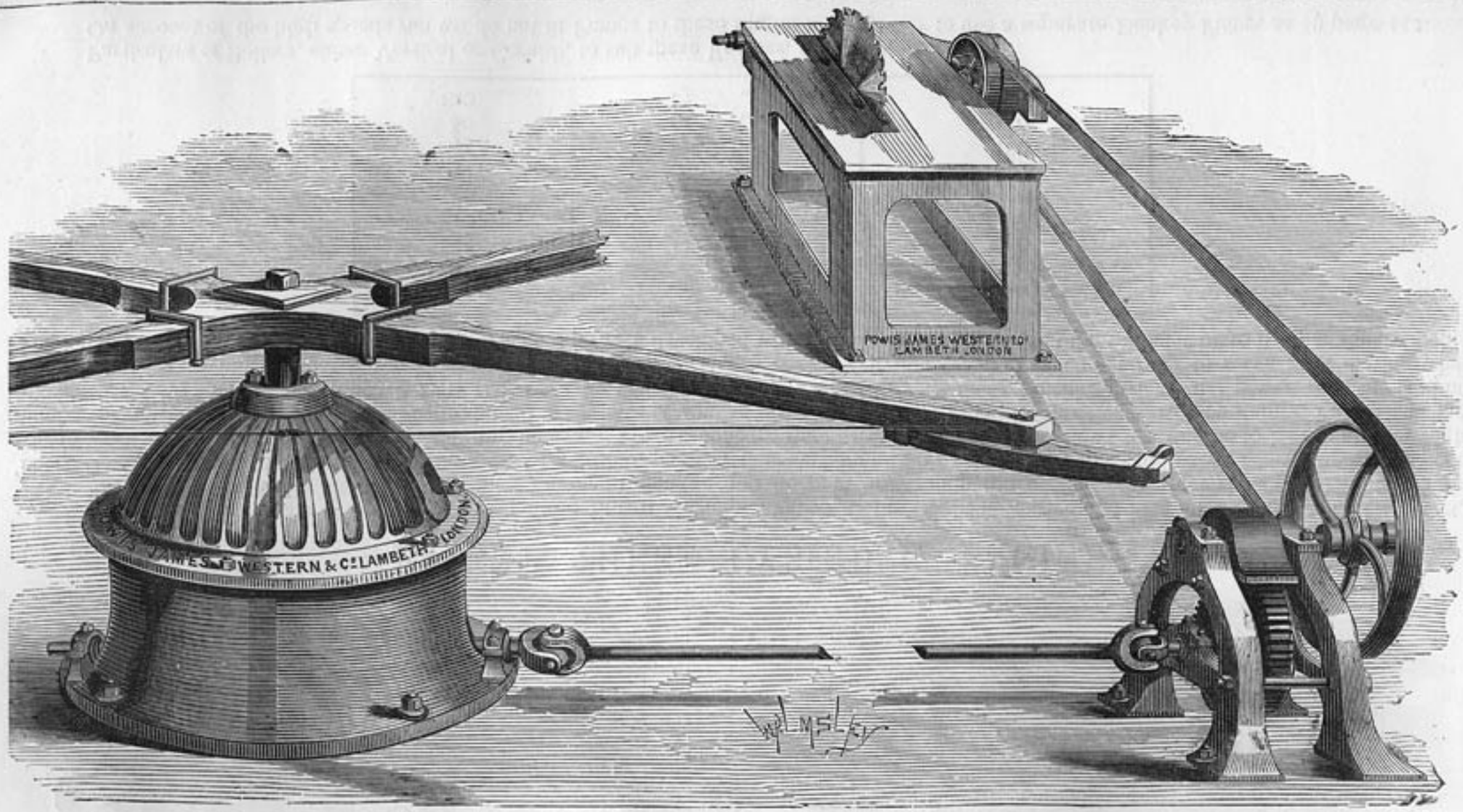


PATENT THREE CYLINDER ENGINE.

ALTHOUGH this Engine is constructed with three Steam Cylinders, which at first sight may give the idea of complication, yet in fact, it has fewer parts, and is altogether a simpler Engine to manage and keep in order than the ordinary Single Cylinder Horizontal Engine. There is only one joint to be kept tight where the Crank-Shaft passes; there are no piston rods and only one slide valve, which requires no eccentric to work it, and supplies steam to all three Cylinders. The peculiar arrangement of the Cylinders allows this Engine to be run at a far higher number of revolutions than has before been attained in Engines of similar size, thus specially fitting it for driving Rotary Pumps, Fans, Centrifugal Machines, &c. The speed at which it runs renders a fly-wheel unnecessary when driving these Machines where the power requisite is almost uniform, but for driving Circular Saws, Moulding Machines, &c., we supply one, the circumference of which is turned to serve as a driving wheel. The horse powers given below are the actual indicated powers developed with a mean steam pressure in the Cylinder of 40 lbs. per square inch.

Horse Power.	Diameter of Cylinders.	No. of Revolutions per Minute.
5	$3\frac{1}{2}$ Inches	600
10	5 „	400
20	7 „	300
35	9 „	225
55	$11\frac{1}{2}$ „	180
80	14 „	150
120	17 „	120

Particulars of Boilers, either Vertical or Cornish, to suit these Engines, sent on application.
On account of the high speeds run we do not fit Pumps to these Engines, but prefer to use a separate Donkey Pump, as on page 142.



IMPROVED HORSE AND BULLOCK GEAR.

THIS mode of driving Sawing and other Wood-working Machinery, is specially adapted for use in the Colonies or new countries, but will be equally useful to Country Gentlemen and Farmers at home, who have not got any steam power. When not in use for Sawing, small Agricultural Machines, such as Chaff-cutters, Thrashing Machines, Dressing Machines, &c., can be driven by it.

The Drawing represents a 4-horse gear, and, with good horses, will drive a 30-inch Circular Saw.

The principal gearing is all contained in a strong iron dome, to preserve it from the weather and accidents.

Although shown above as driving a Saw Bench, of course, any other Machine requiring the same power can be driven by it equally well.

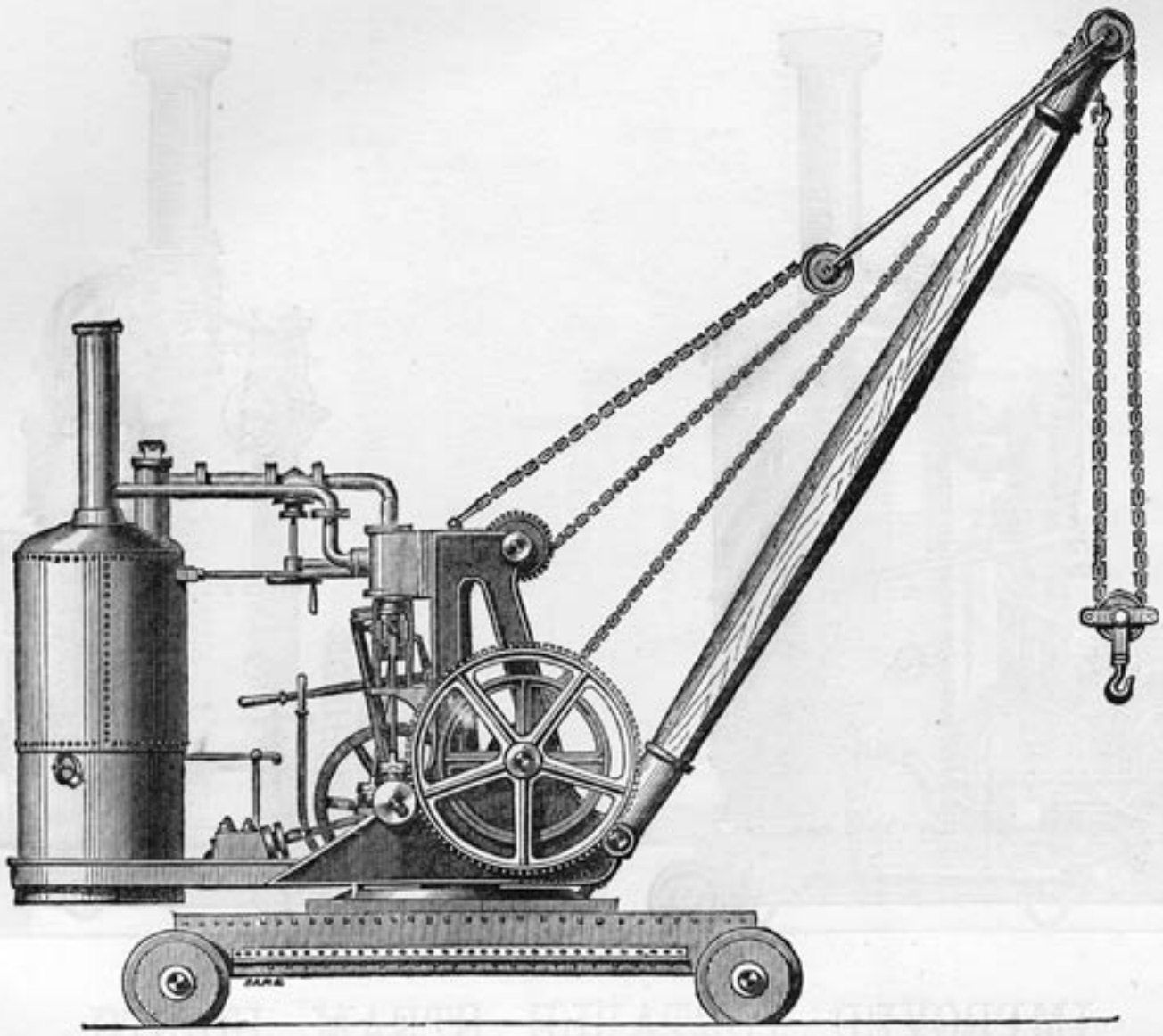
The price includes the Intermediate motion, pulley, and connecting shaft.

No.	Suited for.	Size of Saw Bench will drive.
1	2 Horses	20 inch.
2	4 „	30 „
3	6 „	36 „

For particulars of Saw Benches, see page 54.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.



IMPROVED PORTABLE OR FIXED STEAM CRANES.

WE wish to call attention to several particulars in which this is superior to the common class of Cranes. The Boilers which are made of the best Staffordshire and Lowmoor iron are carried on a platform some distance off the centre pillar so as to help the better to counterbalance the load. The centre pillar is of wrought iron. The cranes are made to hoist, lower, and radiate in either direction by steam and are reversed by link motion. The starting and reversing handles and foot traps are conveniently placed to be under easy control of one man. These cranes may be had "portable" as shown in the drawing, mounted on a strong wrought iron carriage with either flanged or broadway wheels, or "fixed" for use on wharfs, ships' decks, &c. In this latter case the centre pillar or crane post is made considerably longer, for fixing permanently in the brick or stone foundation. The pattern of this is not quite the same as shown above, a drawing will be sent on application. For fixing on ships' decks they may be had without the Boiler.

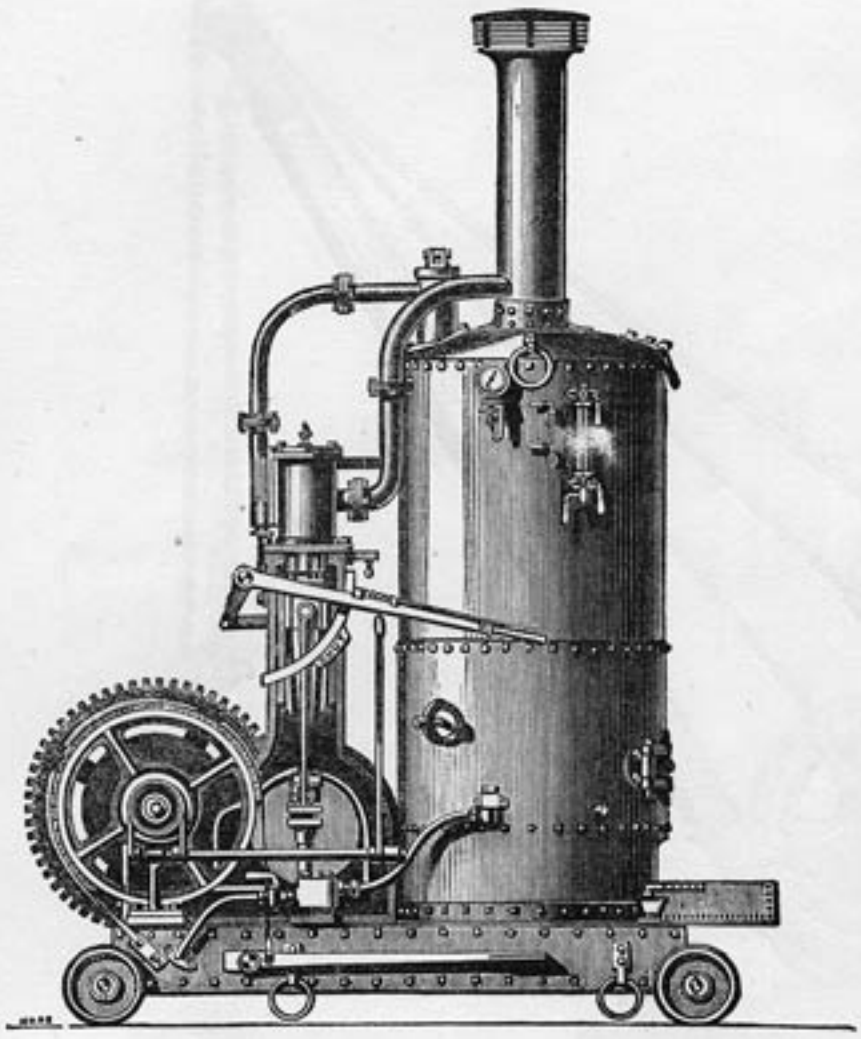
No. 1.—Single Cylinder to lift 2 tons.
No. 2.—Double " " 3 "
No. 3.— " " " 4 "

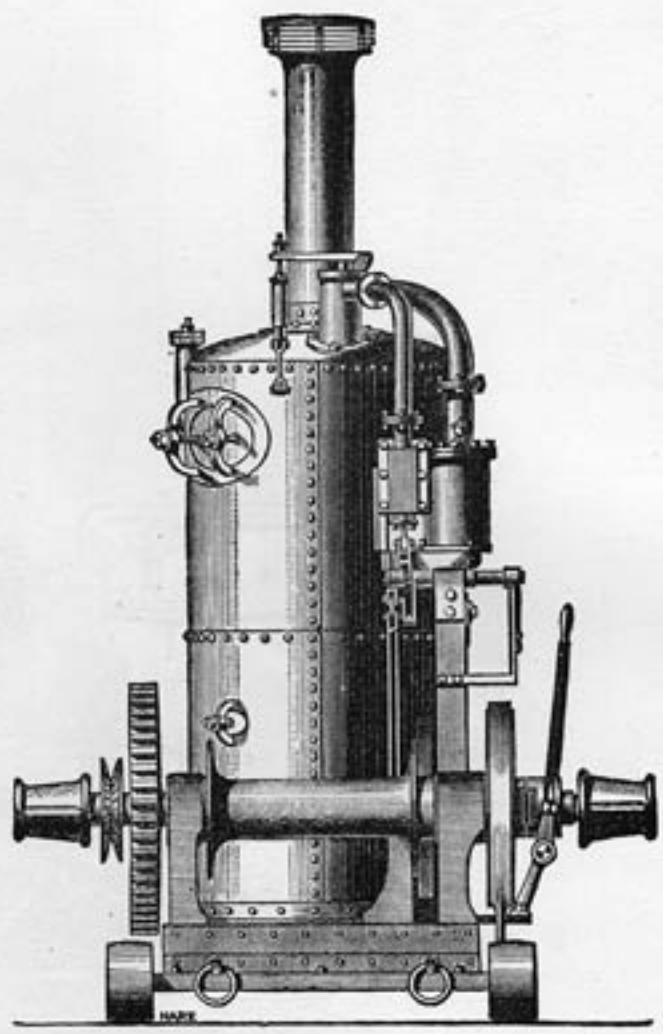
No. 4.—Double Cylinder to lift 5 tons.
No. 5.— " " " 6 "
No. 6.— " " " 7 "

Special Quotations given for larger Sizes.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.





IMPROVED PORTABLE STEAM HOISTS,

FOR BUILDERS AND CONTRACTORS AND FOR USE ON SHIPS' DECKS AND WHARVES.

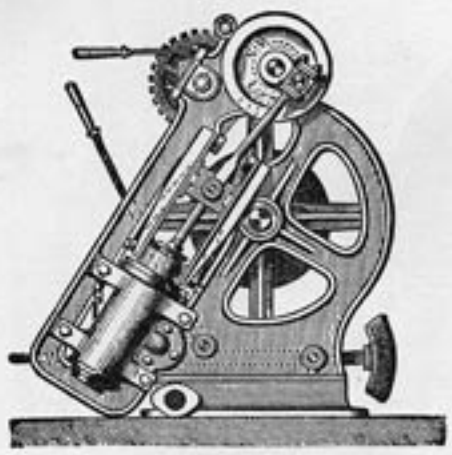
THESE Hoists are simple and easy of management, and great attention being given to the fitting and adjustment of the working parts they cannot easily get out of order, and it is unnecessary to employ skilled labour to drive. Each Engine is supplied with Link Motion for reversing, and a powerful Friction Brake, and is calculated to raise loads up to the heights specified at a speed of from 40 to 50 ft. per minute.

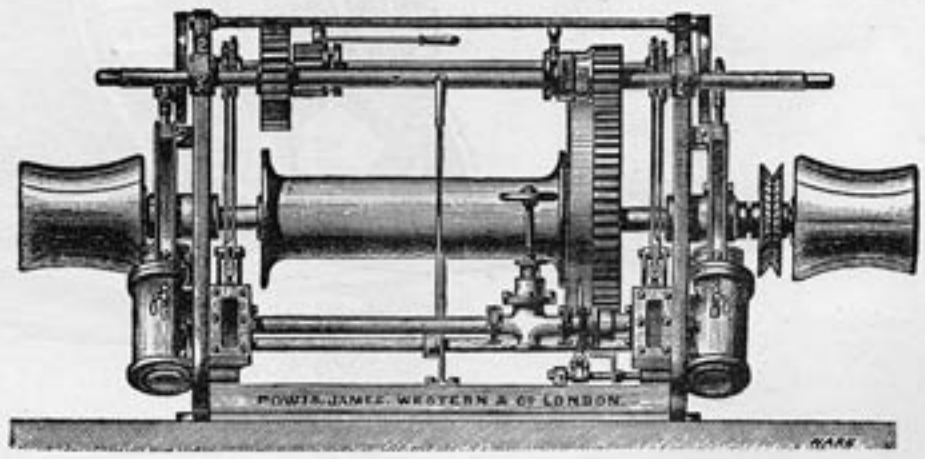
The Boiler is provided with Cross-tubes rivetted to the shell of the Fire-box instead of the ordinary vertical tubes which are continually leaking, and is supplied with all the usual gauges, valves, and other mountings.

The wrought iron Carriage on which the Engine and Boiler are fixed, serves also as a Water Tank for the Boiler pump to draw from. It is mounted on iron wheels, which may either be flanged or plain as shown above.

No. 1.—To lift..... 12 cwt.	No. 3.—To lift..... 35 cwt.
„ 2.— „ ..... 22 „	„ 4.— „ ..... 45 „

Special prices given for larger sizes.





IMPROVED STEAM WINCH.

FOR SHIPBUILDERS, WAREHOUSES, CONTRACTORS, &c.

ALL the parts of these Winches are of ample strength to withstand the rough usage they often receive, and the workmanship and material used will be found equal to any London maker.

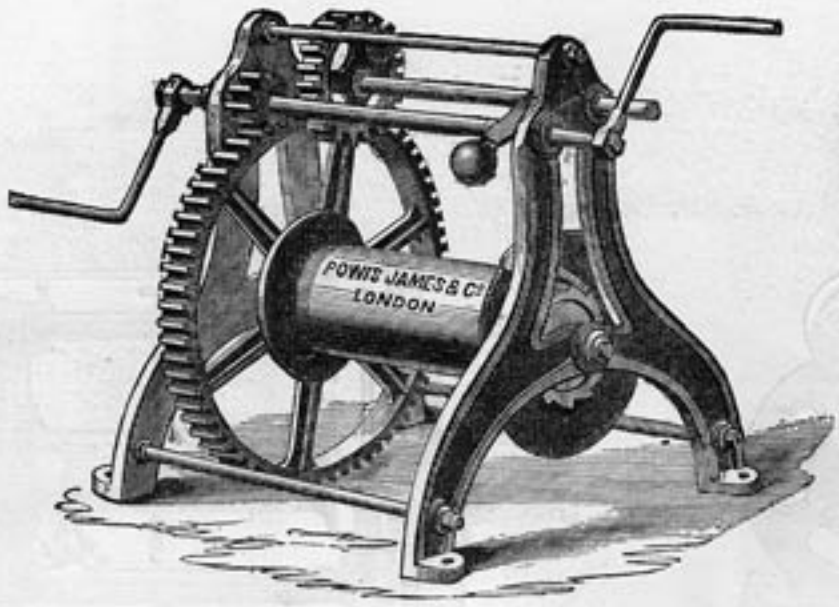
Each Winch is fitted with link motion double purchase gear, and a powerful break.

When there is no steam up, the Winch can be worked by hand power, for which purpose two handles are provided.

No. 1.—To lift 2 tons. With 2 Cylinders 5 inches diameter.

„ 2.— „ 3 „ „ „ 6 „

„ 3.— „ 4 „ „ „ 7 „



IMPROVED SINGLE AND DOUBLE PURCHASE CRABS.

THESE Crab Winches will be found of the most improved construction in every working detail, and well calculated for all general purposes of lifting. Each Crab is fitted with improved Break for lowering.

SINGLE PURCHASE—

No. 1.—To Lift One Ton, with one and two sheave pulley blocks.

„ 2.— „ Two „ „ „ „

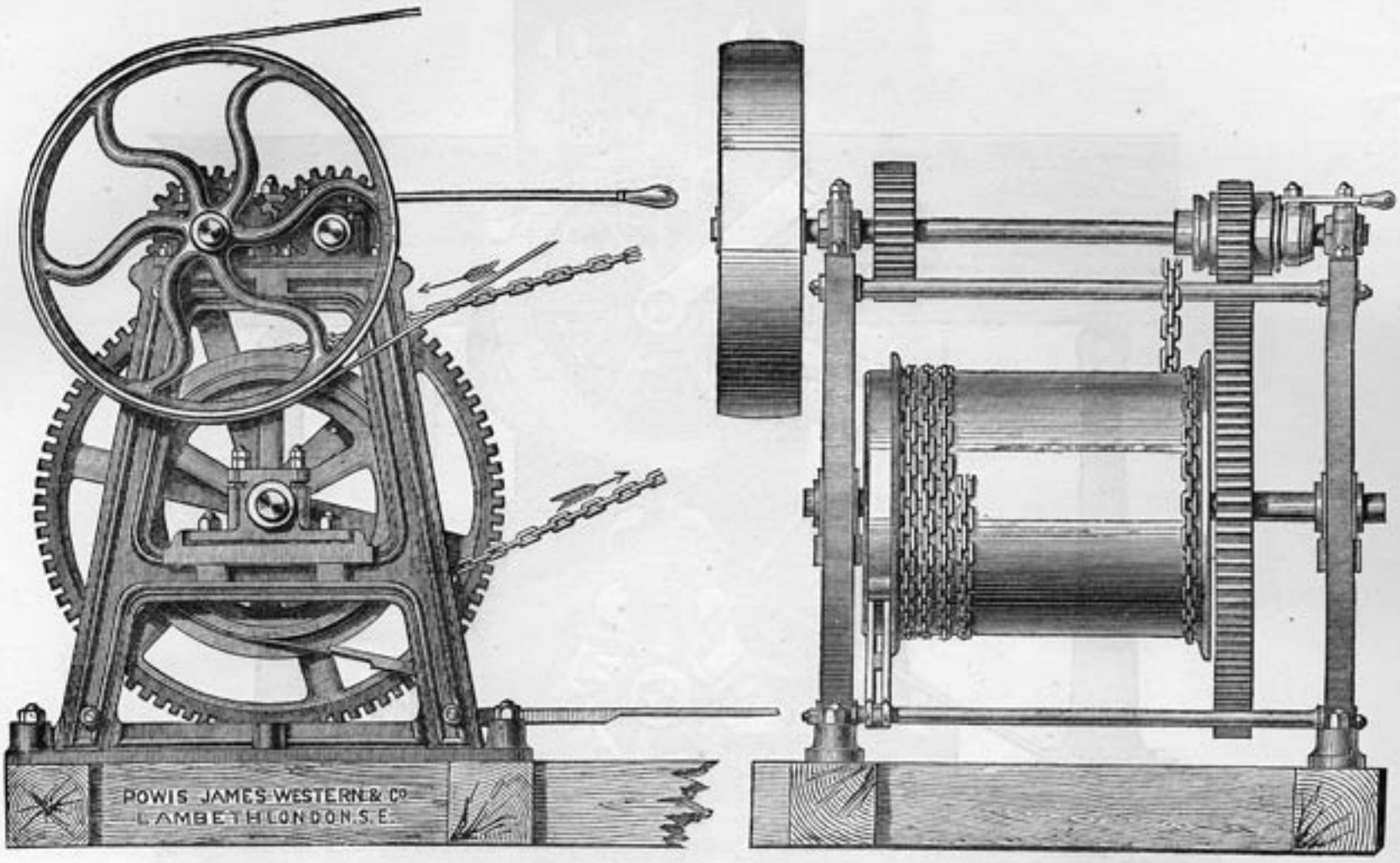
DOUBLE PURCHASE—

No. 3.—To Lift Two Tons, with one and two sheave pulley blocks.

„ 4.— „ Three „ „ „ „

„ 5.— „ Four „ „ „ „

These Crabs will fully lift one-third the weights specified, direct from the barrel.

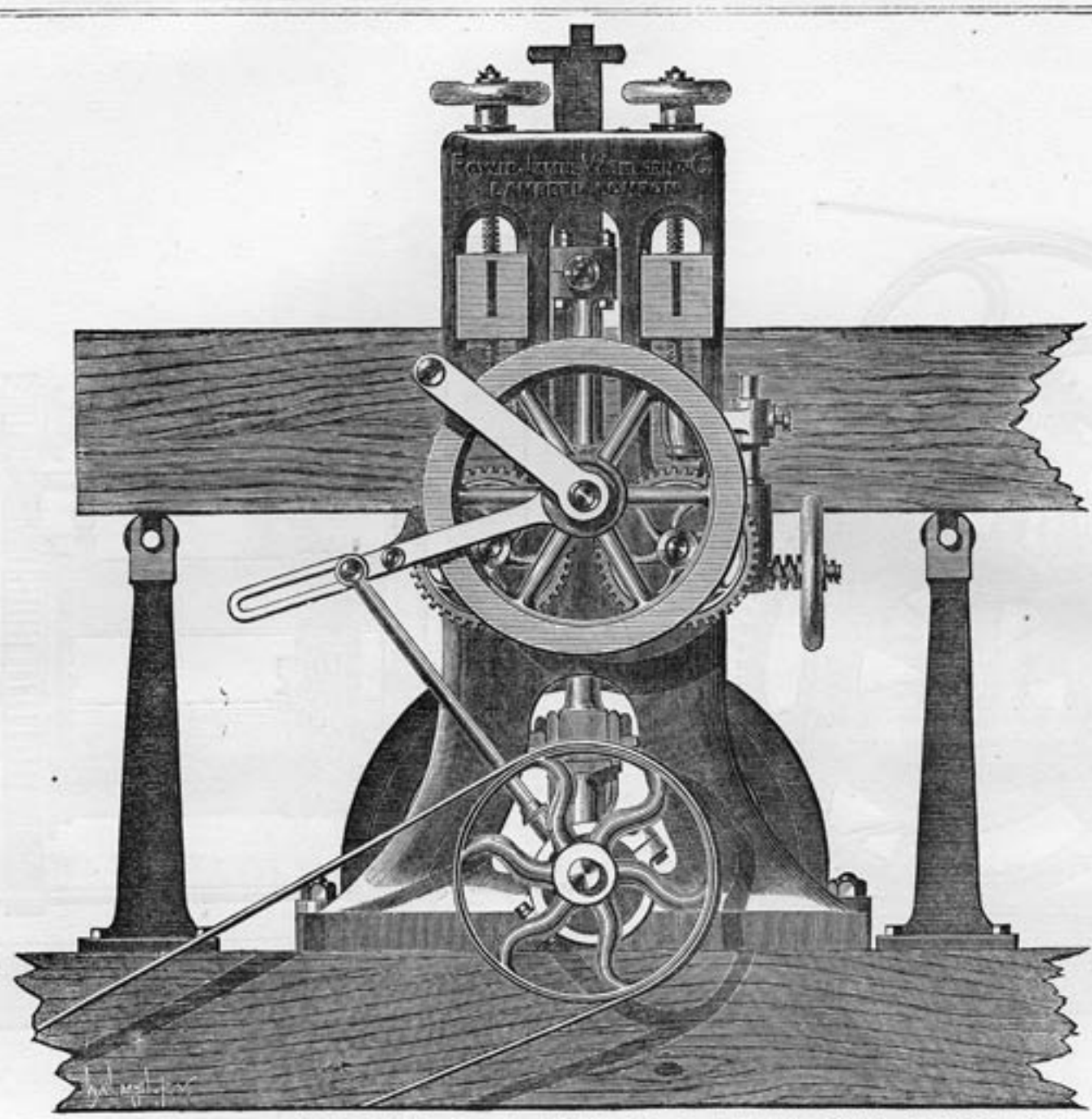


IMPROVED BARROW HOIST,

FOR BUILDERS AND CONTRACTORS.

THIS Hoist is meant specially for raising Bricks, Mortar, Timber, &c., and is provided with two chains working off the same drum, but from opposite sides, so that one chain is raising while the other is lowering, thus saving both time and power. The arrangement of the gearing is such that the driving pulley may be always running, and the barrel is made to hoist, lower, or is stopped simply by moving the hand-lever. A break, worked by a foot-lever, is also provided. The pulley may be driven by a belt direct from a Portable Engine, and, at a speed of 150 revolutions per minute, will raise 8 cwt. at the rate of 200 feet per minute.

The Price includes 100 feet of chain.



IMPROVED SINGLE DEAL OR FLITCH FRAME,

ROLLER FEED.

THERE are several important advantages in a Deal or Timber Frame for sawing over that of the Circular Saw Bench. The Saws used being thin, a considerable saving of wood is effected, increasing in value in proportion to the quality of the wood being sawn. The work done is of a better quality, requiring less labour in planing, and saving a still further waste of thickness in the board.

The power required is comparatively small to that necessary for a Circular Saw Bench, whilst the quantity of work produced for the power exerted is much greater in consequence of the increased number of cuts produced in the same time.

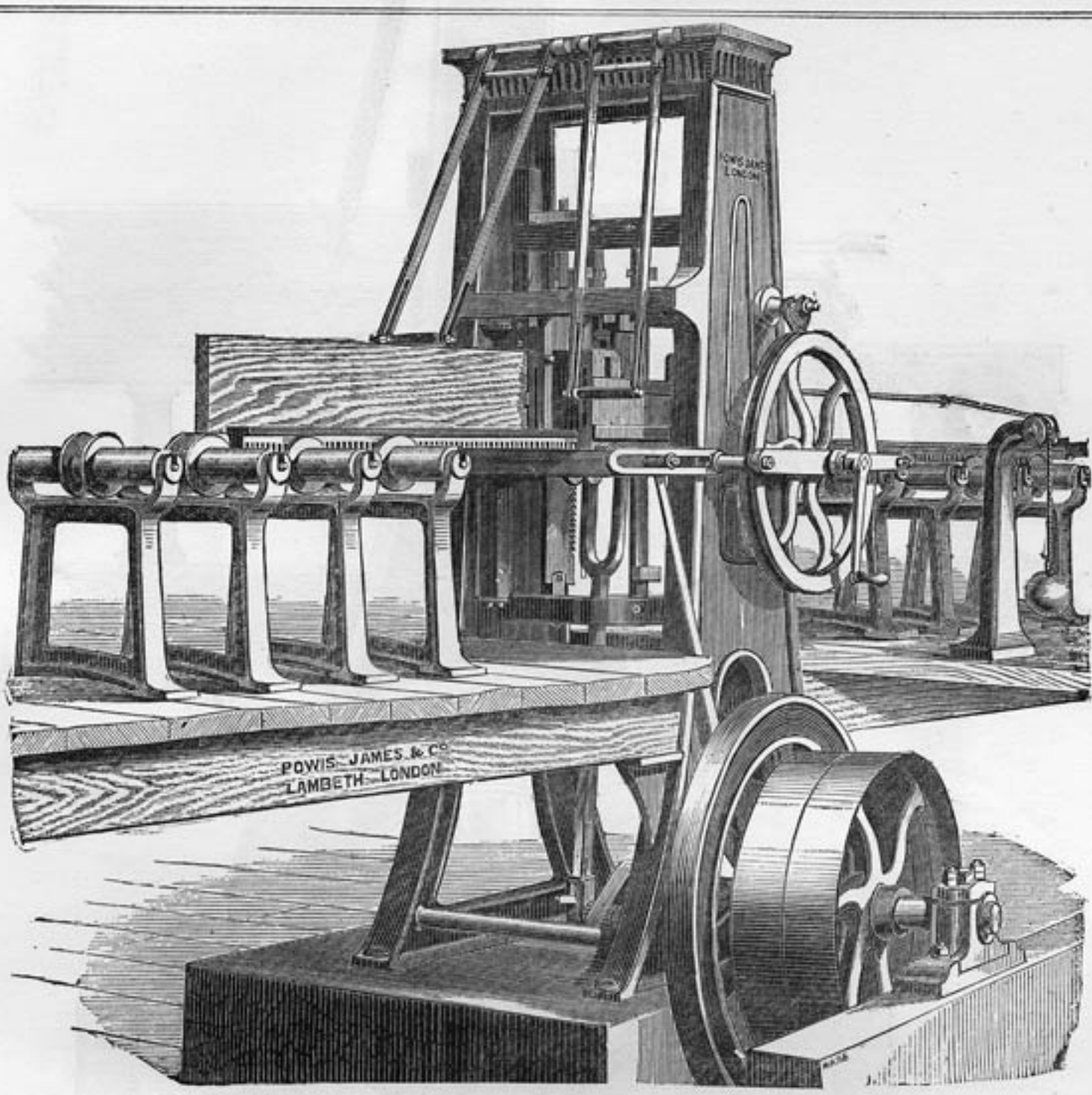
The Machine here illustrated is designed to meet the want of those who have not sufficient work to employ a Double Deal Frame profitably.

It necessitates but small outlay, and the cost of brick or stone foundations can be dispensed with. The Casting being very rigid, and quite self-contained, it may be placed on wood framing upon the ground, or bolted to a strong mill floor.

All recent improvements contained in our larger frames will be found in this, and the whole finished with an equal regard to durability and high speed.

If preferred, Rack or Chain Feed can be supplied, or a Steam Cylinder, to drive direct, placed either at top or bottom of Frame.

Size.	To cut one deal.	Average Power Required.	No. of Revolutions.
No. 1	11 in. by 3 in.	2 Horse.	300
„ 2	14 „ 4 „	3 „	280
„ 3	18 „ 6 „	4 „	270
„ 4	22 „ 6 „	4 „	250



IMPROVED DOUBLE DEAL FRAME,

RACK FEED.

THE advantage of a Rack Feed is that the edges of the wood sawn are left perfectly clean and not crushed or indented. In this Frame the Deals are carried up on Smooth Rollers supported on standards, each standard having three Rollers working independently of one another, so that the Rack may be traversed to and fro whilst the Deals remain stationary. The workmen can thus replace the Deals while the Frame is working.

The Dog at end of Rack is made to fold up when it is travelling back.

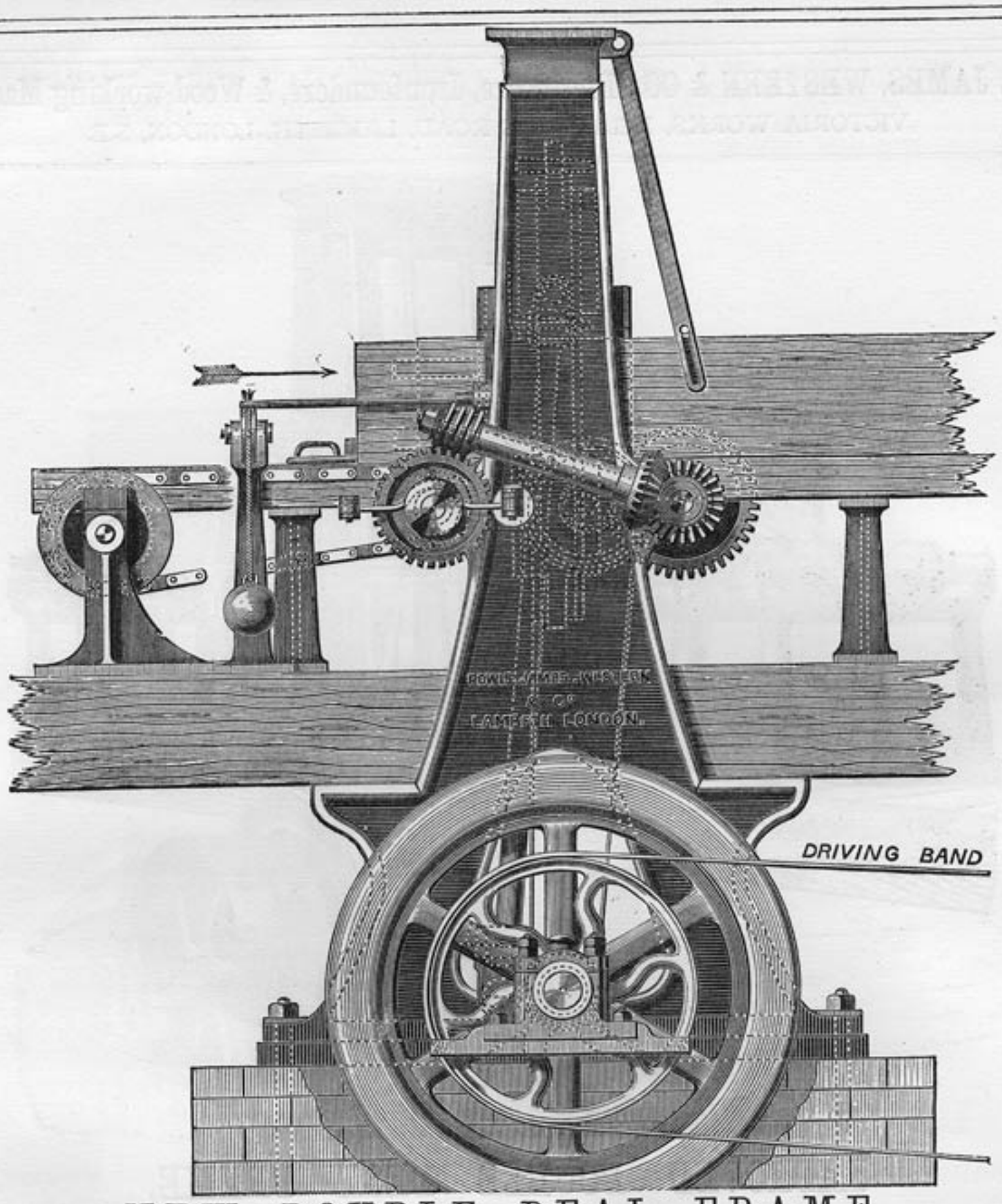
The Binding Rollers are on the universal principle, and ensure uniform pressure where the deals are unequal.

The top rails of the Swing Frame are made of Steel to avoid being scored by the Keys of the Saw Buckles.

These Frames are fitted with Patent Silent Feed, and are calculated to cut at the rate of about 3 feet per minute; are simple and easy to manage, and constructed so substantially as to render it almost impossible to put them out of order.

The Rack is long enough for 22 feet Deals, but can be made longer if desired.

No.	To Cut Two Deals.	Average Power required.	Revolutions.
1	11 × 3	3 Horses.	280
2	14 × 5	4 „	240
3	18 × 6	5 „	220
4	24 × 7	6 „	200



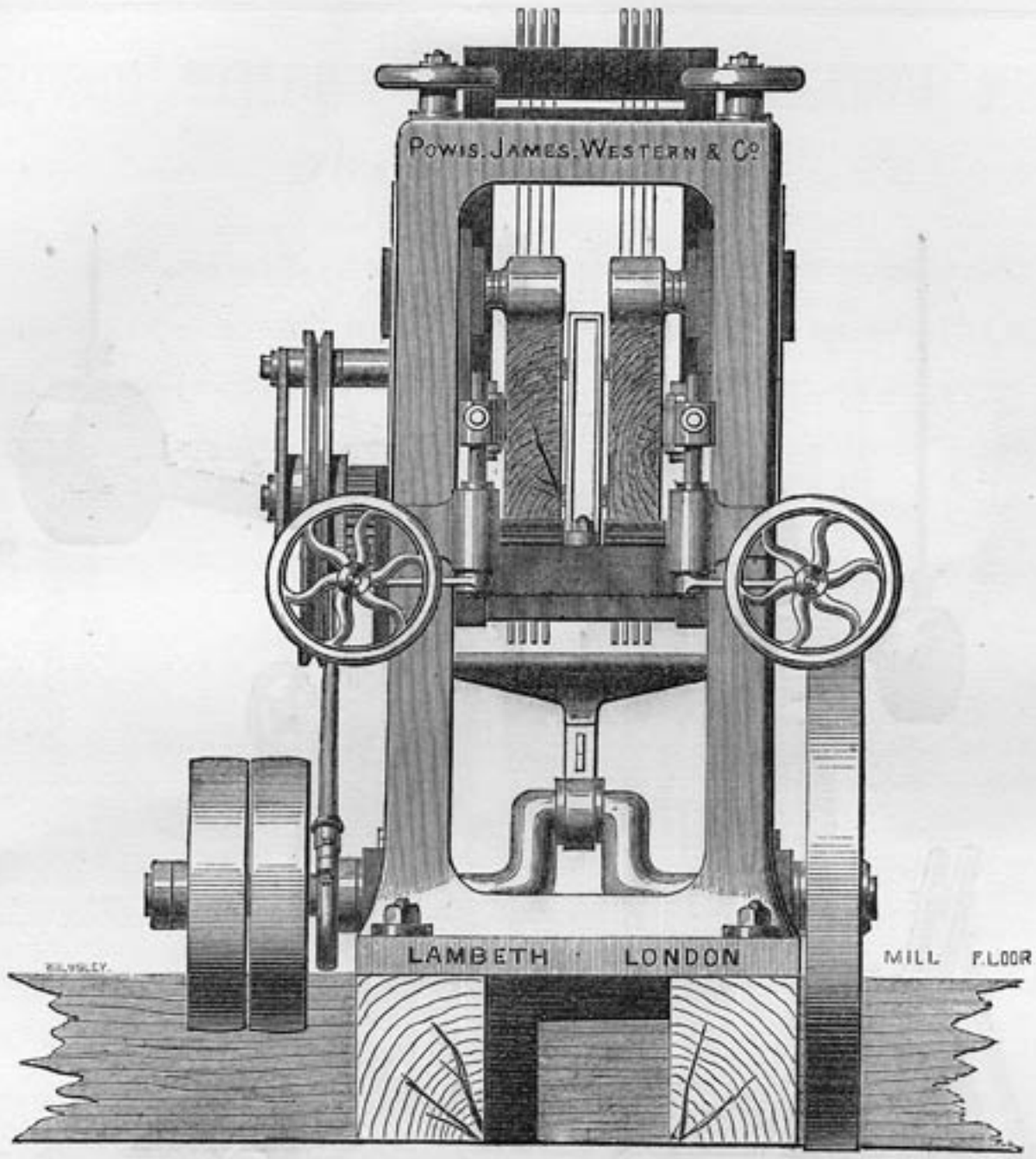
NEW DOUBLE DEAL FRAME

FOR VERY FAST CUTTING—CHAIN FEED.

THIS is a form of Frame which we recommend with confidence to any one who has a large amount of Cutting to do. It is provided with Two Endless Chains—one for each Deal—so that Deals of unequal length can be cut at the same time. The Feed Motion shown in the drawing is continuous. This we consider best for the smaller sizes, which run very fast; but to the larger sizes we generally fit the Patent Silent Feed. The rate of feed can easily be varied from 18 in. to 4 ft. per minute, to suit different kinds of work; and, if desired, could be put up to 6 ft. per minute, by increasing the speed of the Crank Shaft. If run, however, only at the number of revolutions named below, this Frame will do as much work in twelve months as any Frame now made; our experience of running Frames at extreme speeds being that a great deal more time and money is spent in repairs than the extra cutting is worth. The general construction and workmanship is the same as in the other Frames here described. The Swing Frame-crank and Flywheel are very accurately balanced. The Frame sides are bolted to a cast-iron base plate, which binds them together, and makes the Frame free from vibration, and also facilitates fixing.—The Price includes sufficient Chain and Standards for cutting 26-ft. Deals.

No.	To Cut two Deals.	Average Power required.	No. of Revolutions.	No.	To cut two Deals.	Average Power required.	No. of Revolutions.
1	11 × 3	3	280	3	18 × 6	5	220
2	14 × 5	4	240	4	24 × 7	6	200

Equilibrium Frames quoted for on application, but we do not illustrate this kind here because we consider the one shown above superior and cheaper to work.



IMPROVED PORTABLE DOUBLE DEAL FRAME.

ROLLER FEED.

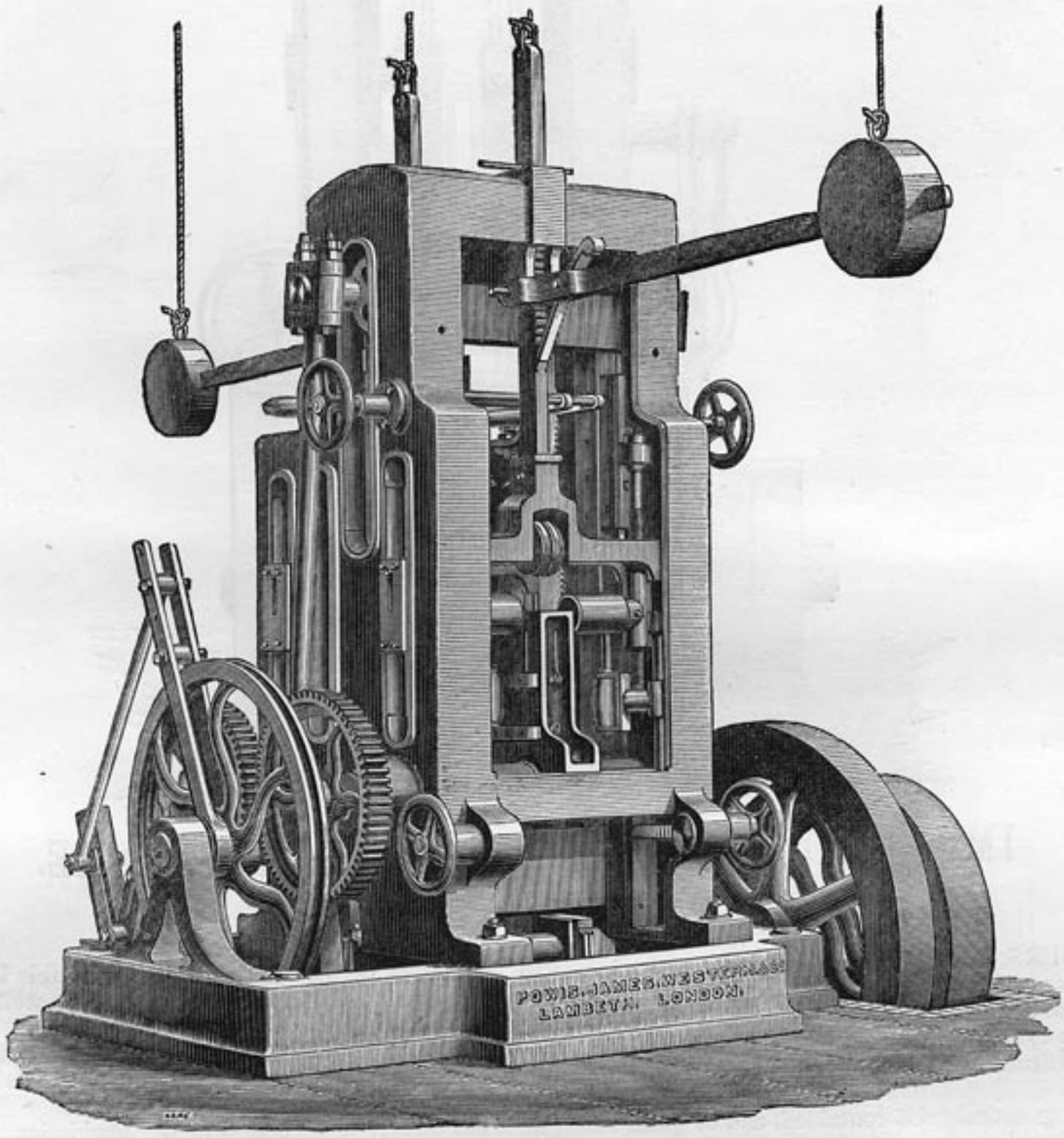
BUILDERS, Contractors, and others, would often avail themselves of the advantages of a Double Deal Frame on account of the economy of working, the small power required to drive, and the quantity, as well as quality, of the work delivered, if it could be readily fixed and removed, and applied like a Circular Saw Bench.

It is to supply this want that the above Frame has been designed, which we do not doubt will find general favour, particularly as it is equally well calculated for a permanent mill, after having completed its temporary purpose.

Being entirely self-contained, and of great strength, it has merely to be bolted to the foundation, or to wood framing, placed on the ground, when it is at once ready for work. It may be driven direct from a Portable or Stationary Engine, or from ordinary shafting fixed either above or below ground.

The whole of the material and workmanship throughout will be found of the same superior quality and durability as that of our larger Frames, well adapting it for driving at high speed.

Size.	To Cut Two Deals.	Average Power required.	Number of Revolutions.
No. 1	11 in. by 3 in.	3 Horse.	280
„ 2	14 5	4 „	240
„ 3	18 6	5 „	220



IMPROVED COMBINED TIMBER, DEAL, OR FLITCH FRAME,

TO CONVERT ROUND OR SQUARE LOGS INTO PANELLING, BOARDS, OR PLANKS.

IMPROVED TIMBER, DEAL, AND FLITCH FRAME,

ON BASE-PLATE.

THE construction of this Frame enables it to be readily fixed upon the Mill floor, either with a timber, brick, or stone foundation at a great saving in cost, and effectually disposing of the difficulties hitherto presented by marshy ground, overflow of water from tidal rivers, and other causes of a similar kind.

This is accomplished by making the Frame of unusual solidity, and attaching it, with the whole of the working parts, to a massive bed plate, by which means the utmost possible strength is obtained, with increased facility of control. Logs may thus be converted at much higher speeds than usual, and the very best quality of work ensured.

Two side connecting Rods are attached to the Swing Frame from a double crank shaft of best fagoted Scrap Iron. Our Improved Patent Silent Feed Motion is supplied to each Frame for varying the rate of feed for all kinds of hard or soft woods.

The top-pressure Rollers work independently of each other in Deal and Flitch cutting, so that two pieces of unequal depths may be sawn at the same time.

The Crossheads are forged in the solid, of best fagoted Scrap Iron. The whole of the material and workmanship throughout cannot be surpassed.

These Frames are also made for sawing timber only, without the Flitch cutting apparatus.

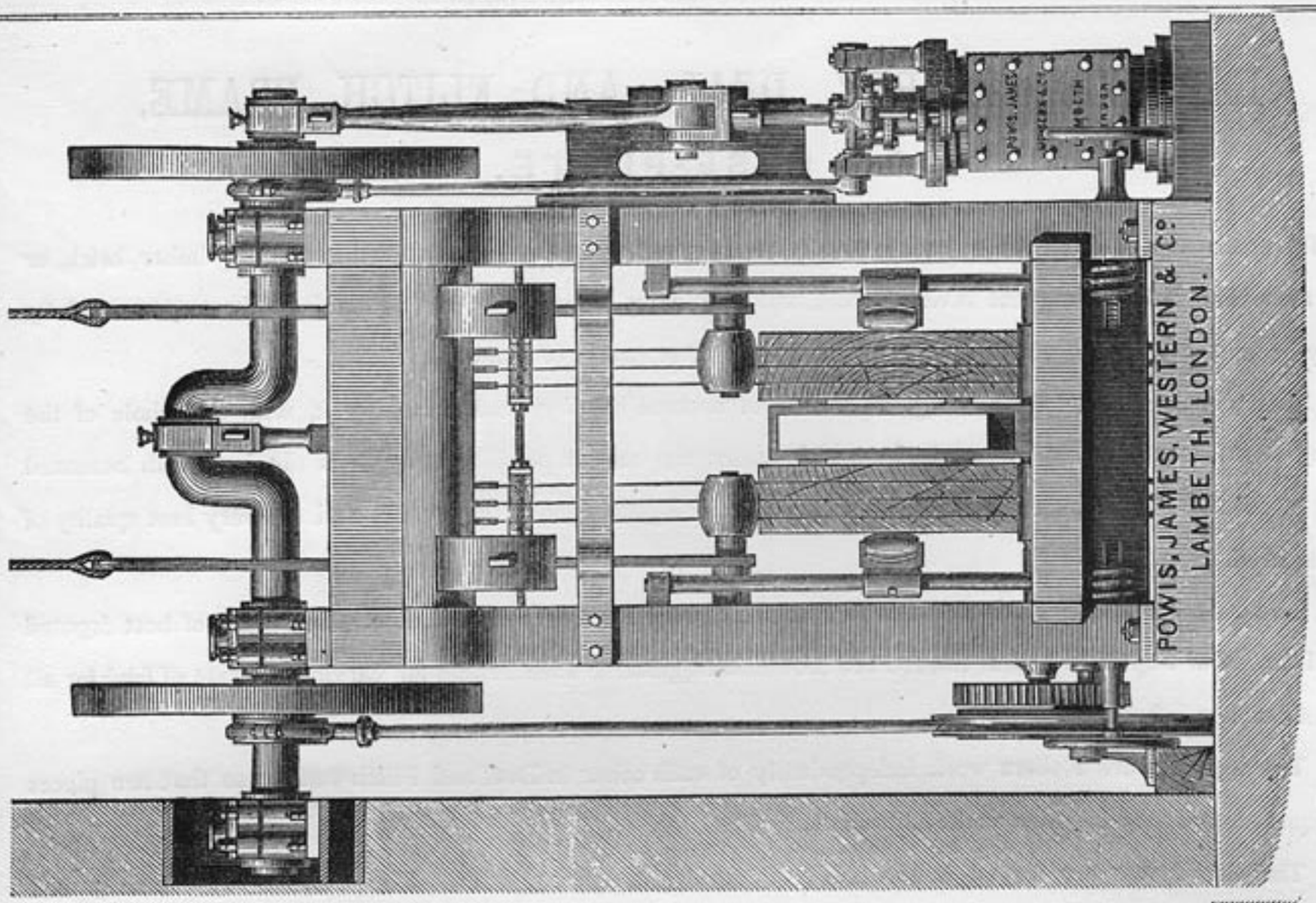
The price includes two timber carriages fitted with Improved Screw Clips, and the necessary lengths of rails.

No.	To Cut Logs.	Or two Flitches.	Length of Log.	Average Power required.	No. of Revolutions.
1	12 in. X 12 in.	12 in. X 4 in.	25 feet.	3 Horse.	200
2	18 „ X 18 „	18 „ X 6 „	25 „	4 „	180
3	24 „ X 24 „	24 „ X 7 „	30 „	5 „	150
4	30 „ X 30 „	30 „ X 7 „	30 „	6 „	130
5	36 „ X 36 „	36 „ X 8 „	35 „	8 „	120

This Frame may be fitted with Rack or Chain feed instead of Roller feed, if preferred.

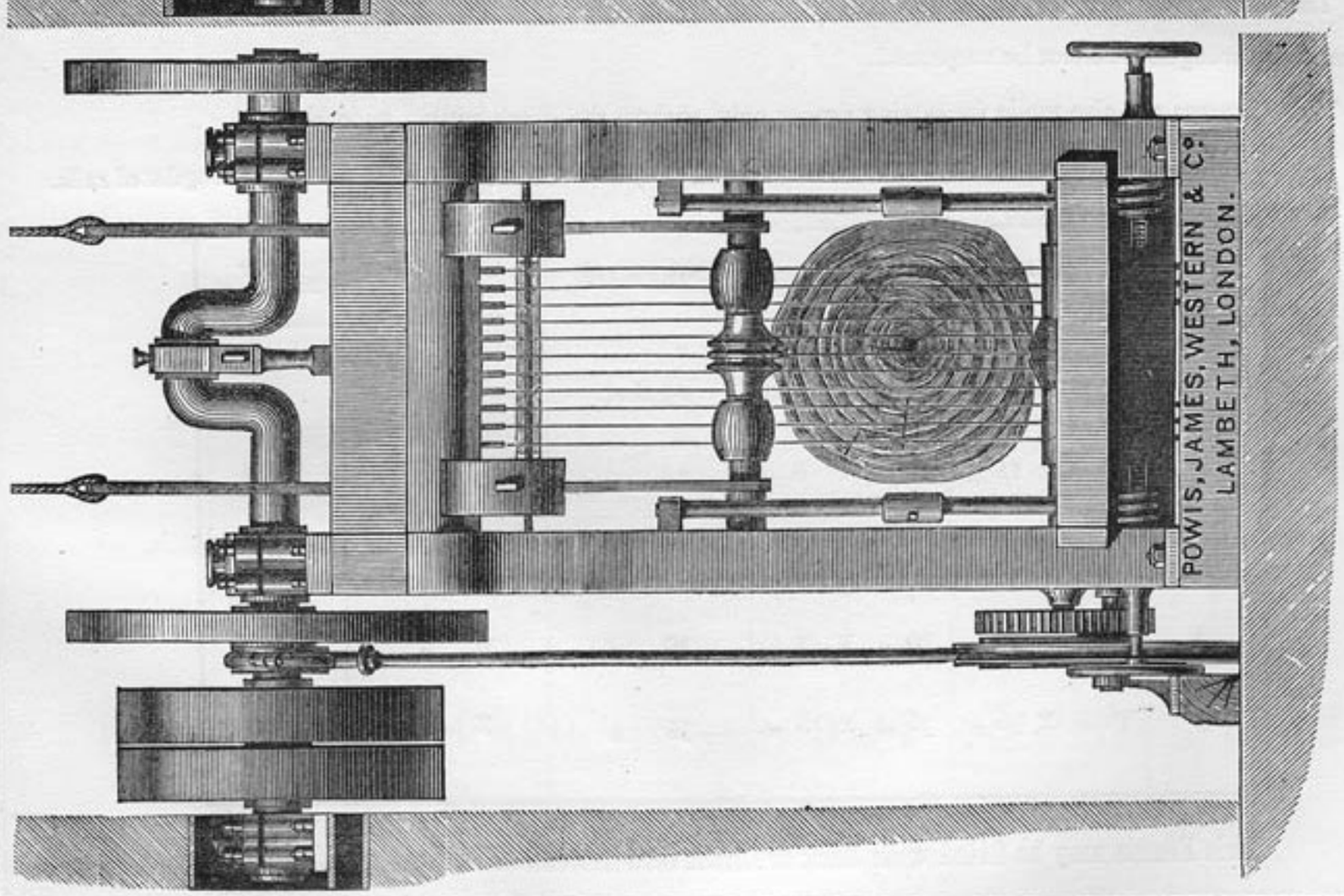
POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.



NEW OVERHEAD TIMBER, DEAL, AND FLITCH FRAME,

DRIVEN EITHER WITH STEAM CYLINDER DIRECT OR WITH BELTING.



NEW OVERHEAD TIMBER, DEAL, AND FLITCH FRAME,

FOR SAWING ROUND OR SQUARE LOGS INTO FLITCHES, BOARDS, AND PANELLING, OR TWO DEALS OR FLITCHES AT ONE TIME.

WE invite especial attention to this, as the most improved Overhead Frame yet offered, whether Combined, or as a Log Frame only. It may either be driven with fast and loose pulleys by a belt in the ordinary manner, or by a direct acting Steam Engine, as shown in the drawings opposite.

The arrangement of the Cylinder prevents vibration, gives an increased length of connecting rod, offers great facilities for any necessary adjustment, and entirely prevents condensed steam from running over the working parts, and on to the log.

In Log cutting the top pressure Roller is carried upon a spindle passed through the Slides and Rollers of the Deal Apparatus.

When Deals or Flitches are being sawn, the top pressure Rollers admit of easy adjustment, so that two Flitches of different depths can be cut at the same time.

The Frame is complete with a pair of Timber Carriages and the necessary lengths of Rails. These Carriages are supplied with improved Clips for holding the Timbers, and have a transverse arrangement to suit twisted or crooked Logs.

These Frames are made either for cutting Timber only, or with the addition of the Flitch cutting apparatus.

No.	To Cut Logs.	Or two Flitches.	Length of Log.	Average Power required.	Speed.
1	12 in. x 12 in.	12 in. x 4 in.	25 ft.	3 Horse	200
2	18 „ x 18 „	18 „ x 6 „	25 „	4 „	180
3	24 „ x 24 „	24 „ x 7 „	30 „	5 „	150
4	30 „ x 30 „	30 „ x 7 „	30 „	6 „	130
5	36 „ x 36 „	36 „ x 8 „	35 „	8 „	120
6	42 „ x 42 „	42 „ x 8 „	35 „	10 „	110

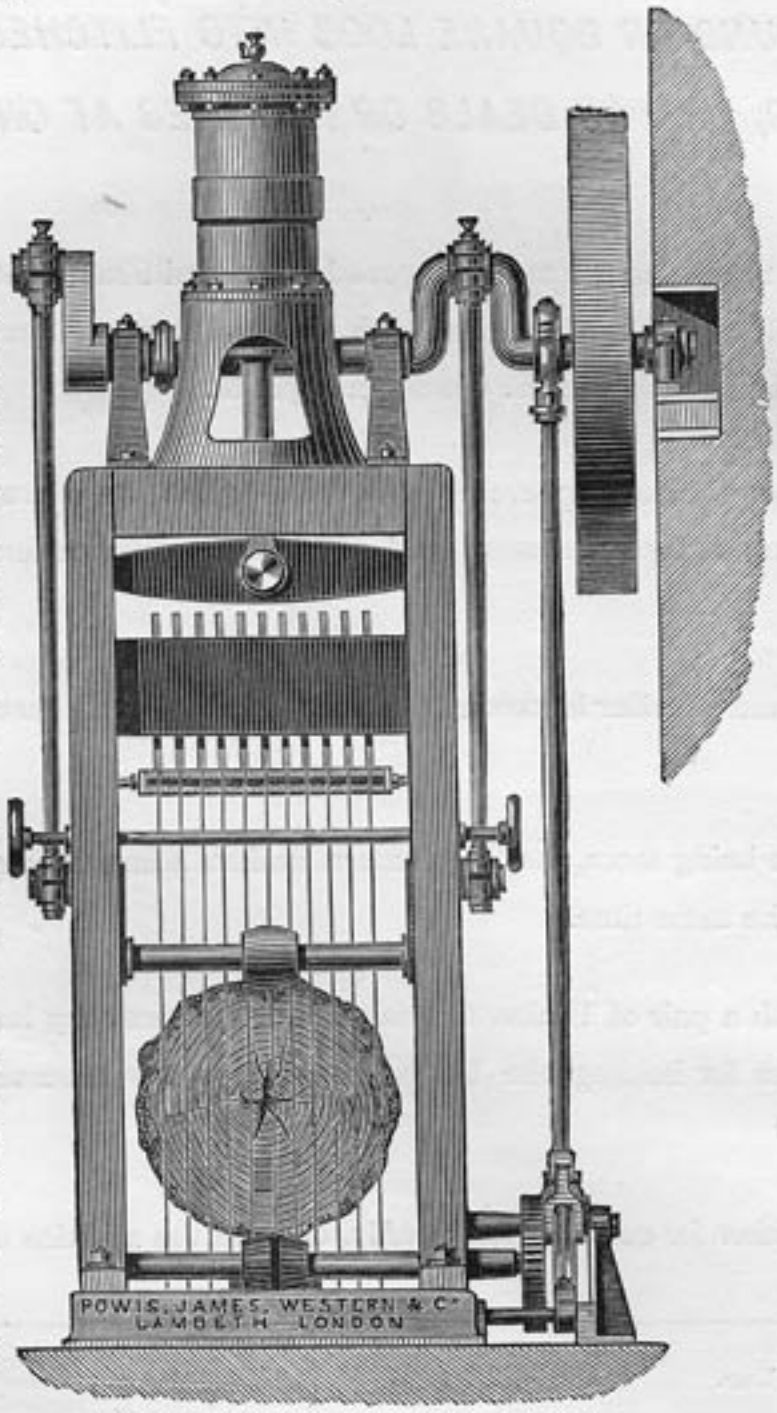
Special Estimates given for larger sizes.

This Frame may be fitted with Rack or Chain feed instead of Roller feed, if preferred.

IMPROVED TIMBER OR LOG FRAME,

WITH OVERHEAD STEAM CYLINDER.

For Converting Round or Square Logs into Boards or Planks,



THE principal features in this Frame consist in its being driven direct from a Steam Cylinder attached to top of Frame as shown, or below if preferred; also in its being placed on a large and massive Bed Plate, so that it may be fixed level with the Mill Floor, either upon Timber, Brick, or Stone Foundations.

Conditions frequently arise to render one or both of these principles absolutely necessary. In some cases marshy ground or the proximity of tidal rivers, &c., render deep Foundations very costly, if not quite impracticable; in others the Frame may require to be driven independently of the rest of the Machinery or Shafting. The Engine may be already overloaded or the Boiler of insufficient power; in the latter case a small extra Boiler may be erected for the purpose.

In Forests, or where a Mill is not designed to be permanent, this plan offers special advantages, both as to cost and the short time taken in erection.

Thus a cheap and efficient Mill may be readily set up and removed as required.

The general merits of this Frame for strength, durability, ease and accuracy in working leave nothing to be desired.

The Cylinder is constructed as to admit of regulating the exact amount of Steam required for the work in hand.

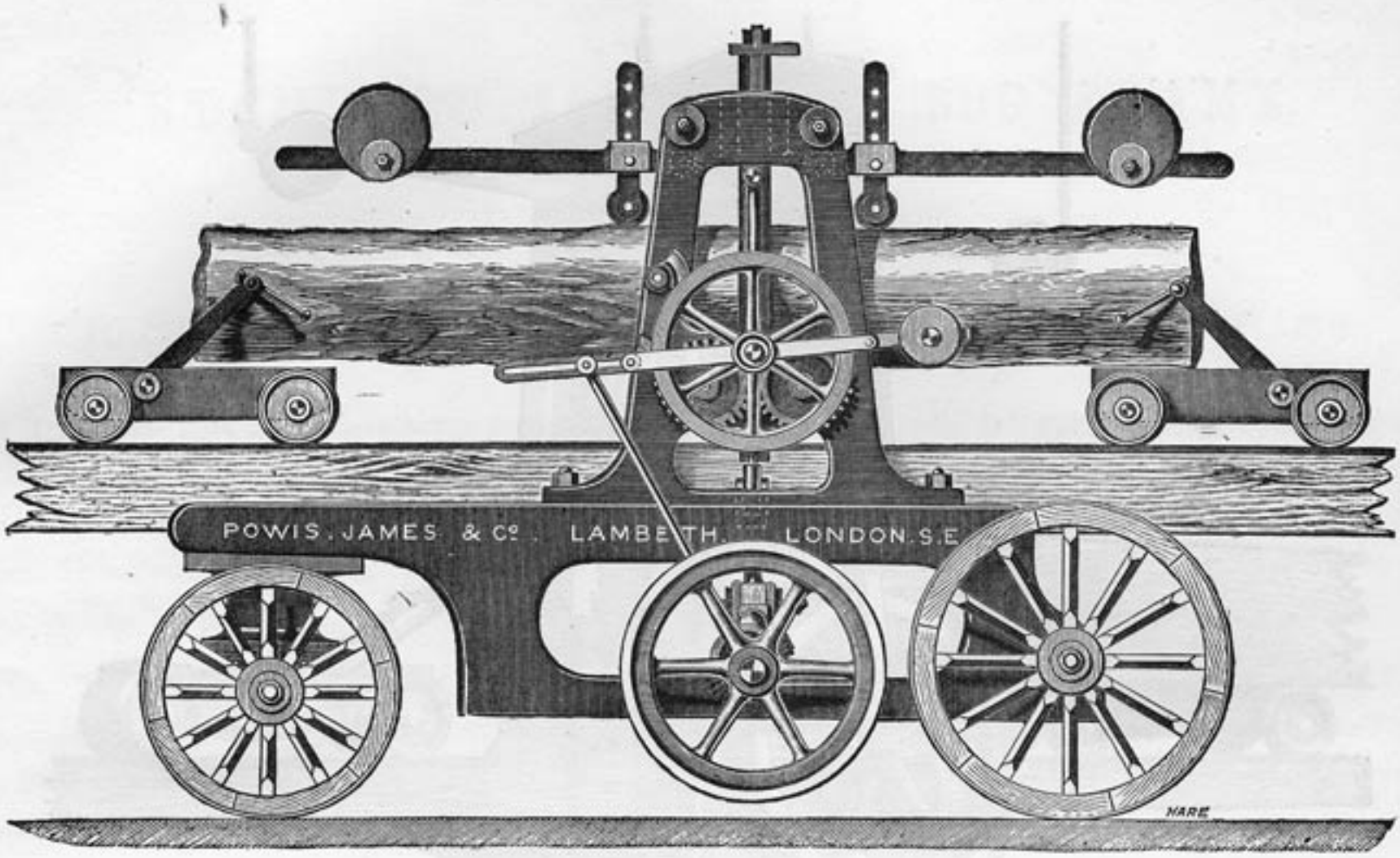
Silent-feed Motion and all recent improvements adopted in our other Frames will be found in this.

The Price includes a Pair of Timber Carriages with Improved Clips and the necessary length of Double Rails.

Size.	To Cut Logs.	Or Two Flitches.	Length of Log.	Average Power required.	Speed.
No. 1	12 in. × 12 in.	12 in. × 4 in.	20 feet.	3 Horse.	180
„ 2	18 in. × 18 in.	18 in. × 6 in.	25 „	4 „	160
„ 3	24 in. × 24 in.	24 in. × 7 in.	30 „	5 „	140
„ 4	30 in. × 30 in.	30 in. × 7 in.	30 „	6 „	130
„ 5	36 in. × 36 in.	36 in. × 8 in.	35 „	8 „	120
„ 6	42 in. × 42 in.	42 in. × 9 in.	35 „	10 „	110
„ 7	48 in. × 48 in.	48 in. × 10 in.	40 „	12 „	100

SPECIAL ESTIMATES FOR LARGER SIZES.

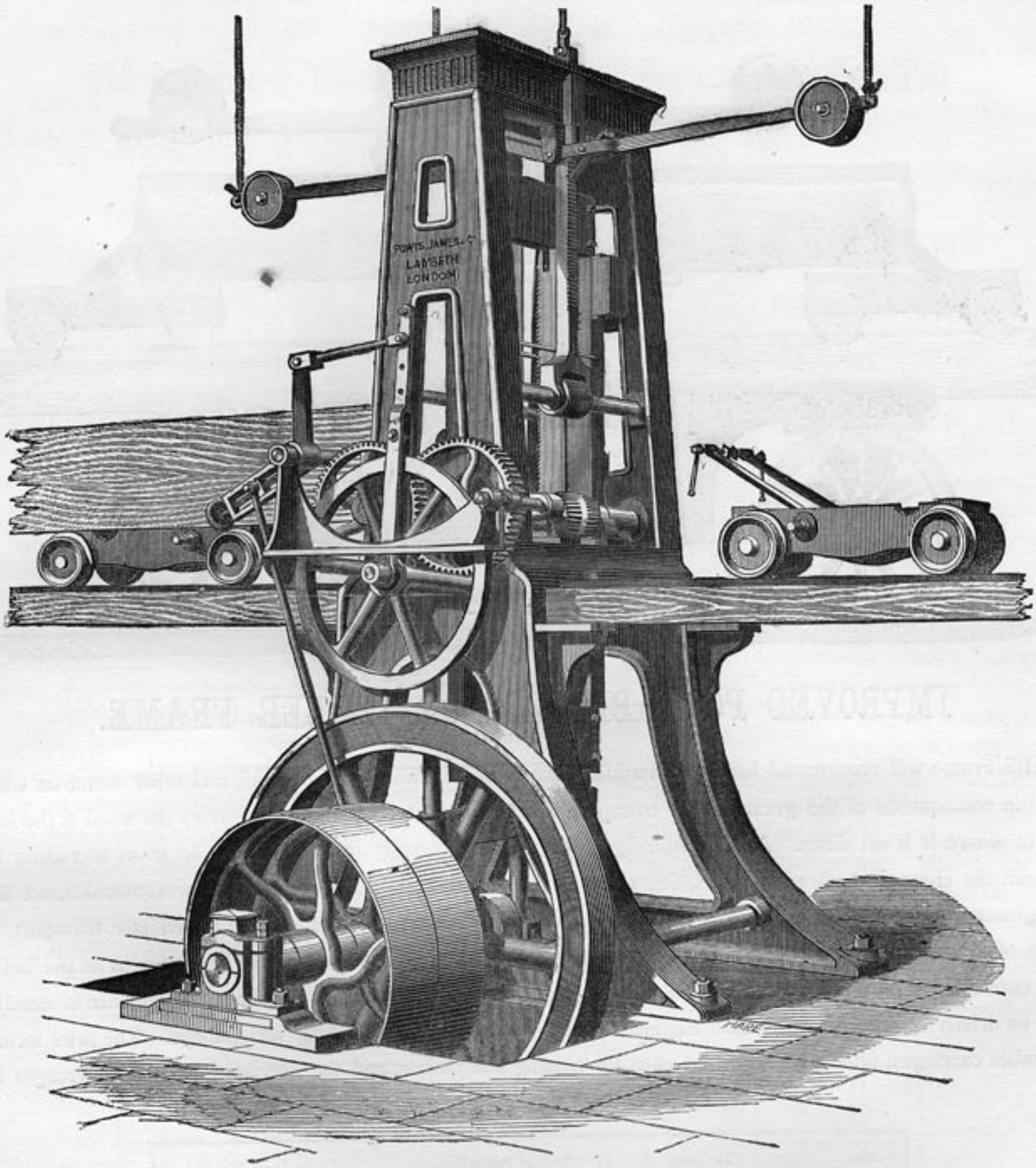
This Frame may be fitted with Rack or Chain-feed, instead of Roller-feed, and Deal Cutting Apparatus can be added.



IMPROVED PORTABLE LOG OR TIMBER FRAME.

THIS Frame will recommend itself to Saw Mill Owners in Australia, New Zealand, and other countries where, in consequence of the great cost of transport, it is found most economical to convert the wood in the forest close to where it is cut down. All the working parts are very strongly and carefully made, so as to reduce to a minimum the chances of a break down, which would be more than usually awkward in the forest at a distance from an Engineer's shop. The Carriage and Frame sides are lightened as much as possible to facilitate transport, and yet are of such a section as gives rigidity and strength. To fix ready for work, it is only necessary to let the bottom of the carriage rest on the ground, or bolt it to some long pieces of timber, so as to give it a large base to steady it. It can be driven direct from a Portable Engine, requiring no intermediate shafting and pulleys. The price includes two timber carriages, fitted with improved clips for holding the timber, and the necessary lengths of wrought iron rails.

No.	To Cut.	Average Power Required.	Approximate Weight.
	in. in. ft.		
1	12 × 12 × 20	3 horse	3 tons
2	18 × 18 × 25	4 „	4 „
3	24 × 24 × 30	5 „	5 „
4	30 × 30 × 35	6 „	6 „



STANDARD TIMBER OR LOG FRAME,

DRIVEN FROM BELOW,

TO CUT ROUND OR SQUARE TIMBER INTO PLANKS, BOARDS, OR PANELLING.

STANDARD TIMBER OR LOG FRAME,

DRIVEN FROM BELOW,

TO CUT ROUND OR SQUARE TIMBER INTO PLANKS, BOARDS, OR PANELLING.

WE have little to add in reference to this Frame to what has been stated in the previous pages as applying to our Frames generally. The design, workmanship, and materials used are unexceptionable, and secures the maximum of quantity and quality in the work performed, with the greatest possible durability and entire freedom from derangement in working. For all ordinary purposes we recommend it to Timber Merchants and others as our Standard Log Frame.

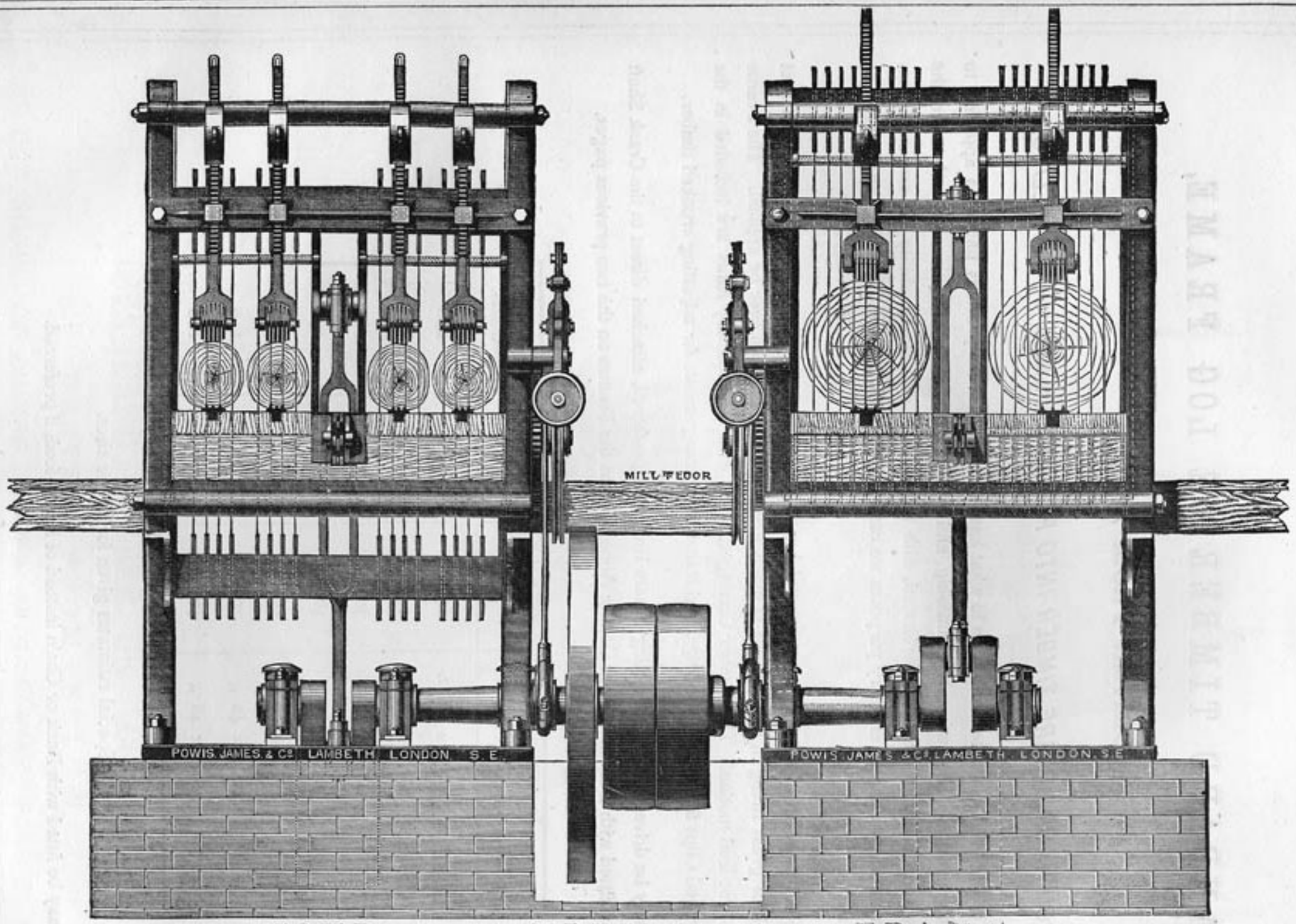
The Crank Shaft revolves in extra long gun-metal bearings, and with the Cross Heads is forged of best fagoted Scrap Iron, is of great strength, and capable of much greater strain than can ever be applied. The Frame is fitted with patent silent-feed motion. The Timber Carriages, which with the necessary Rails are included in the price, have new improved Clips for holding the Logs, and transverse arrangements for adjusting crooked timber.

This Frame may be driven with direct acting Steam Engine, if preferred, attached direct to the Crank Shaft of Frame, and may be fitted with Deal and Flitch Cutting Apparatus, as the Frames on the two previous pages.

Size.	To cut Logs.	Length of Log.	Average Power required.	No. of Revolutions.
No. 1	12 in. x 12 in.	25 feet	3-horse	200
„ 2	18 „ x 18 „	25 „	4 „	180
„ 3	24 „ x 24 „	30 „	5 „	150
„ 4	30 „ x 30 „	30 „	6 „	130
„ 5	36 „ x 36 „	35 „	8 „	120
„ 6	42 „ x 42 „	35 „	10 „	110
„ 7	48 „ x 48 „	40 „	12 „	100

Special estimates given for larger sizes.

This Frame may be fitted with Rack or Chain instead of Roller-feed, if preferred.



COUPLED MULTIPLE LOG FRAME,

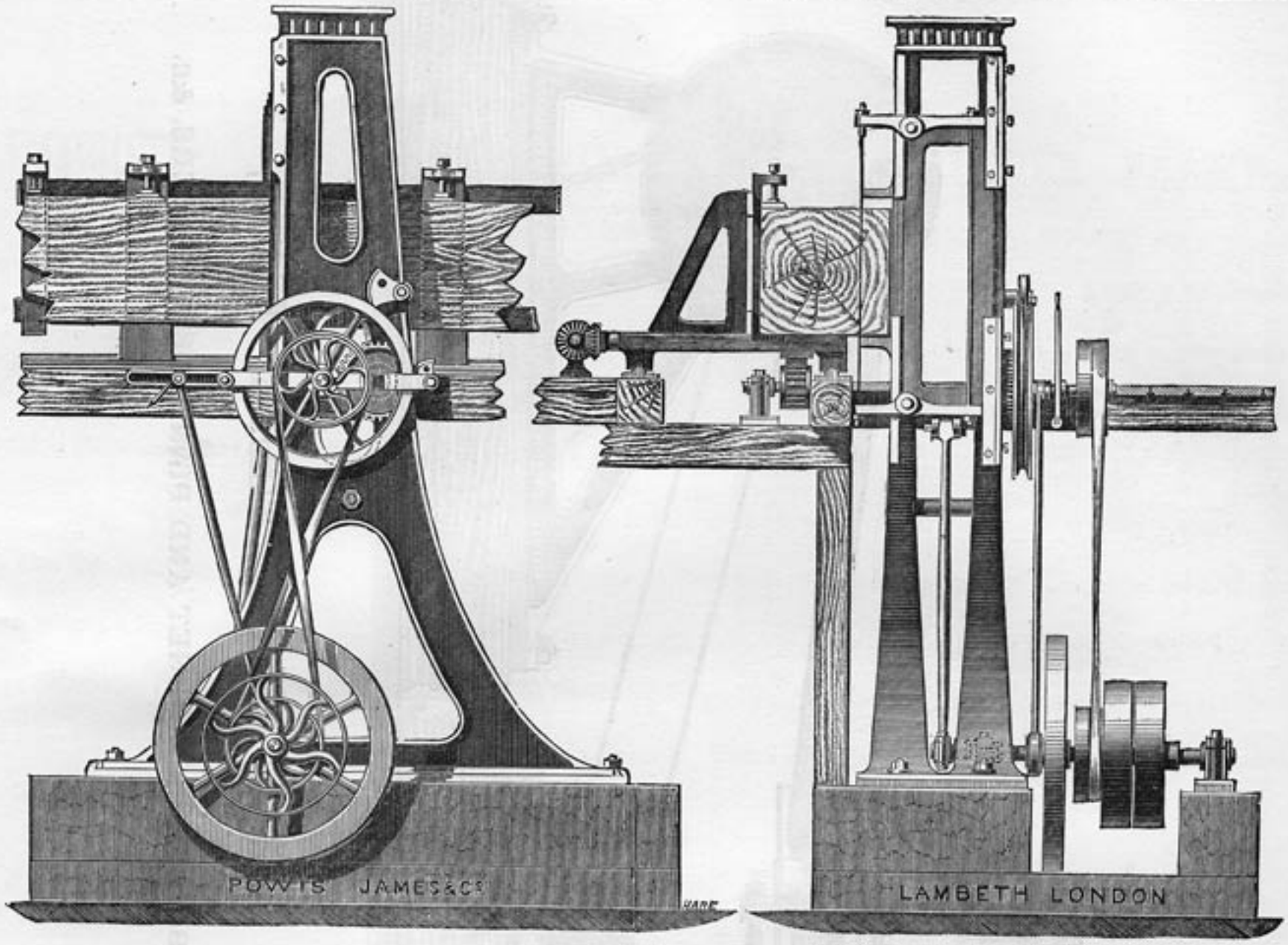
WITH IMPROVED ENDLESS CHAIN-FEED.

THIS style of Frame will be found highly advantageous for use in countries where very large quantities of Timber have to be cut day after day of the same size and into the same scantling. In cutting 1-inch boards, about 1,000 superficial feet per hour can be cut.

For Timber up to 12 or 16 inches diameter, as many as four trees may be cut at once with advantage, and larger sizes two at a time. A further economy, both in power and space occupied. will be effected by coupling two frames, as shown in the drawing.

We consider our improved endless Chain-feed the best adapted for these Frames, but a Rack or Roller-feed can be fitted if preferred.

No.	To Cut	Length of Logs.	Average Power.	No. of Revolutions.
1	Four 12-inch logs,	25 ft.	8-horse	100
2	Four 16-inch ,,	25 ,,	10 ,,	,,
3	Two 20-inch ,,	30 ,,	8 ,,	,,
4	Two 24-inch ,,	30 ,,	10 ,,	,,



IMPROVED COMBINED VERTICAL SINGLE BLADE TIMBER FRAME AND FLITCH CUTTING FRAME.

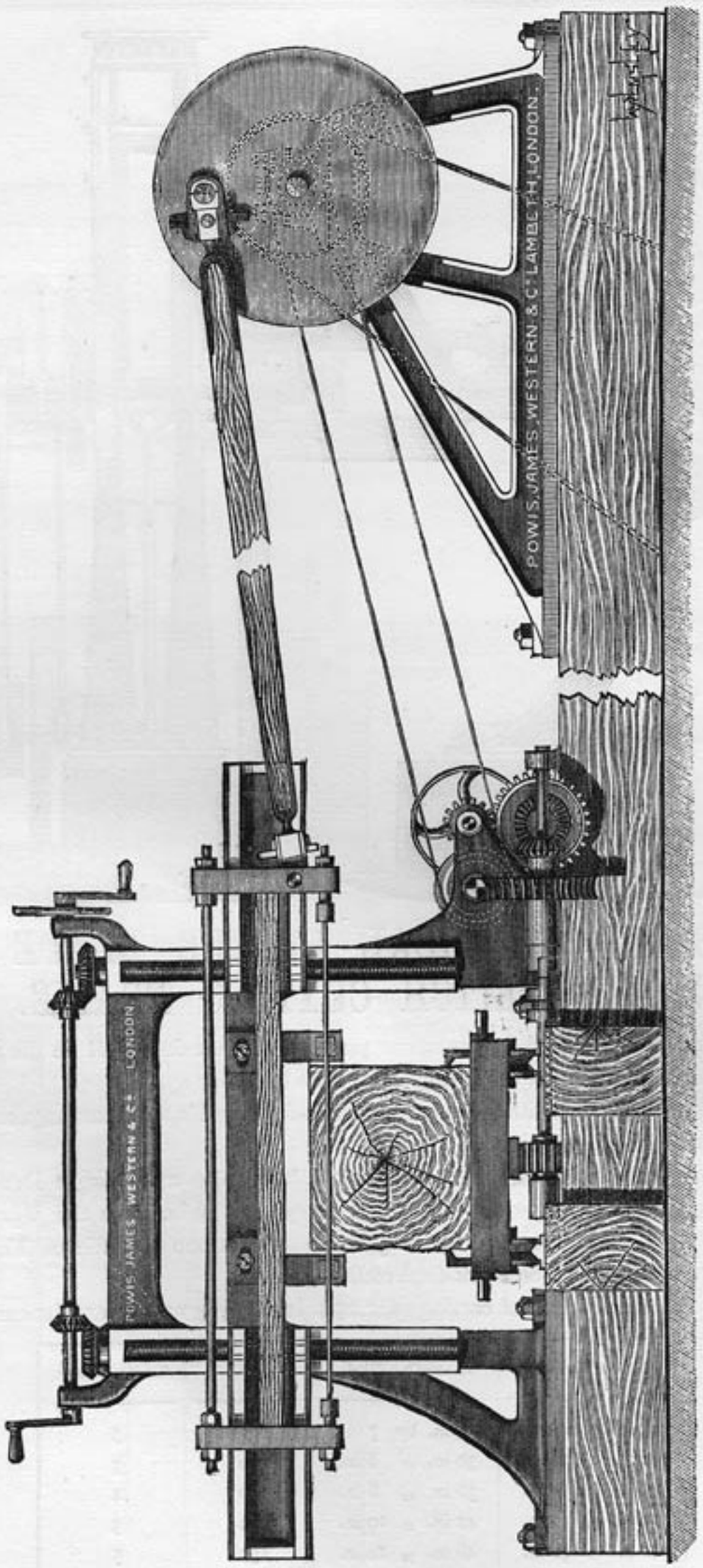
AS a Single Blade Timber Frame this is used for the same purposes as that described on the next page, but has the advantage over the Horizontal form of occupying very much less floor space.

The log is carried on a travelling bed with a self-acting rack-feed, and special arrangements are made for moving the wood up to the saw parallel after each cut.

To make this Frame more generally useful, we sometimes fit it up also as a Single Deal or Flitch Frame. This is done by making the Swing Frame stronger, so that it will carry saws in between the Upright standards. It is arranged so that a Flitch of the full width can be cut into ½-inch boards at one operation. The Flitch or Deal is fed through by Rollers; but if preferred, Chain or Rack-feed could be fitted.

The prices quoted include sufficient length of carriage for 25ft. logs, but greater lengths can be had.

Size.	To cut Timber.	To cut One Flitch.	Speed.	Average Power.
No. 1	24 in. by 24 in.	24 in. by 7 in.	230	3
2	30 in. „ 30 in.	30 in. „ 8 in.	200	3
3	36 in. „ 36 in.	36 in. „ 8 in.	180	4
4	42 in. „ 42 in.	42 in. „ 10 in.	160	5
5	48 in. „ 48 in.	48 in. „ 10 in.	150	5



IMPROVED HORIZONTAL SINGLE BLADE TIMBER FRAME,

FOR TIMBER MERCHANTS, COACH BUILDERS, CABINET AND PIANOFORTE MAKERS, &c.

IMPROVED HORIZONTAL SINGLE BLADE TIMBER FRAME,

FOR COACH BUILDERS, CABINET AND PIANOFORTE MAKERS, &c.

THIS Frame, like the ordinary Log or Timber Frames illustrated in the following pages, is intended to convert Round or Square Logs into Flitches, Planks, Boards, or Panelling, but is specially designed for cutting choice and valuable woods into Pianoforte Tops, Coach Panels, Table and Counter Tops, &c., where it is an advantage to examine the soundness of each board as it is cut.

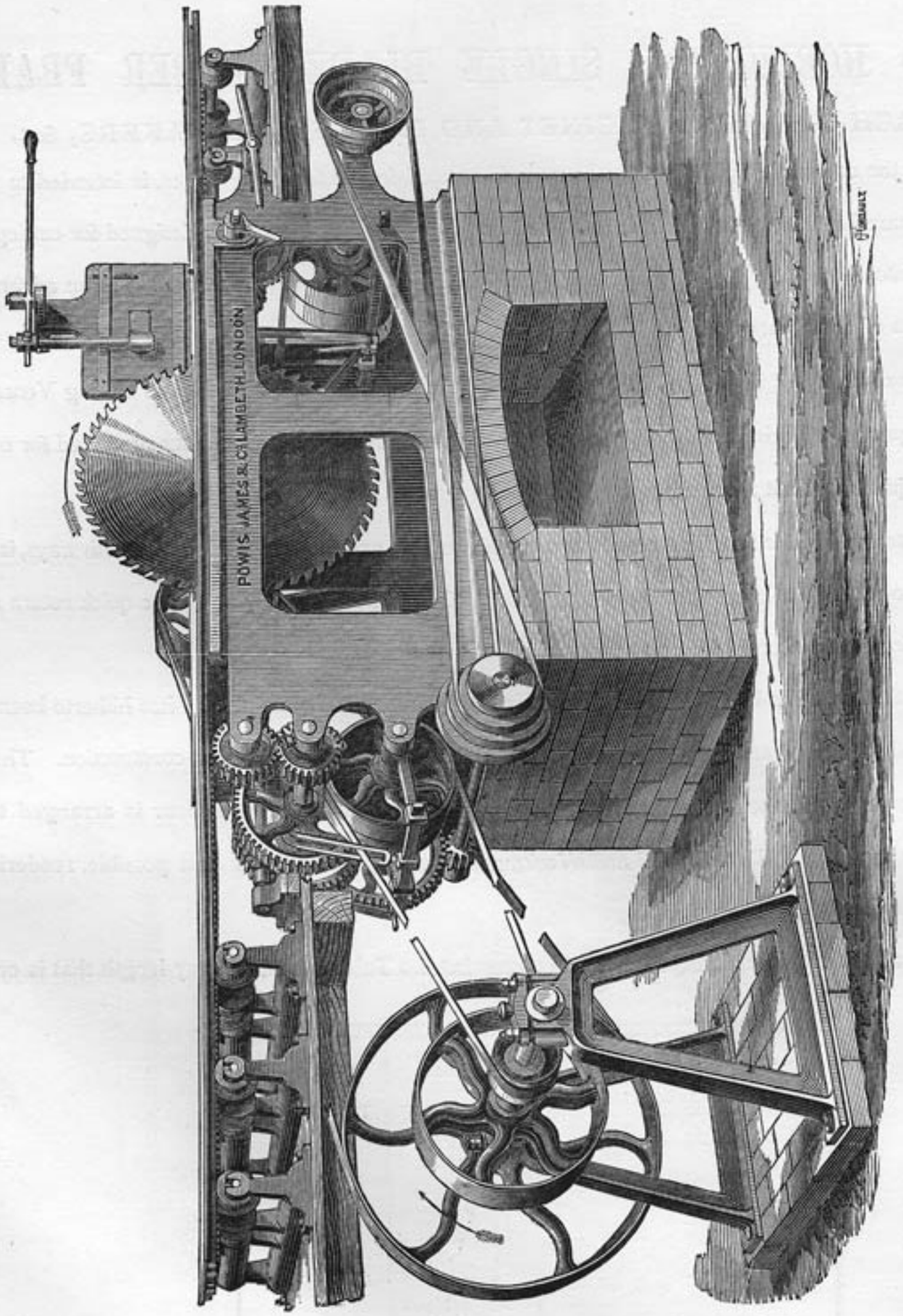
Being capable of carrying very thin Whip Saws, but little more wood is wasted than in cutting Veneers. It has also the advantage of being driven with very little power, for which reason it is sometimes preferred for ordinary work where a large quantity is not required.

Variable Self-acting Feed is supplied to suit hard or soft woods; and the Saw, which cuts both ways, is driven at a very high speed so as to do a large quantity of good work. The Travelling Carriage has a quick return motion, and is arranged to bring up the wood with exact regularity.

It will be seen that care has been taken to render this Machine more substantial than has hitherto been made. The standards are well bracketed and very heavy, whilst the whole Frame is of stronger construction. The Slide Frame has wide guides to ensure the utmost steadiness and great durability. The Feed Gear is arranged to give greater facility to the workmen. The Material and Workmanship throughout are the best possible, rendering the work produced equal in fineness to Veneer Sawing.

The Prices are all taken as for cutting Logs 25 feet long, but the Tables are made any length that is ordered.

Size.	To Cut Logs.	Average Power required.	No. of Revolutions.
No. 1	24 „ × 24 in.	3-horse	220
„ 2	30 „ × 30 „	3 „	200
„ 3	36 „ × 36 „	4 „	180
„ 4	42 „ × 42 „	5 „	160
„ 5	48 „ × 48 „	5 „	150



NEW PATENT RACK CIRCULAR SAW BENCH,

REQUIRING ONLY ONE COUNTERSHAFT.

NEW PATENT RACK CIRCULAR SAW BENCH.

THE utility of the Rack Bench places it almost, if not quite, the first in importance for consideration whenever quantities of large and heavy Timber, round or square, have to be sawn into Planks, Flitches, or Scantling on account of the ease in handling and the rapidity of the work performed.

Over a series of Rollers, placed nearly level with the Mill Floor, an Iron Bed is made to travel by means of strong self-acting Gear. This Bed is divided longitudinally where the Circular Saw is placed.

The log to be cut merely requires to be rolled on to the Bed and adjusted to its proper position, when the Bed is set in motion by a lever and the wood is carried up to the Saw at a speed varying from 12 to 45 feet per minute, the Feed being varied at the workman's pleasure, according to the nature of the wood being sawn. On completing the cut the Bed is run back at 60 feet per minute, and is ready for the next operation.

The Rack Bench we have succeeded in producing, as shown above, will be found by far the most simple, complete, and substantial ever yet offered.

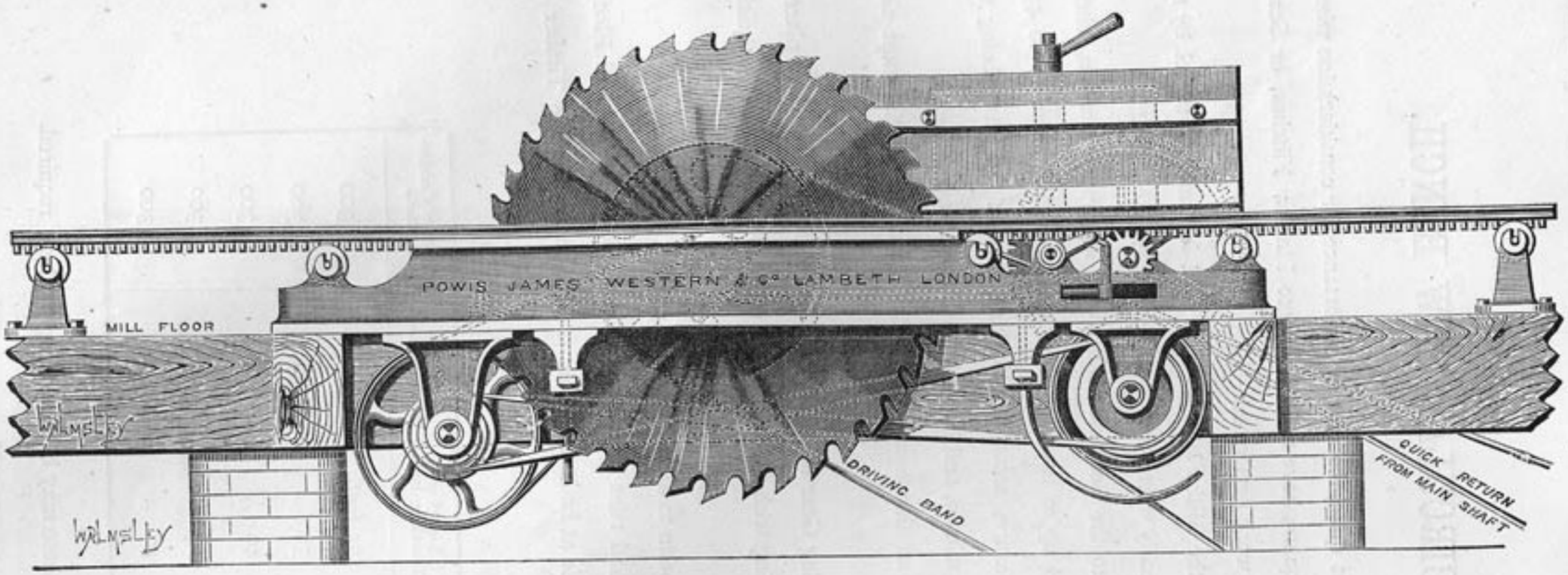
The Frame carrying the Saw, and Feed, and Driving Gear is cast in one entire piece, and when placed on a single block of masonry it is complete, entirely dispensing with the cumbrous wood erections usually requisite in fixing this kind of machine.

One Countershaft only is necessary, which gives motion to all the working parts.

The Travelling Bed is entirely of wrought-iron and runs on turned rollers placed on the Mill Floor, in addition to which a full set of rollers are ranged on the side at back and front of Saw to receive the Timber both before and after being sawn.

Diameter of Saws will carry.	Depth will Cut.	Length of Travelling Bed.	Average Power required.	Speed of Counter-shaft.
No. 1—42 in.	15 inches.	25 feet.	6-horse.	300
„ 2—52 „	20 „	30 „	8 „	300
„ 3—62 „	25 „	40 „	10 „	300
„ 4—72 „	30 „	40 „	14 „	300
„ 5—84 „	36 „	50 „	20 „	300

The usual lengths of Travelling Bed are given, but these may be made longer where required.

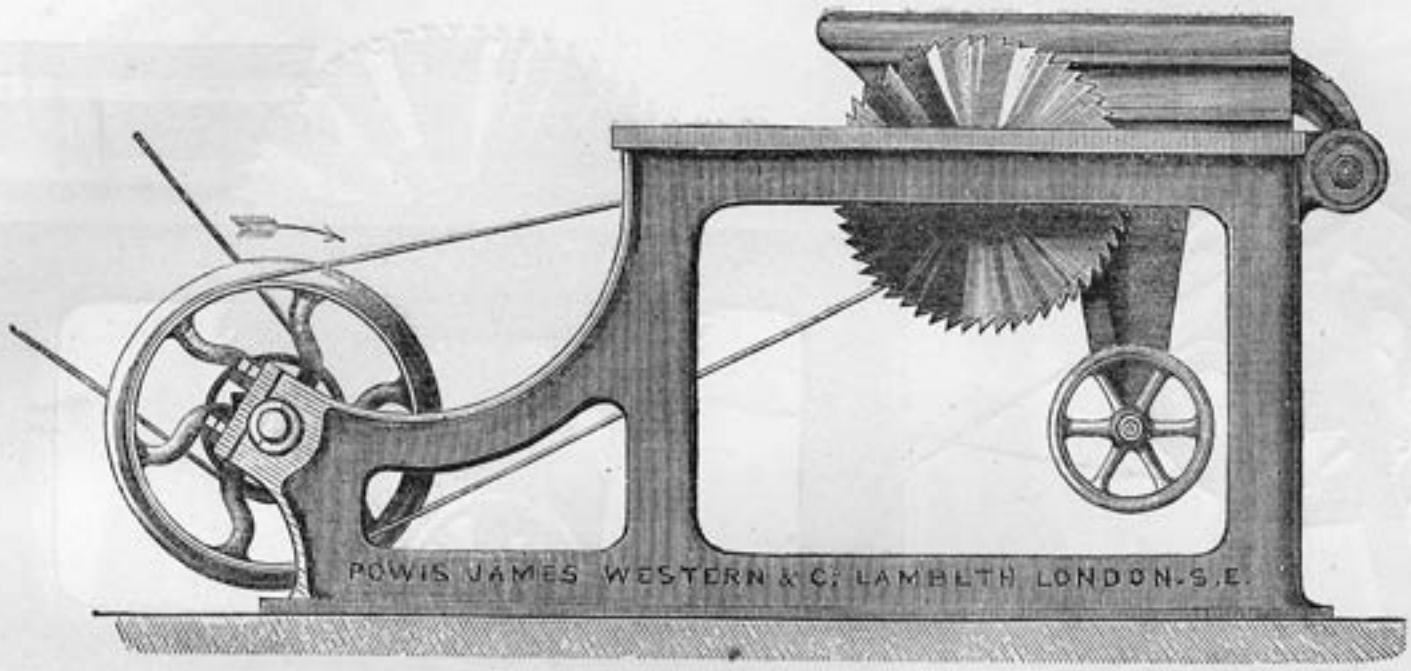


IMPROVED RACK CIRCULAR SAW BENCH.

WHILE for Permanent Saw Mills no better Rack Bench can be made than that shown on the previous page, yet to large Builders and Contractors the form of Bench here shown will recommend itself on account of the great ease with which it may be fixed and removed from job to job as may be required. The Bench itself is a very strong casting, and to it are attached all the gearing necessary to give motion to the different parts. Whereas, in the old form of Rack Bench two and three separate countershafts are often used, in this not one is required, but the Saw and Feed Motion are both driven direct from the Main Shaft, or if on an out-job, direct from a Portable Engine. The Bench may either be fixed on Timbers, as shown in the lithograph, or if it is to be permanently fixed, on brickwork. The quality of the Workmanship and Materials is in all respects first class, and the same as used in the Bench on previous page.

No.	Diameter of Saws will Carry.	Depth will Cut.	Length of Travelling Bed.	Average Power Required.	Speed of Saw.
1	48 inches.	20 inches.	25 feet.	8-horse.	600
2	60 „	25 „	30 „	10 „	500
3	72 „	31 „	40 „	14 „	400
4	84 „	36 „	50 „	20 „	300

Greater Lengths of Travelling Bed can be Supplied.



IMPROVED GROOVING AND REBATING BENCH,

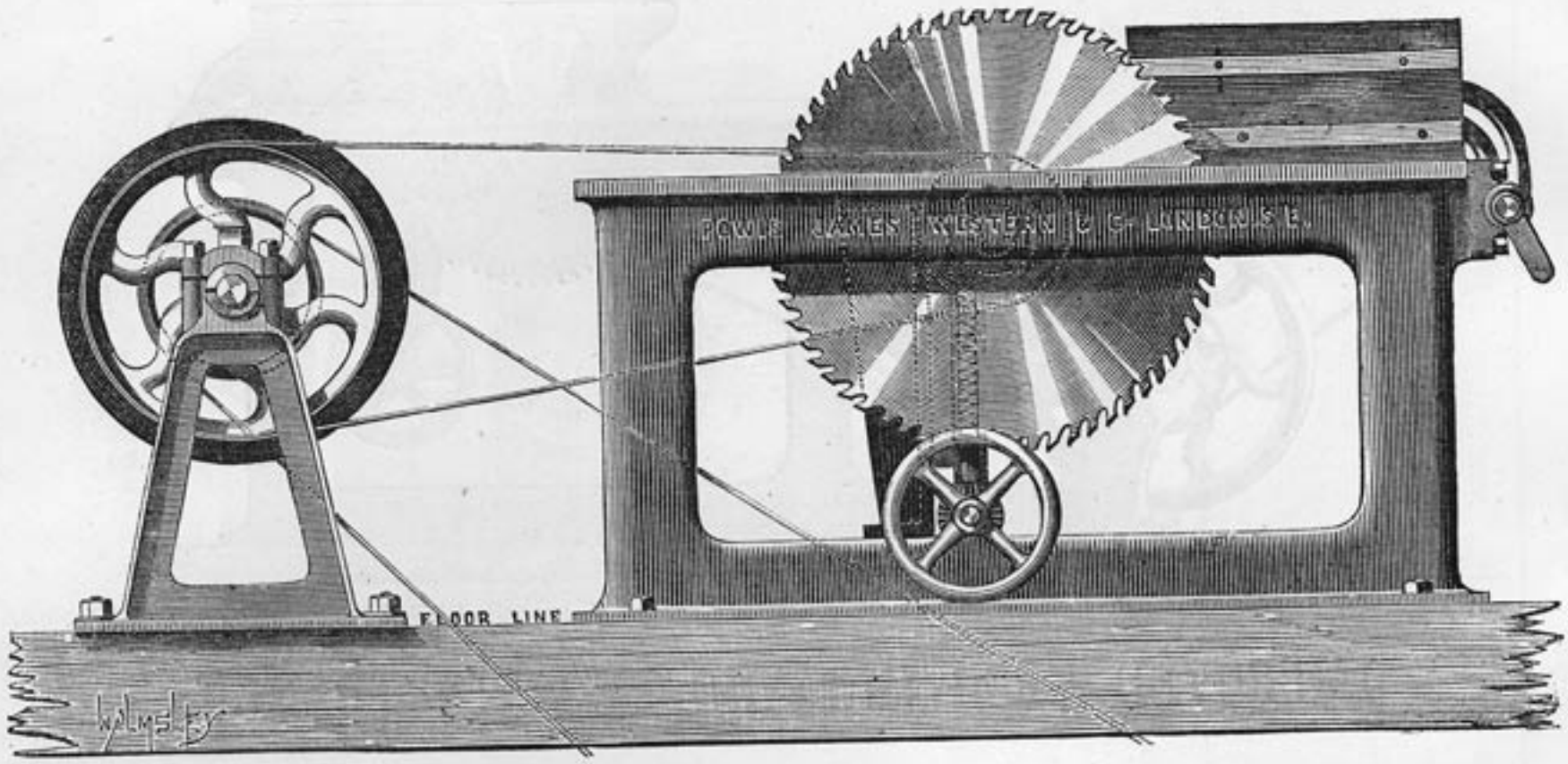
WITH COUNTERSHAFT ATTACHED.

IN all Joiners' and Cabinet makers' shops there is plenty of work for this little bench, which is specially designed for Grooving, Tonguing, and Rebating; but may also be used as an ordinary Saw Bench. The Countershaft, to which is fitted with cone-pulleys to give two speeds, is carried in brackets cast on the Main Frame, and is specially arranged so as to avoid the necessity of cutting the floor to clear the pulleys.

The Fence is made long enough to guide the work past the saw, and can be removed readily so as to leave the top of the Bench clear for cross cutting, &c., without undoing a single screw. The spindle is made long enough for two Tenoning Saws, or Collars for a Drunken Saw; although, instead of the latter, we recommend special Grooving Saws, which we keep in stock.

The price includes the Countershaft and a set of Spanners.

No.	Length of Bench.	Diameter of Saw will Carry.	Speed of Countershaft.	Average Power Required.
1	3 ft. 6 in.	18 ins.	500	2-horse
2	4 ft. 6 in.	24 „	„	2 „



IMPROVED RISING SPINDLE CIRCULAR SAW BENCH,

FOR SAWING, GROOVING, TONGUING, REBATING, BORING, &c.

THIS Bench is of equal strength and durability to that described on the previous pages, and of first class materials and workmanship.

The Saw Spindle and Bearings, being made to rise and fall, offers great facilities for the various requirements of Joiners, Cabinet Makers, and others.

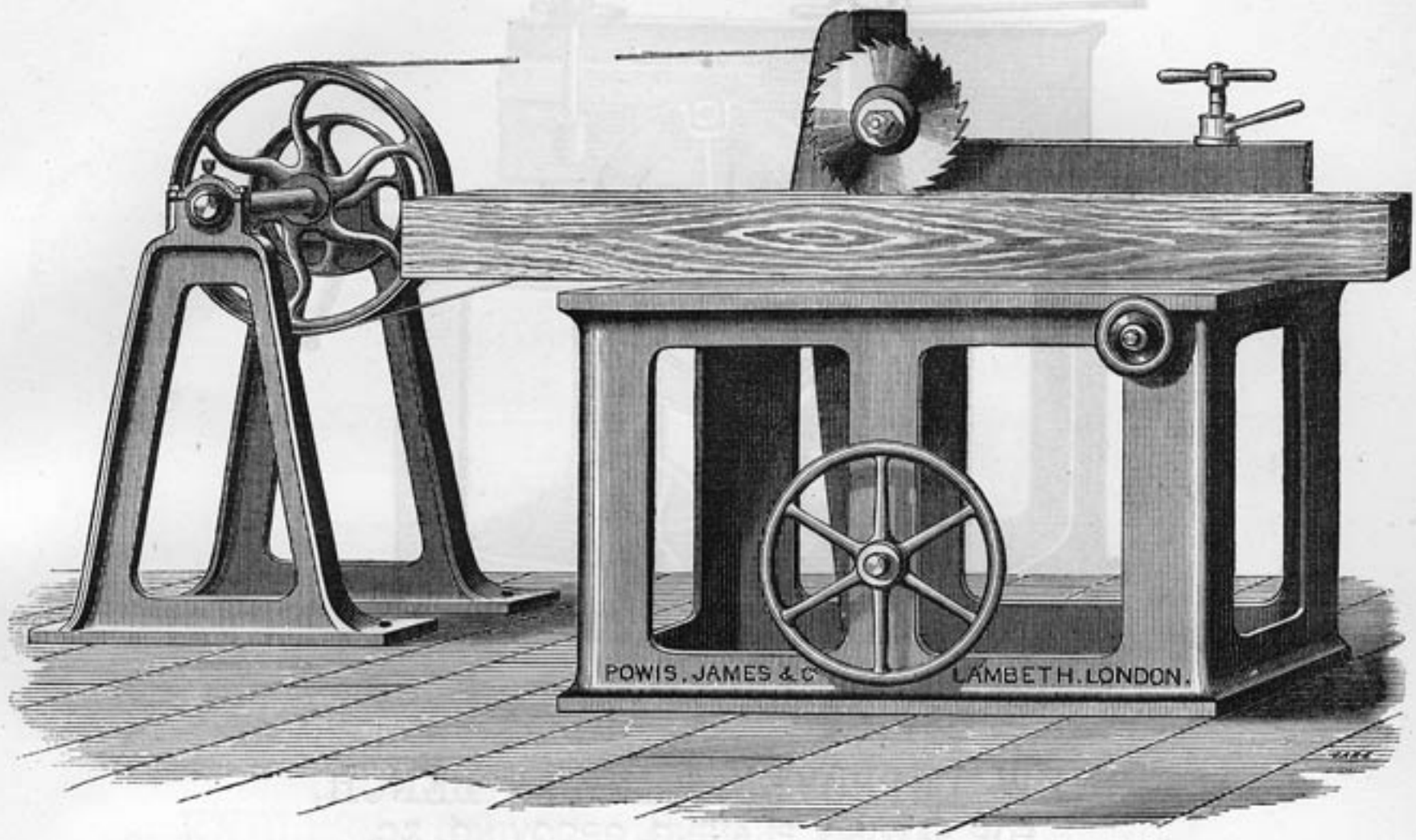
The end of Spindle is made to receive boring bits and slotting tools.

The Fence is made to turn easily out of the way for Cross Cutting.

If the Countershaft is supplied with the Bench, Cone pulleys are fitted on the spindle so that the speed may be altered to suit different sized saws.

A mortising apparatus may be fitted to this Bench, either in front or behind, according to the position it is to occupy in the shop.

Size.	Diameter of Saw will carry.	Depth of Cut.	Speed.	Average Power required.
No.	Inches.	Inches.		Horse.
1	16	5	1,600	2
2	20	7	1,400	2
3	24	9	1,200	3
4	30	11	1,000	4
5	36	14	800	5
6	42	16	650	6

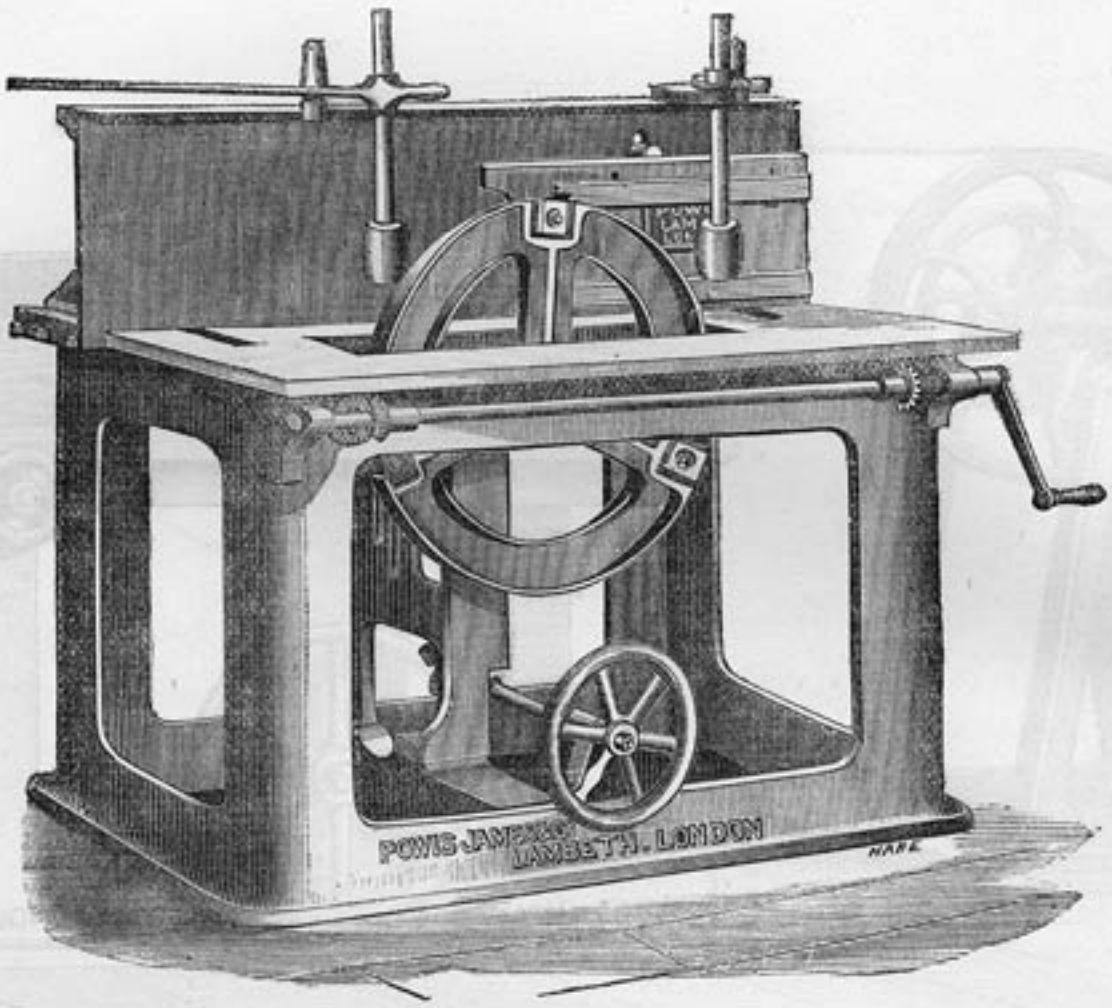


IMPROVED REBATING AND GROOVING BENCH,

FOR RAILWAY CARRIAGE AND WAGON WORKS, &c.

THE special object of this Bench is to rebate or groove large pieces of Timber, on both the upper and lower sides, without the labour and inconvenience of reversing the Timber end for end, and also, after cutting the top rebate, it saves bringing it back to the right hand end of the bench, in order to make the rebate on the under side. This is effected by making the Saw Spindle to rise above the table as shown in the drawing, as well as fall beneath it, as in the usual Rebating Bench on pages 55 and 56.

In working heavy timber a man will stand at each end of the bench, the timber will be pushed forward to make the top rebate, the saw will then be sunk and the timber pushed back again to make the lower rebate. When not required for other purposes it can be used as an ordinary Saw Bench, for which purpose it will carry a 30-inch Saw. The price includes the Countershaft with two speed cones. Speed of same, 500 revolutions per minute.



NEW IMPROVED JOINERS' BENCH,

FOR SAWING, PLANING, GROOVING, &C.

FOR many purposes this Machine will be found exceedingly well adapted, and save a considerable outlay in more expensive Tools.

In small Saw Mills it is used for flatting and deepening, cutting Plain and Feather-edged Boards, &c., up to 9 and 12 inches, for which purposes no better plain Saw Bench can be made; also, for making Matched Boards, Skirtings, and planing Floor Boards, Scantlings, &c. A Moulding Block may be added with cutters and springs for sticking Sash Bars, Beads, and ordinary stock Mouldings.

In many trades, such as Wheelwrights, Coach-builders, and Agricultural Implement Makers, it will be found one of the most useful general machines that can be employed, and capable of earning as much money as far more costly tools. It is exceedingly easy to work and keep in order, and may be changed for the various kinds of work at an average of about one minute each change.

For Gentlemen's estates, Farm Buildings, &c., it is particularly suitable, both for light and heavy work. The smaller size will take wood of any length up to 9 inches deep by 10 wide; the larger, up to 12 inches by 13.

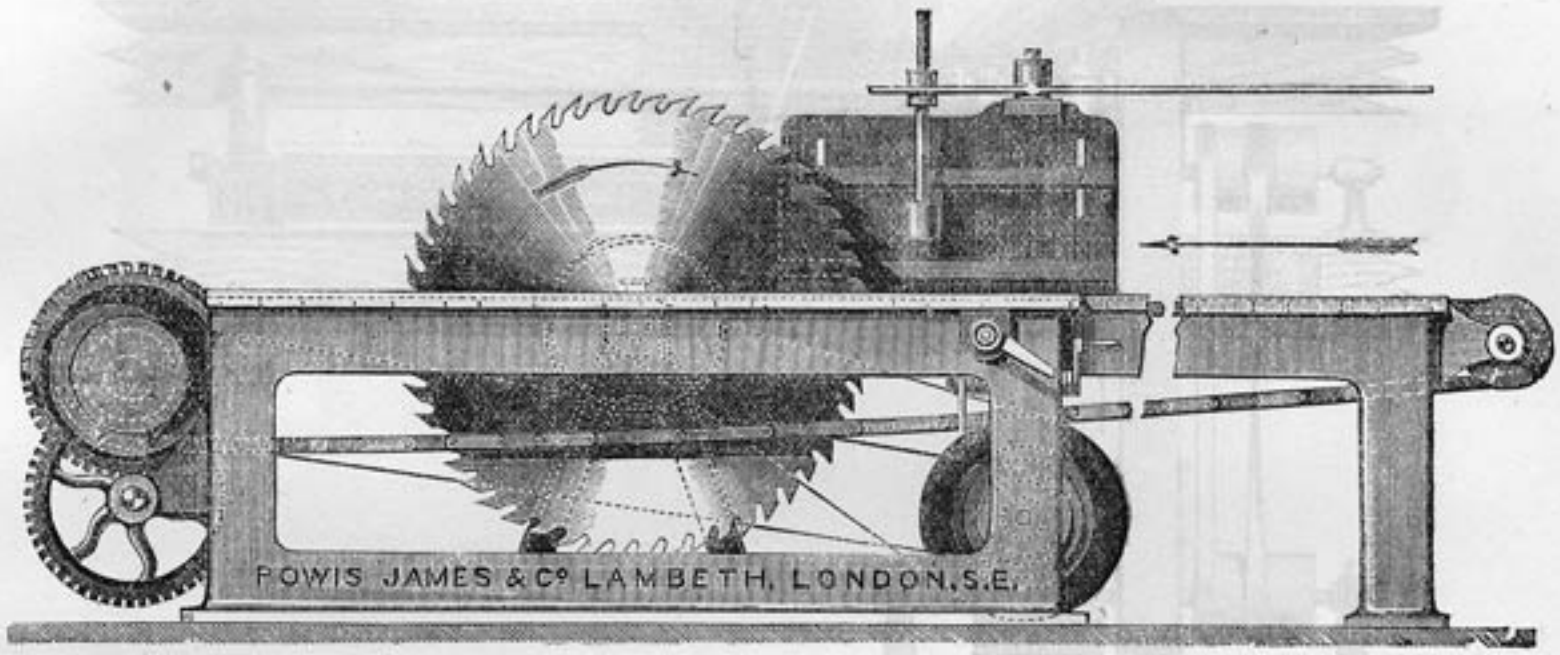
The Framing is cast in one entire piece, and each Bench supplied with extra Fence for plain and angular sawing, planing disc and plane irons, binding rollers and holding down rollers; and fitted either with one speeded pulley, to suit the different speeds for Sawing, Moulding, &c., or a pair of fast and loose pulleys.

The outer end of Saw Spindle is fitted to receive boring or slotting tools.

A special apparatus for mortising may also be added at small extra cost.

Size.	Diameter of Saw will carry.	Speed for Sawing.	Speed when Moulding.	Average Power required.
No. 1	26 inches.	1,200	2,000	3-horse.
No. 2	32 ,,	1,000	2,000	4 ,,

This Bench can be had for Sawing and Planing only, in which case the Spindle is fixed, instead of being made to rise and fall as here.



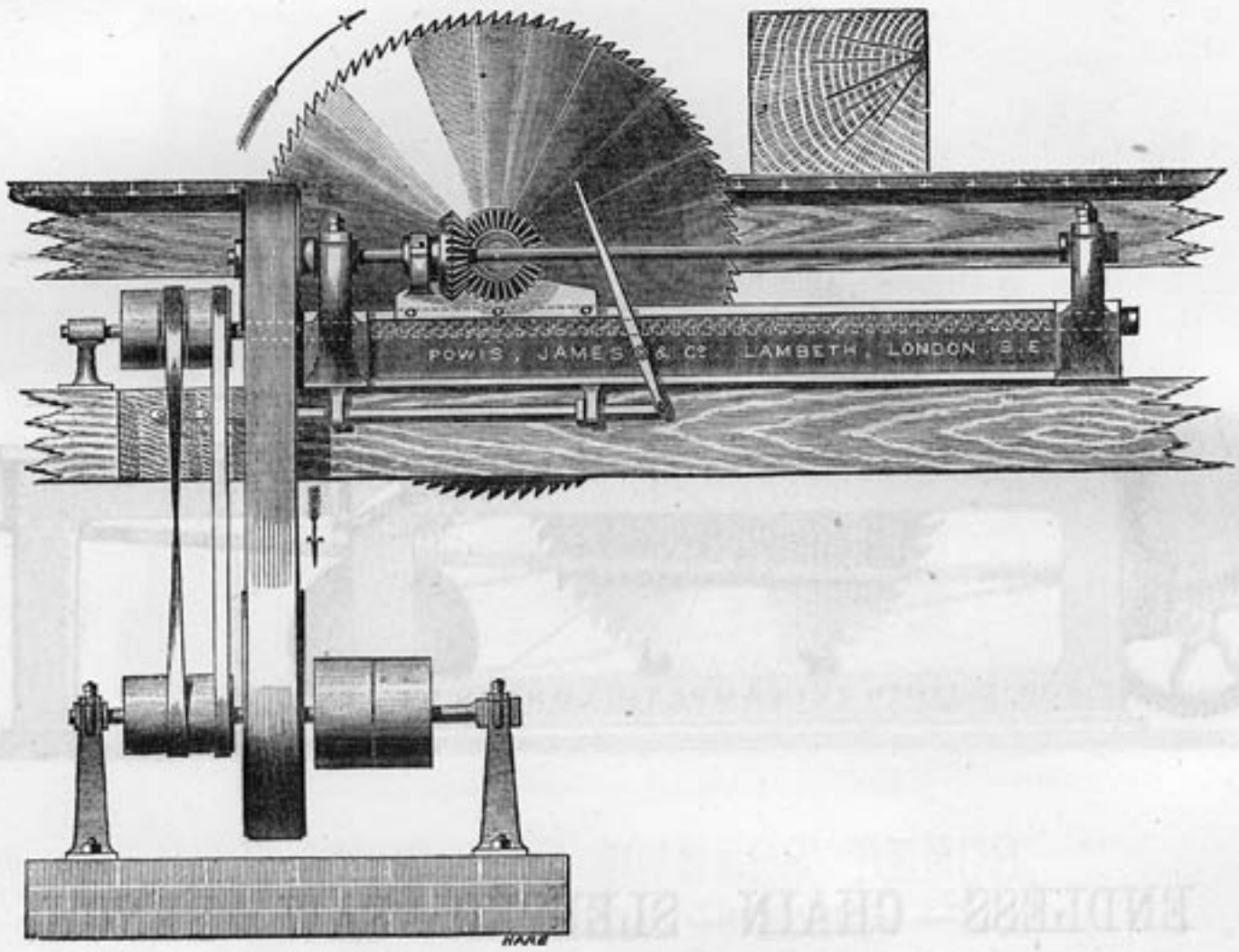
ENDLESS CHAIN SLEEPER SAW BENCH.

THIS Bench is specially designed for Cutting Railway Sleepers, but at the same time the Contractor will find it a very useful Bench for many other purposes, such as Cutting Deals, Scantling, &c. Sometimes we make this Bench so as to carry two Saws at one time, which, if kept properly in order, will turn out double the amount of work with less labour than with one Saw only.

The Fence is adjustable for Feather-edged Cutting, and is furnished with a Binding Roller.

No.	Will carry Saw.	Depth will Cut.	Length.	No. of Revolutions.	Average Power.
1	42 in. diameter.	16 in.	12 feet.	700	6-horse.
2	48 „ „	19 „	12 „	800	8 „

Extra lengths of Table and Chain can be supplied.



HORIZONTAL CROSS-CUTTING MACHINE,

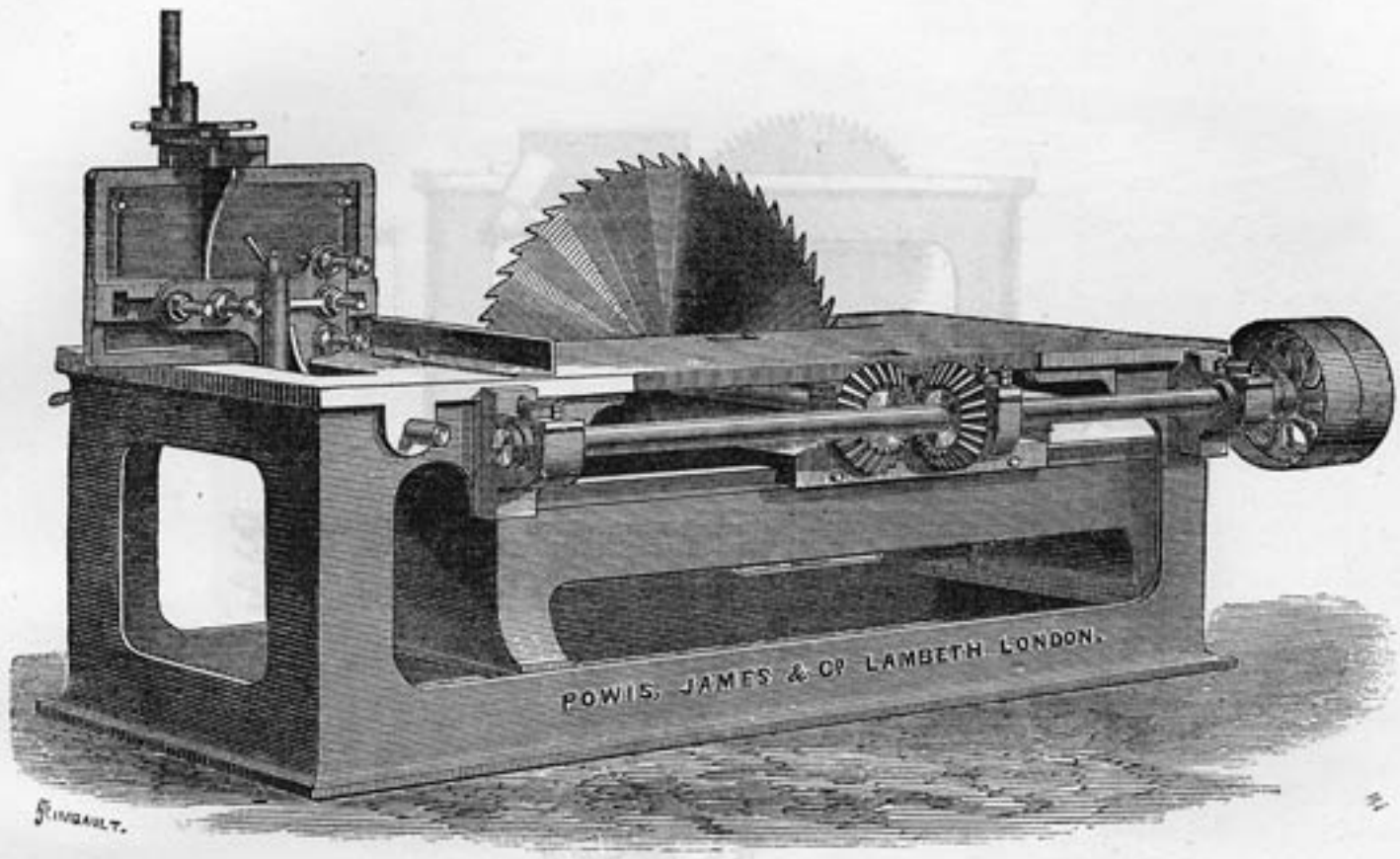
FOR LARGE TIMBER.

THIS is the best form of Cross-cutting Bench for large-sized Timber, such as is used by ship-builders. The frame-work is all placed below the mill floor, in which is a slit for the saw to traverse. We thus avoid the labour of lifting the heavy pieces of Timber on to the table. The traversing motion is self-acting, backwards and forwards, and under perfect control of the workman.

The Countershaft may be fixed to the roof instead of under the floor, if more convenient.

The Price includes Countershaft and a set of Spanners.

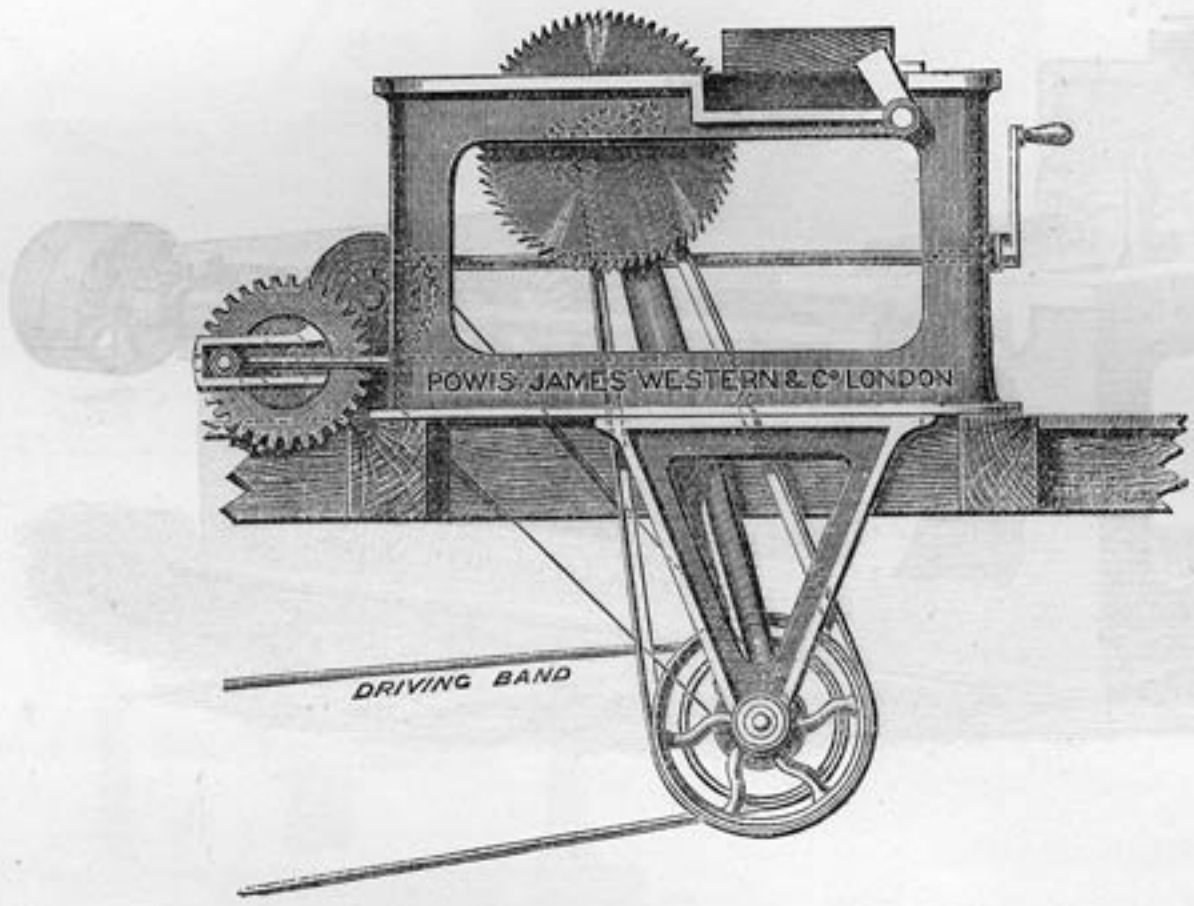
No.	Diameter of Saw.	Will Cross-cut.	Speed of Driving Pulleys.	Average Power.
1	52	20 in. by 20	250	4-horse
2	62	25 in. „ 25	250	5 „
3	74	30 in. „ 30	250	6 „



COMBINED CROSS CUTTING AND RIPPING BENCH.

THIS will be found a most useful bench for Cross-cutting only, but is specially designed for employment in a shop where there is not sufficient of this work to keep it always going as such. By removing the Angle iron fence shown in the drawing, it is at once made into an ordinary Ripping Saw Bench. As in all cross-cutting Benches of good design, the saw is here made to move through the wood, instead of the wood being pushed through the saw. This is accomplished either by a self-acting feed, or by a hand wheel, according to the wish of the purchaser. The Frame of the Bench, like all ours, is cast in one piece, and the driving gear is so arranged that no special countershaft is required, and the floor need not be cut away as in Pendulum benches.

No.	Diameter of Saw for Cross-cutting.	Will Cross Cut.	Depth will Rip.	Average Power for Cross-cutting.	No. of Revolutions.
1	26	9 in. by 9 in.	12 in.	2	900
2	32	12 „ 12 „	15 in.	3	800
3	42	16 „ 16 „	20 in.	4	600

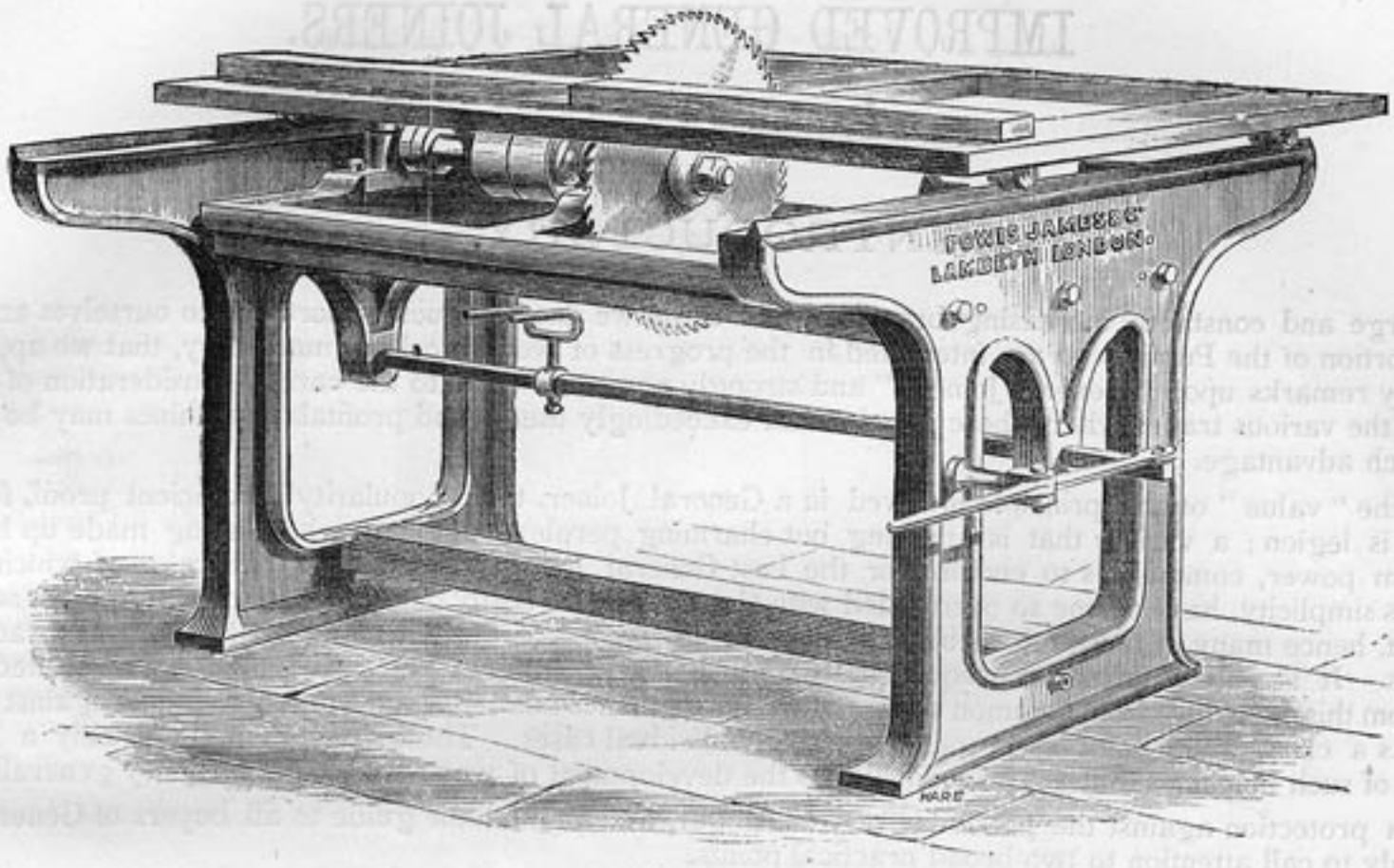


SELF-ACTING PENDULUM CROSS-CUTTING BENCH.

THIS Bench is specially designed for Packing Case Makers and Cabinet Makers, or others who have a quantity of cross-cutting to do, and who want it done expeditiously and accurately. The saw is moved backwards and forwards by self-acting gear, and the lad who attends to the Bench has only to put the Wood in position for cutting.

A setting out Bar is fitted to the Bench, for cutting off Boards accurately to length. If preferred, the Saw can be brought through the Wood by means of a Treadle, instead of the Self-acting Feed.

Will Cross-cut.	Diameter of Saw will carry.	Speed of Countershaft.	Average Power.
12 in. × 3 in.	24	500	2-horse.



IMPROVED CROSS CUT BENCH, WITH SLIDING TABLE,

FOR JOINERS, CABINET AND PACKING CASE MAKERS, PIANOFORTE MANUFACTURERS, &c.

THIS is made to carry a 20-inch circular saw, and to cut up to 6 inches deep by 18 inches wide. It is fitted with Stop and Gauge Rod for setting out lengths.

The Table is very light and runs with great ease on V grooved wheels.

In addition to cross-cutting Boards, Scantlings, &c., if fitted with a special saw (see price list page) it may be used and found invaluable for fitting Drawer Fronts, squaring off Drawer Sides, Carcase ends, and other work for Dovetailing, leaving the edges perfectly true and almost equal in fineness to that of the best trying plane.

Where desired, an extra Table is supplied with adjustable Fence for ordinary sawing, straight or angular.

No. of Revolutions.	Average Power.
1,800	2-horse

IMPROVED GENERAL JOINERS.

INTRODUCTORY.

THIS large and constantly increasing branch of our trade we deem of such importance to ourselves and a large proportion of the Public who are interested in the progress of wood-working machinery, that we append these introductory remarks upon "General Joiners," and strongly commend them to the careful consideration of all practical men in the various trades where these popular and exceedingly useful and profitable machines may be employed with so much advantage.

Of the "value" of the principle involved in a General Joiner, their popularity is sufficient proof, for already their name is legion; a variety that is anything but charming perplexes the man who, having made up his mind to adopt steam power, commences to enquire for the best General Joiner. A machine, the value of which can only consist in its simplicity, has become so overloaded with elaborated and costly detail that its primary object seems quite lost sight of, hence many of these too highly ingenious productions are aptly termed by the bulk of practical men Toy Joiners. It is only a natural consequence that much disappointment and loss should have resulted in many quarters from this departure from common sense simplicity, and hence has arisen a mistaken prejudice against Combined Machines as a class, which can only properly apply to individual cases. These defects entail not only a loss to the purchasers of such machines, but act prejudicially to the development of wood-working machinery generally.

As a protection against the possibility of this danger, and an infallible guide to all buyers of General Joiners, we have only to call attention to two broad practical points.

The first is very obvious, yet often overlooked; it simply consists in seeing that the Machine will really do what you require of it. For example, a builder has a large quantity of ordinary doors to make, for which purpose he determines to buy a General Joiner, and probably finds that he can work the Stiles and Top Rails, but that the machine will not take in the Middle and Bottom Rails and Panels, to say nothing of Stair Treads, Risers, Skirtings, &c.; true, it may be large enough to make Sashes or Dwarf Doors, stick-angle Beads, and Architraves; but it is not satisfactory that a General Joiner should leave off where the bulk of the work commences.

The second point is of nearly equal importance, but requires to be more carefully noted, as it is so seldom thought of. Upon it depends entirely the commercial value of the machine, viz., the length of time occupied in changing from one class of work to another. Upon a careful investigation, we find that in an ordinary joiner's shop, of say 20 or 30 men, the average number of changes per day of ten hours required in a General Joiner for different kinds of work, amounts to 50. If a machine takes ten minutes each change, eight hours and twenty minutes of the day are lost in changing alone, leaving one hour and forty minutes only for sharpening and work. Where this occurs, and which is usually the case in complicated machines, their value is all but neutralized, but few varieties of work can be done, and the machine certainly is not a General Joiner. To deserve this name it should be capable of fifty changes at least in sixty minutes; then, allowing one hour per day for sharpening, eight hours from ten are left for profitable working. This is generally the result obtained from our General Joiners, and due entirely to their simplicity, whilst every operation for which they are designed is performed as well as it could be done by any machine made. These essential requisites have made our machine deservedly popular; they fully account for the large number we have sold, and induce us to maintain our stand (as we have hitherto done successfully) upon the value of any machine from its money-earning point of view.

We have seen cases where otherwise good machines have been so ill adapted to a Builder's requirements that they have had to stand idle five days out of six, simply because the number and smallness of the jobs would not pay for the time occupied in changing.

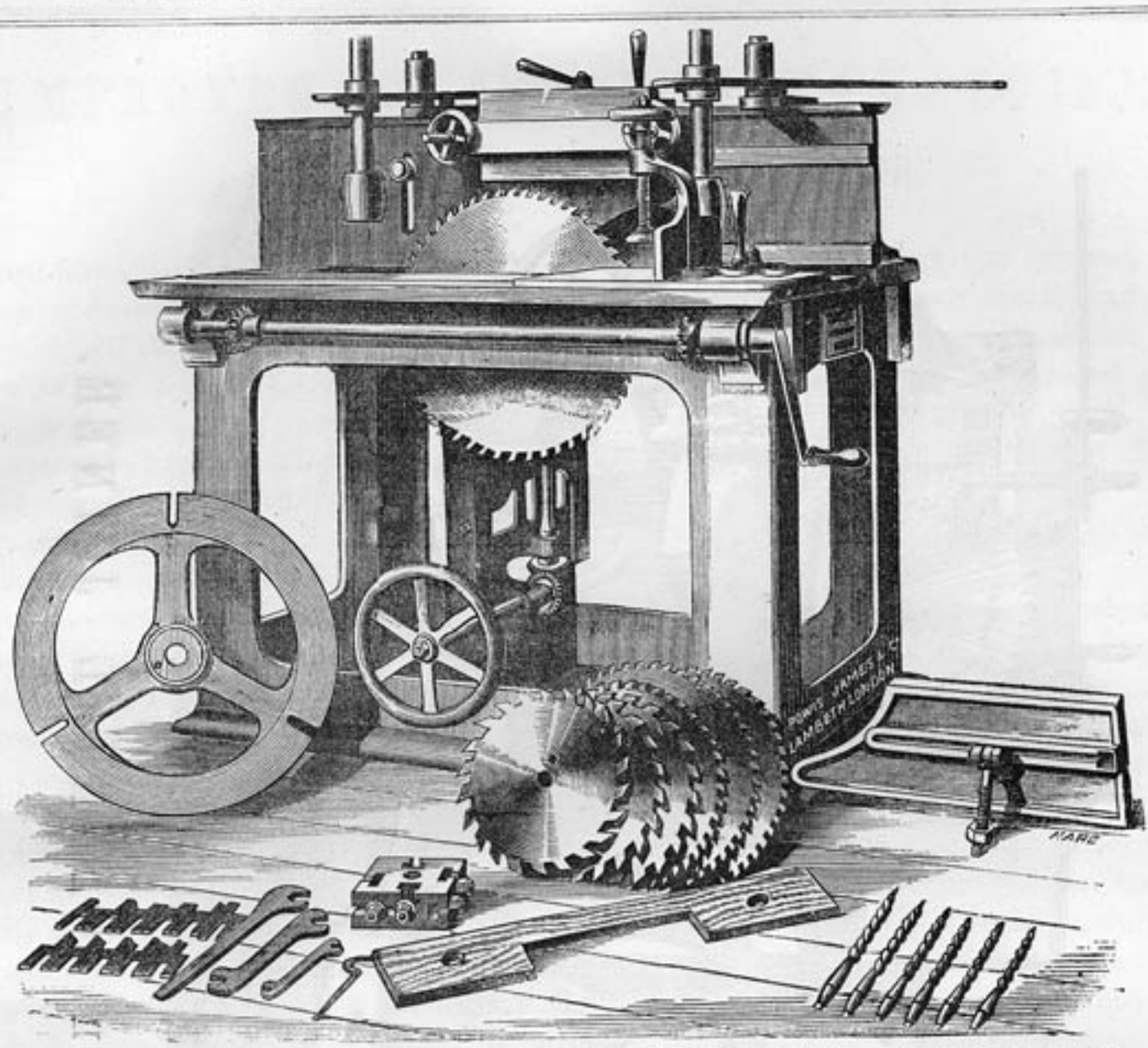
These remarks apply with equal force to Cabinet Makers, Pianoforte or Agricultural Implement Manufacturers, or any other trades for which this machine is suited, and where its earnings should average from £4 to £6 per day. In order to ensure this result, we invariably advise our friends to have a competent man from the works to fully instruct in its use.

There are other considerations worthy of notice that also apply to machinery in general, *i.e.*, the greater the simplicity of construction; the more heavy work may be got through with less liability to get out of order, in addition to which much less skill and attention is required on the part of the workman.

One of these machines may always be seen in operation at our works.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.



IMPROVED 26-in. GENERAL JOINER.

THIS machine is designed for all kinds of Sawing up to 9-in. deep; Planing and Thicknessing up to 7-in. wide at one cut, and 11-in. by reversing, from ½-in. up to 9-in. in thickness; Moulding and Chamfering Sash Stuff, Beads, Inlay, Bolection, and Architrave Mouldings, up to 4 inches wide; if single or double sunk, up to 6 inches; Edging, several thicknesses at one time. up to 9 inches wide; Rebating, Tonguing, and Grooving of all kinds; Mitreing Stair Risers, &c.; Tenoning, Single and Double; Shouldering, without setting out; Boring from outer end of Spindle, &c., &c

Timber of any length may be Sawn and Dressed up to 9 inches square. Doors, Sashes, Stairs, Skirtings, Flooring, &c., may be made, leaving but little to be done by hand beyond wedging up and cleaning off.

Hard woods, such as Mahogany, Oak, Beech, Ash, may be worked equally as well as Deal or other soft woods by adopting a slower feed.

The average time occupied in changing the machine from one kind of work to another is about one minute.

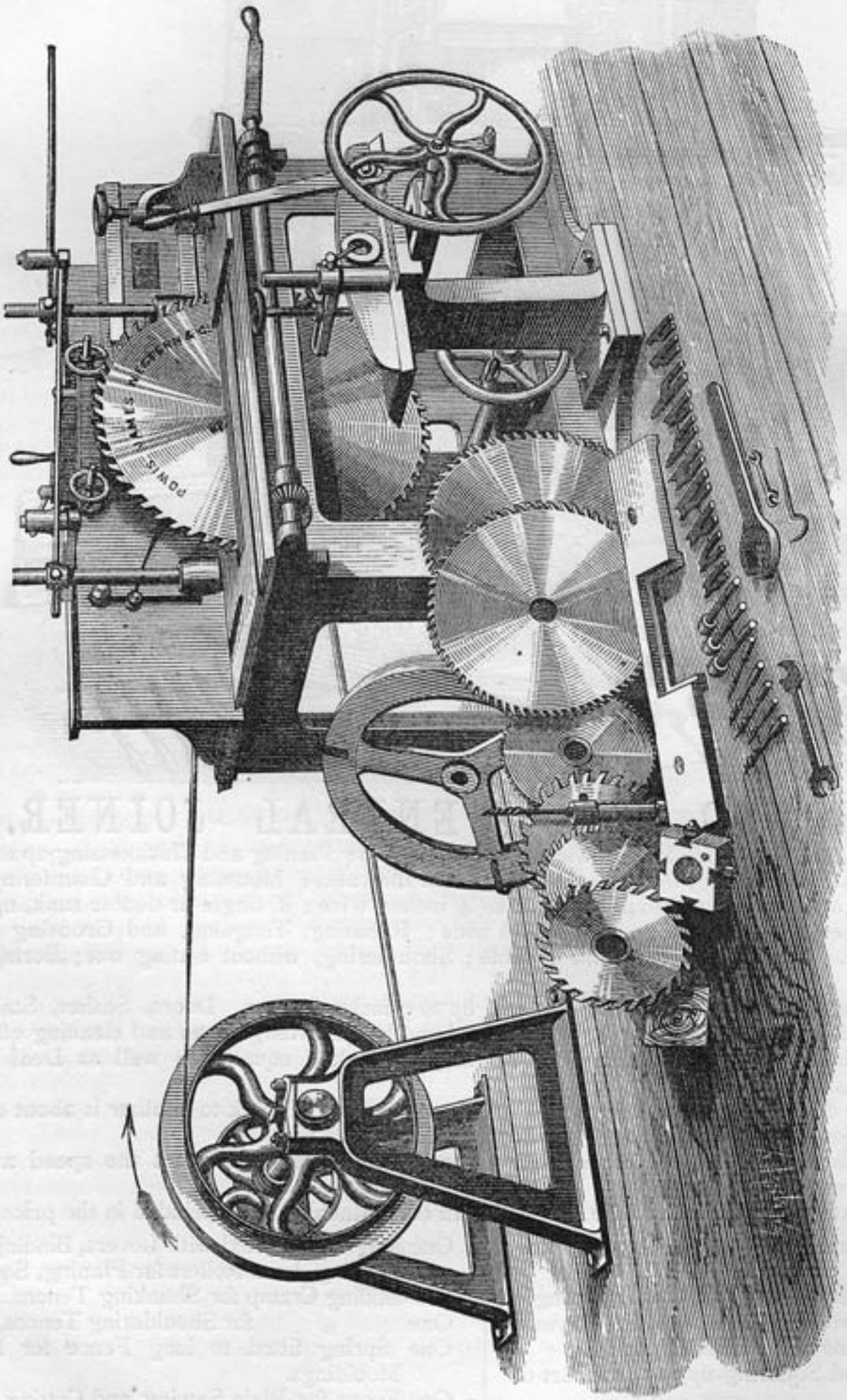
A special arrangement for Mortising may be added at small extra cost.

If a countershaft is supplied, cone pulleys are fitted on the saw spindle, so that the speed may easily be changed to suit the different operations.

The following Tools of the best make are supplied with each Machine, and included in the price:—

One 26-inch cast-steel machine-ground Circular Saw for Plain Sawing.
Two 18-inch do. do., with fine teeth for Tenon cutting.
Three 12-inch cast-steel Grooving Saws, thickness varying.
One 12-inch Saw, with fine teeth for Shouldering.
One Disc for Planing and Squaring-up, &c., with set of Tools.
One Moulding Block, with full set of Bolts, one False Plate, and three sets of various Moulding Cutters.
One set of six Patent Screw Augers, various sizes.
One long Fence fitted with Levers, Binding Rollers, and Holding-down Rollers for Planing, Squaring-up, &c.
One Sliding Cramp for Shanking Tenons.
One „ for Shouldering Tenons, Mitreing, &c.
One Spring fitted to long Fence for holding down Mouldings.
One Fence for Plain Sawing and Cutting Feather-edge Boards.
One full set of Spanners and Handles to fit the various Bolts and Nuts.

Speed for Sawing, 1,000; for Moulding, 2,000. Average Power, 4-horse.



IMPROVED 32-in. GENERAL JOINER.

IMPROVED 32-in. GENERAL JOINER,

WITH MORTISING APPARATUS.

THE great favour with which our General Joiner, described on the previous page, was received, and the many wishes expressed for a larger machine, precisely similar in every respect, except size, induced us to introduce this one, which will be found of still greater power and capability, and fully commensurate in itself to the requirements of any moderate-sized establishment, whilst it is increasingly useful for general purposes where larger and separate machinery is employed.

It has proved a great success, the sale considerably exceeding that of the smaller machine; it has also met with the most unqualified approval in every case.

Being of the same simple construction, it is as easily managed and readily changed for every variety of purpose, whilst it is capable of working up to much larger dimensions.

By this Machine alone Timber of any length up to 13 inches wide × 12 deep may be converted into Doors Sashes, Flooring Joists, and Floor Boards, Matched Boarding, Skirtings, and Mouldings; all other kinds of work up to the same sizes may be done with equal facility in hard or soft woods.

Its strength and durability is proportionate to that of any machine manufactured by us, whilst its price is much below the lighter machines of this class, which are not capable of half its range of work, consequently are unable to earn anything like the same amount of money.

This machine will Saw up to 12 inches deep, Plane 9 inches wide at one cut, Mould, and Dress Skirtings, &c., over 13 inches wide, cut Tenons and Shoulder without setting-out, Mortice, Bore, Rebate, Tongue, Groove, Mitre; in fact, do nearly every operation required in Joinery, &c., except putting together and cleaning-off, with great rapidity, and a truth and finish not only unattainable by hand, but equal in point of quality to that of separate machines. For other particulars see previous page. A competent man may always be had from our works to fully instruct in the working of the Machine in any trade for which it may be required.

Speeded Pulleys are supplied to save the necessity of altering the length of Belt when changing speeds.

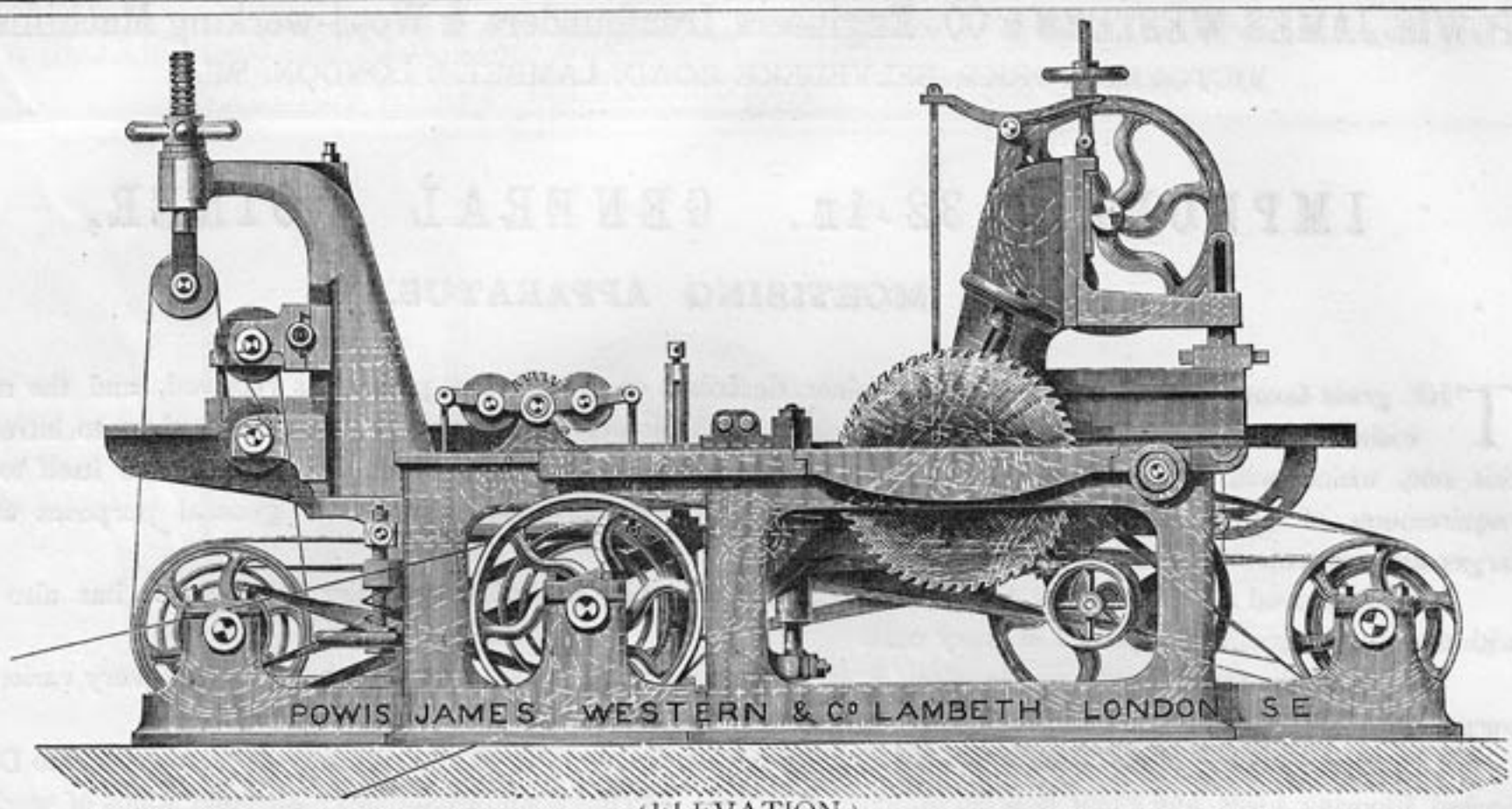
The object of placing the Mortising Apparatus in front of the Joiner is to save room in the shop, as then the back side of the Machine can be placed close to the wall, but if preferred it can be placed at the back side instead.

The countershaft and following Tools, of the best make, are included in the price :—

One 32-inch Cast-steel machine-ground Circular Saw for Plain Sawing.
Two 18-inch do. do. with fine teeth for Tenon cutting.
One 12-inch Saw with fine teeth for Shouldering.
Three 12-inch Cast-steel Grooving Saws, thickness varying.
One Disc for Planing and Squaring-up, &c., with set of Tools.
One Moulding Block with full set of Bolts, one False Plate, and three sets of various Moulding Cutters.
One set of Six Patent Screw Augers, various sizes.
One set of Six best Mortising Augers.
One long Fence fitted with Levers, Binding Rollers, and Holding-down Rollers for Planing, Squaring-up, &c.
One Sliding Cramp for Shanking Tenons.
One „ for Shouldering Tenons, Mitreing, &c.
One Spring fitted to long Fence for holding down Mouldings.
One Fence for Plain Sawing and Cutting Feather-edge Boards.
One full set of Spanners and Handles to fit the various Bolts and Nuts.

Speed of Countershaft.	Average Power required.
500	4-horse.

These Machines may be had without the Mortising Apparatus if preferred.



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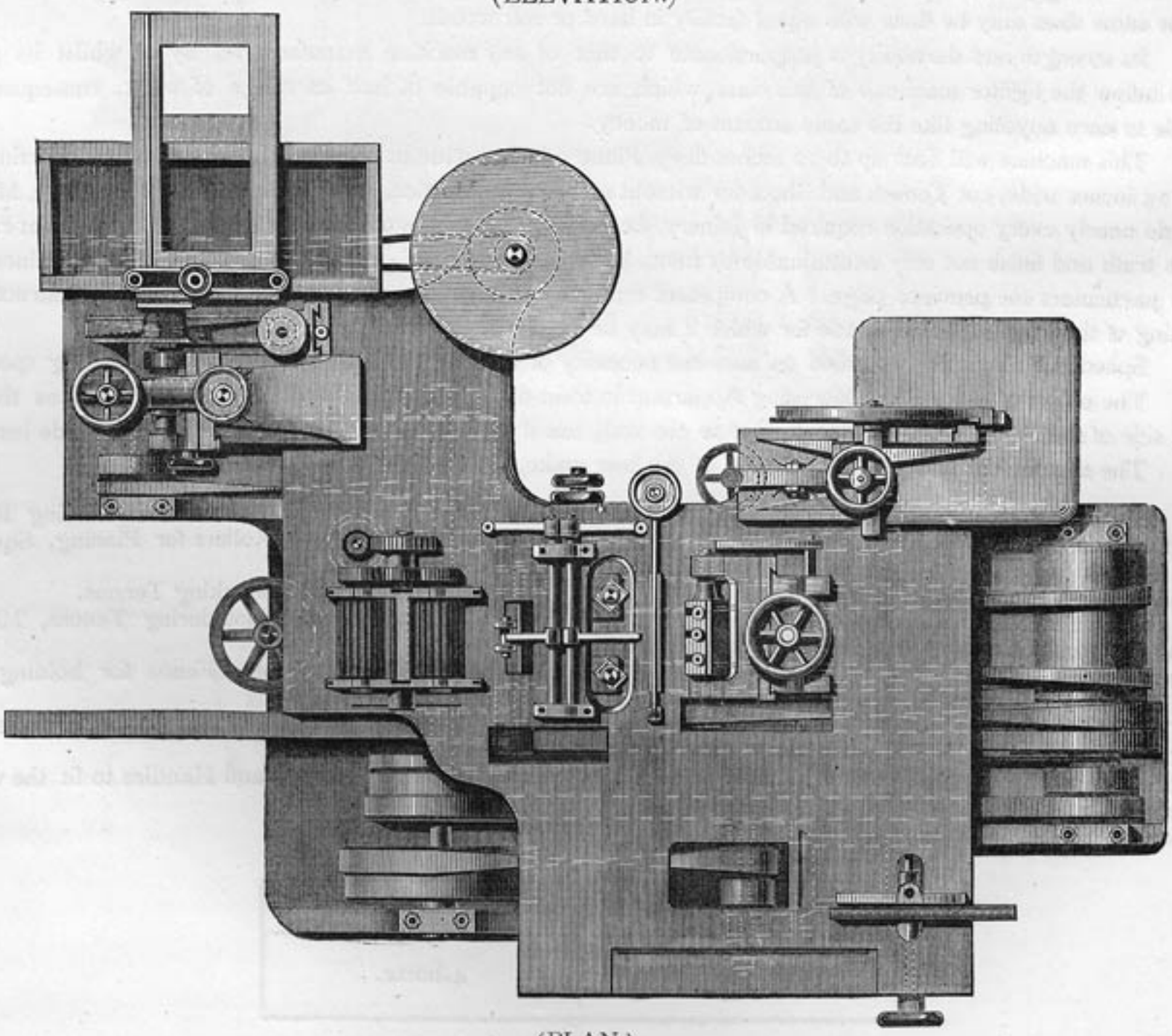


(PLAN.)

NEW PATENT UNIVERSAL JOINER.

NEW PATENT UNIVERSAL JOINER.

THIS Machine is entirely different in its character from those generally sold under the name of General Joiners. It is not, like them, one Machine made to serve many purposes, but is a combination of five distinct Machines in one compact selt-contained Frame, so that every operation in the manufacture of Joinery, can be carried on independently at a great economy both of first and subsequent cost, and of workshop space.

The different parts of this Machine are as follows:—

1st.—A Rising and Falling Spindle Circular Saw Bench for Plain Sawing, Cross-cutting, Grooving Rebating, and Boring. It is fitted with an adjustable Fence, easily removable, and leaves the top clear for Cross-cutting. The Saw Spindle is of Steel, and the front end is bored out to receive Boring or Mortising Augers.

2nd.—A Moulding and Planing Machine, to work wood of any length on all four sides at one operation, at speeds varying from 8 to 20 feet per minute.

3rd.—A complete Tenoning Machine, with Vertical Spindle for cutting double Tenons, Scribing Sash Work, &c.

4th.—A Patent Endless Band Saw Machine. It is fitted with Table arranged to cut at various angles, and our Patent Spring Adjustment, which almost entirely does away with the breakage of Saws.

5th.—An Improved Curvilinear Moulding and Shaping Machine, for all kinds of Cabinet Work, Gothic Work, Circular Window Heads, &c.

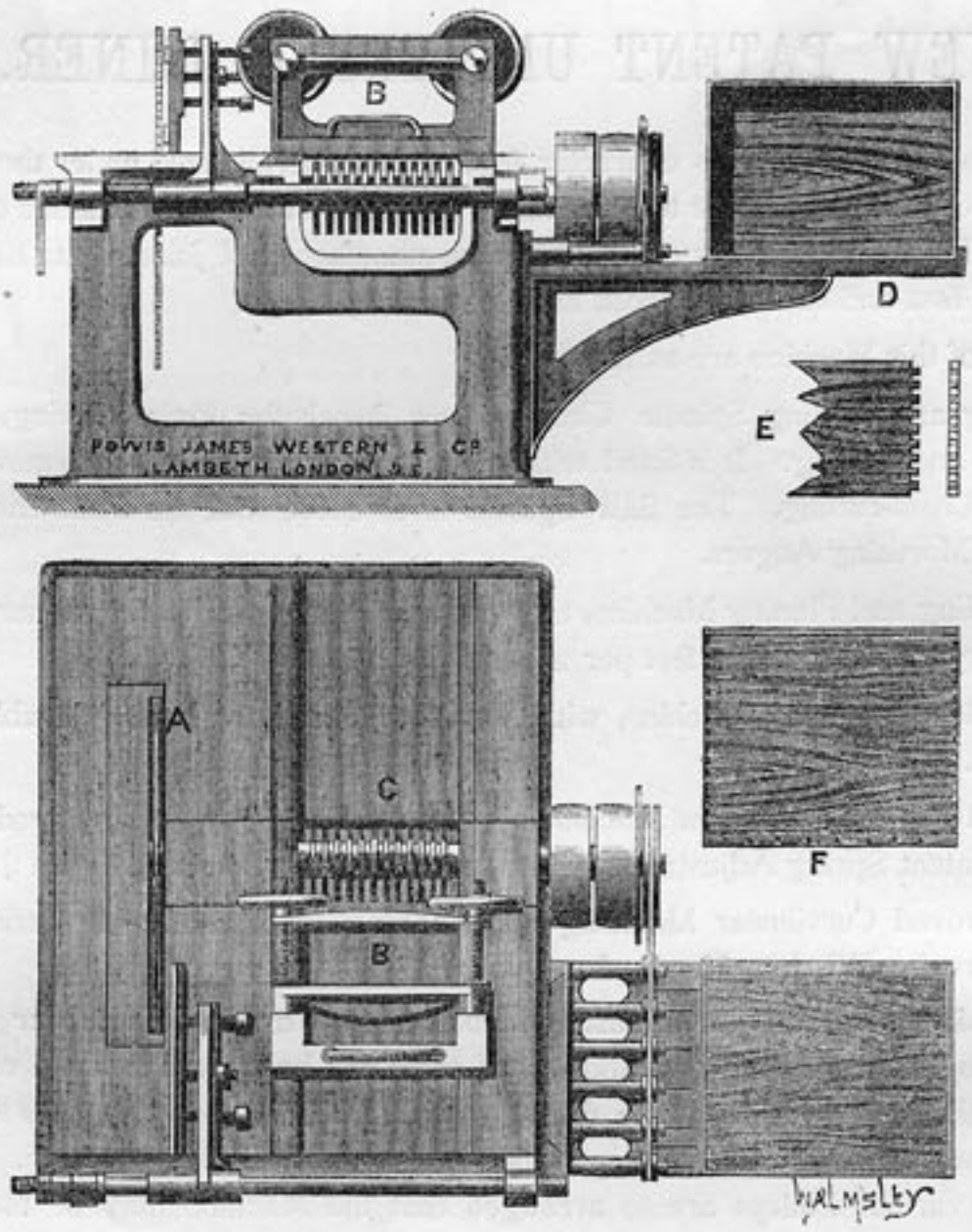
Each of these five Machines is fitted with Fast and Loose Pulleys and Striking Gear and Countershafts so that they may all be worked together or separately, and any of them can be started to work or stopped without in any way interfering with the others. A glance at the drawings opposite will show that the five Machines may all be worked at the same time, without their respective workmen getting in one another's way. Only one Main Driving Belt is required, and the various Pulleys are so arranged that the Machine may be fixed without cutting away the shop floor.

Three sizes of this Machine are made, and the following tools are included in each case:—

One Circular Saw for Saw Bench to cut the depth named.
Three 12-in. Grooving Saws, assorted thicknesses.
Six American Augers.
One Set of Eight Plane Irons.
One Set of Four Tenoning Knives, and a Scribing Block.
Two Best French Band Saws.
One Set of Bead Irons.

No.	Depth will Saw.	Width will Plane and Mould.	Average Power required.	Speed of Main Shaft.
1	7 inches.	7 inches.	6-horse.	600
2	9 „	9 „	7 „	600
3	11 „	11 „	8 „	600

A special Apparatus for Mortising can be added if desired.



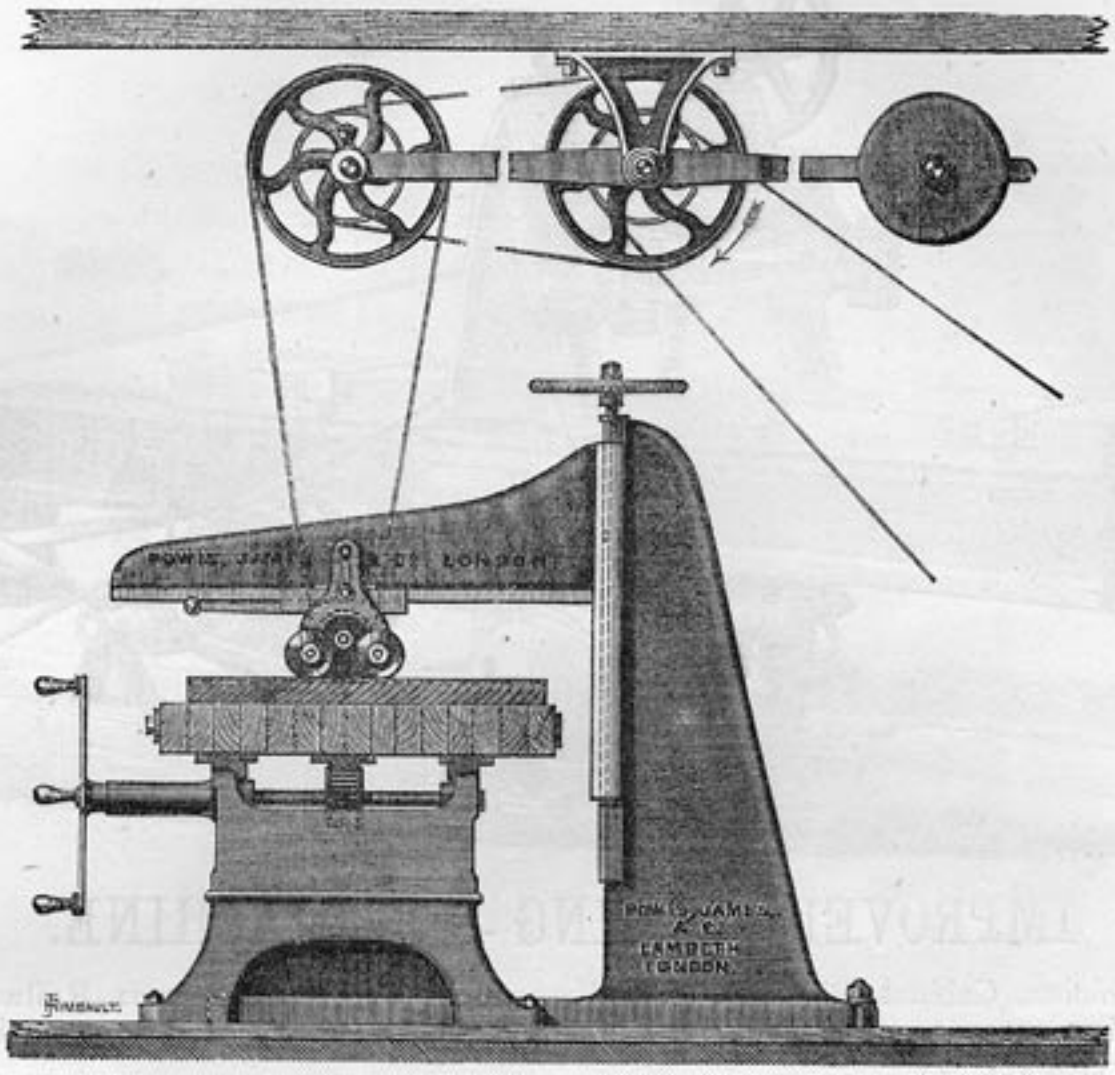
PATENT TEA-CHEST MAKING MACHINE.

THIS Machine is made for use in India, China, and other Tea-growing countries, where the chests are now constructed by hand by native workmen, the consequence of which is that they are badly made, and if at all knocked about let in the damp and spoil the tea. It is often found too that the nails are so carelessly driven that the lead lining is penetrated, and is no longer air-tight. All these faults are entirely obviated by the use of our Patent Machine, which is extremely simple and easy to work; it is strongly made, and not at all liable to get out of order.

The mode of working is as follows:—The wood is sawn into slabs the right thickness with the Circular Saw **A**. It is then cross-cut to the right lengths on a sliding table provided for that purpose, not shown in drawing; after this 12 boards at once are held in the cramp **B**, and pushed over the tenoning saws **C**. These latter are arranged to cut both pins and mortises the same size. The box is then framed together, and placed on the boring table **D**, and the holes bored for the nails. The sides being tenoned together adds great stiffness and strength to the box, and it is so simple to do, that very little extra time is required. A 6-horse power Portable Engine, with furnace constructed for burning wood, will be best adapted for driving. A countershaft with cone pulleys is supplied so as to change the speed of the saw spindle, according to the work that is being done.

The price includes a complete set of tools, viz.:—

One 32-inch Circular Saw for Ripping.
One 24 „ „ Cross-cutting.
Twelve thick Tenoning Saws.
Six Augers.
Cross-cutting Table.
Tenon Cramp.
Boring Table.



NEW CROSS-GROOVING, PLANING, MOULDING, & SQUARING-OFF MACHINE.

WHEN more fully known, this Machine will be highly appreciated for Cabinet Makers, Shop Front Fitters, Show Case Makers, &c.

It has a Spindle mounted in a Traversing Carriage, upon which Grooving Saws, Moulding Irons, Plane Irons or Cross-cut Saws may be fixed. The Bed is made to travel at right angles to this, so that a compound motion is obtained; a Gauge Rod in front for setting out work is supplied.

It will Cross-groove with great cleanness and rapidity, Plane and Thickness Carcase Ends and other work Square-off and Cross-cut for Dovetailing with great accuracy, work Raised Moulded Panels, &c., so that few Machines will be found of more general utility in the trades above mentioned.

Countershaft and Balance Lever are included in the price.

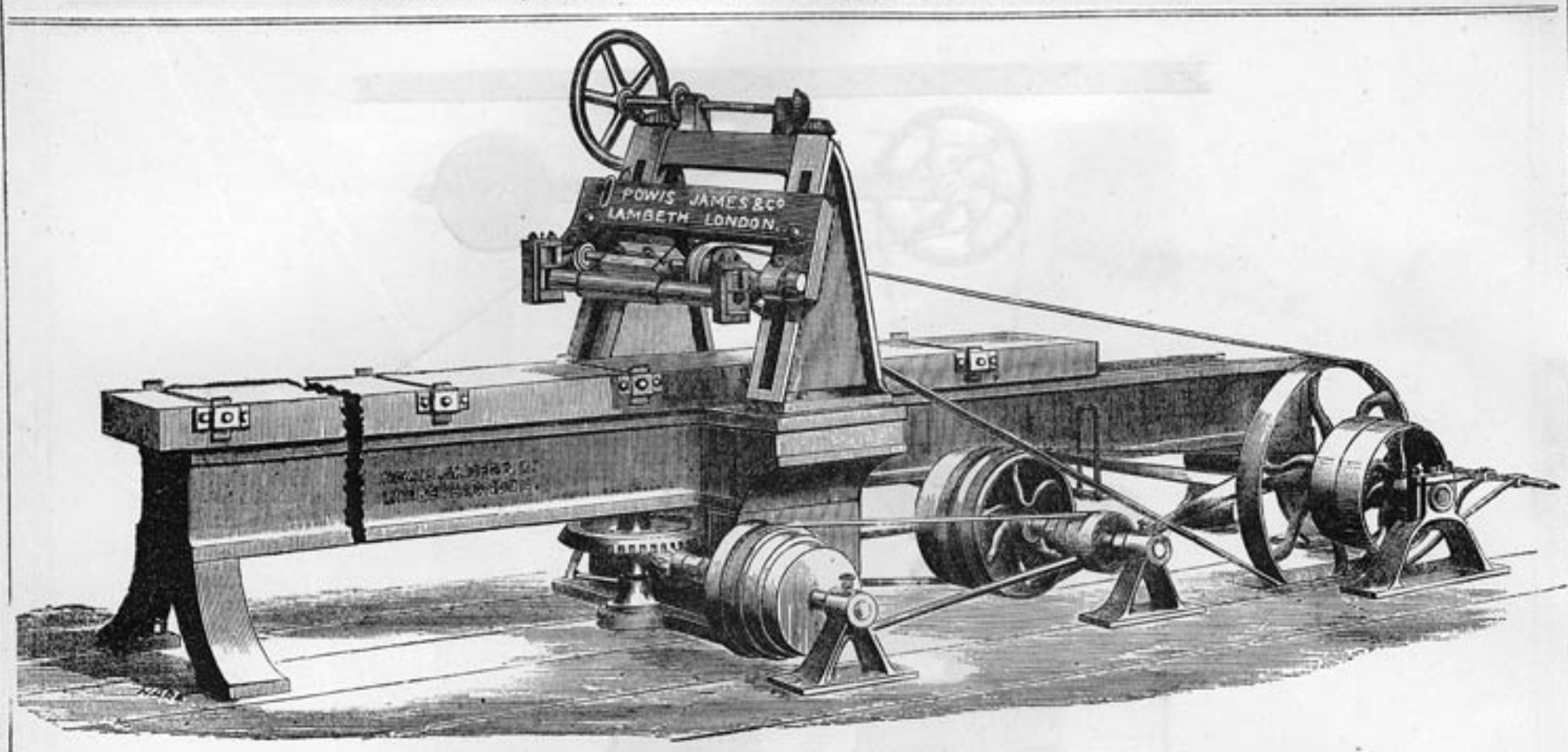
Length will take.	Width.	Speed of Countershaft.	Average Power required.
6 ft.	3 ft.	500	2-horse.

Larger or Smaller sizes at proportionate prices.

Drawings and particulars of Multiple Grooving Machine for Cabinet Makers, &c., will be sent on application.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.



IMPROVED TRYING-UP MACHINE.

FOR Joiners, Machinists, Cabinet, Pianoforte, and Parquet-flooring Manufacturers, Railway Carriage Builders, and other similar purposes, requiring Hard and Soft Woods to be rapidly planed, exactly true, out of winding, and perfectly clean.

Experience proves this class of Machine undoubtedly the best for trueing-up wood for all the above and many other purposes. All kinds of Glue-joints may be made with unerring certainty, from Door Panels to the heaviest "Building-up" required in Cabinet or any other work, in hard and figured woods as well as soft. The cleanness of the work exceeds that of any other Planing Machine.

Besides these advantages, the saving of labour equals, if not exceeds, that of any other machine for this important class of work to such an extent that they will eventually become as essential in every workshop as Jack and Trying Planes have hitherto been. Wide and heavy Framing, &c., may be Rebated, Beaded, and Moulded with the same ease and accuracy as ordinary planing.

The high qualities and superiority of work produced by this Machine over any other is due chiefly to the important improvements we have, from time to time, introduced, as well as the careful finish bestowed on all its parts.

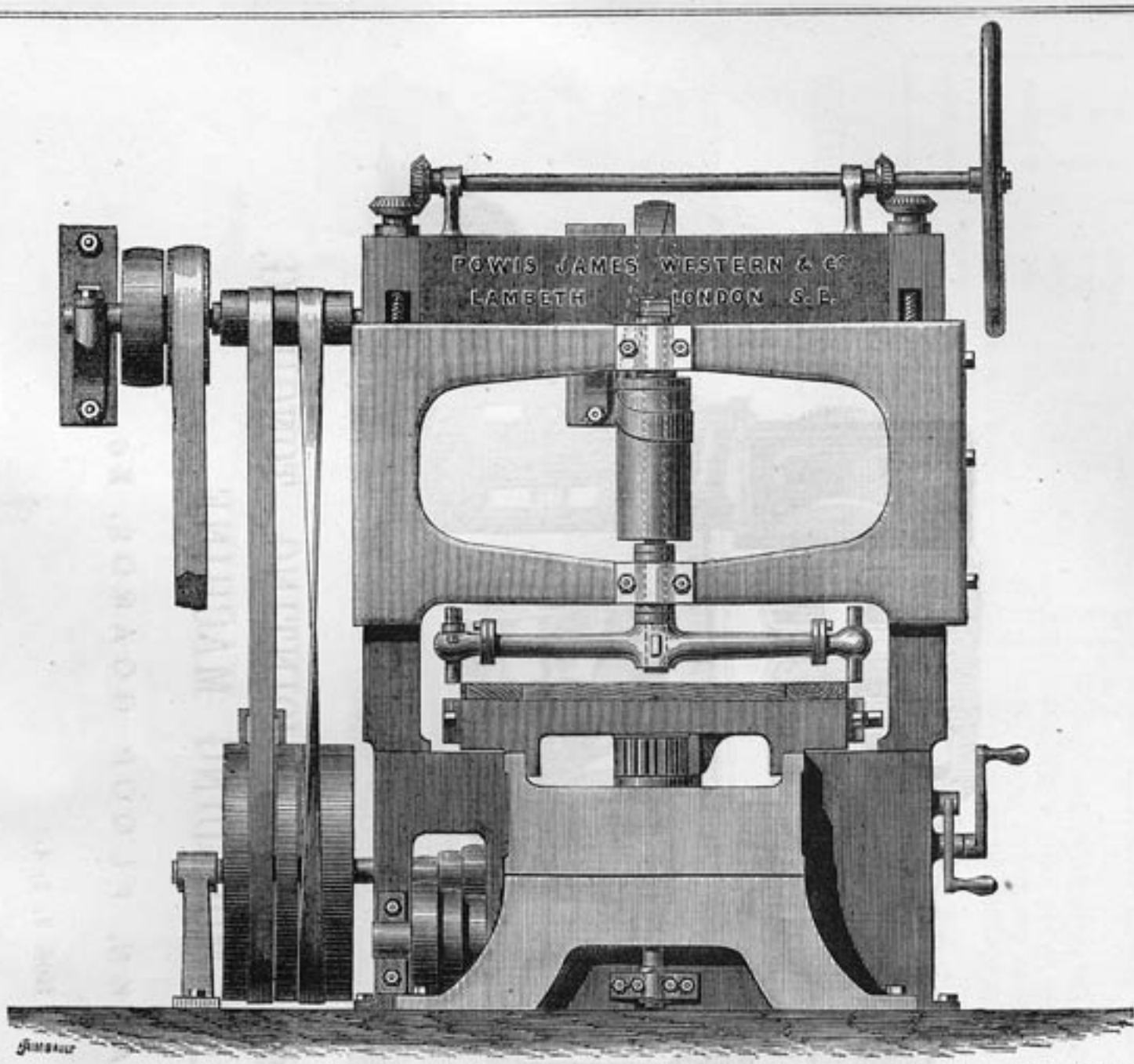
By an entirely new arrangement for the Travelling Bed no irregularity in the work can possibly arise from chips or shavings accidentally falling between the Rack and Pinion.

The Spindle and bearings are adjusted for high speeds, and the Driving Pulley placed within the Brackets, instead of as shown in the Drawing, so that no vibration can occur and the wear of the brasses is perfectly even; the Cramps for fixing the wood upon the bed are exceedingly simple and effective, so that the amount of time occupied in Loading the Machine is very trifling, even with small work. The pressure of the Rollers is capable of the nicest adjustment, to admit of planing Panels and other thin work. Arrangements may easily be added for Concave and Convex Planing when required by Cabinet Makers, Machinists, and others. Vertical Side-cutters are sometimes added to this machine for trueing the edges, grooving, beading, &c., &c. These Cutters operate on the wood at the same time as the Horizontal Knives.

The price includes Countershaft and a pair of Plane Irons.

Size.	Will take Wood. Wide.	Deep.	Long.	Speed of Countershaft.	Average Power Required.
No. 1.	12 in.	12 in.	12 ft.	600	2-horse
„ 2.	15 „	15 „	15 „	600	3 „
„ 3.	18 „	15 „	15 „	600	3 „
„ 4.	22 „	15 „	15 „	600	4 „

These Machines can be constructed to plane any required length.



NEW PATENT TRYING-UP AND CLEANING-OFF MACHINE.

THE high perfection arrived at in our ordinary Trying-up Machine, described on the previous page, induced us to extend the principle to a class of work never before attempted, but of great importance to the trade generally, and the result has exceeded our anticipations in the money-earning value of this Machine, which is pronounced by all competent men who have seen it working to be the most valuable ever yet introduced in a Joinery Manufactory, Builder's, or other Establishment.

As a Trying-up Machine, the quality of the work performed cannot be excelled, whilst its size admits of a much larger quantity being turned out, but its special advantages and profit to Builders, Shipbuilders, and others is in Cleaning-off Doors and work of similarly large surfaces, after being wedged up This is done at a saving of about 75 per cent. in cost compared with hand labour, and produces a surface that it is impossible to equal by any other means. The peculiar construction of the Cutters admit of the Wood being worked as well across the grain as lengthways, the treatment being precisely the same in both cases, and the most delicate edges are left perfectly keen.

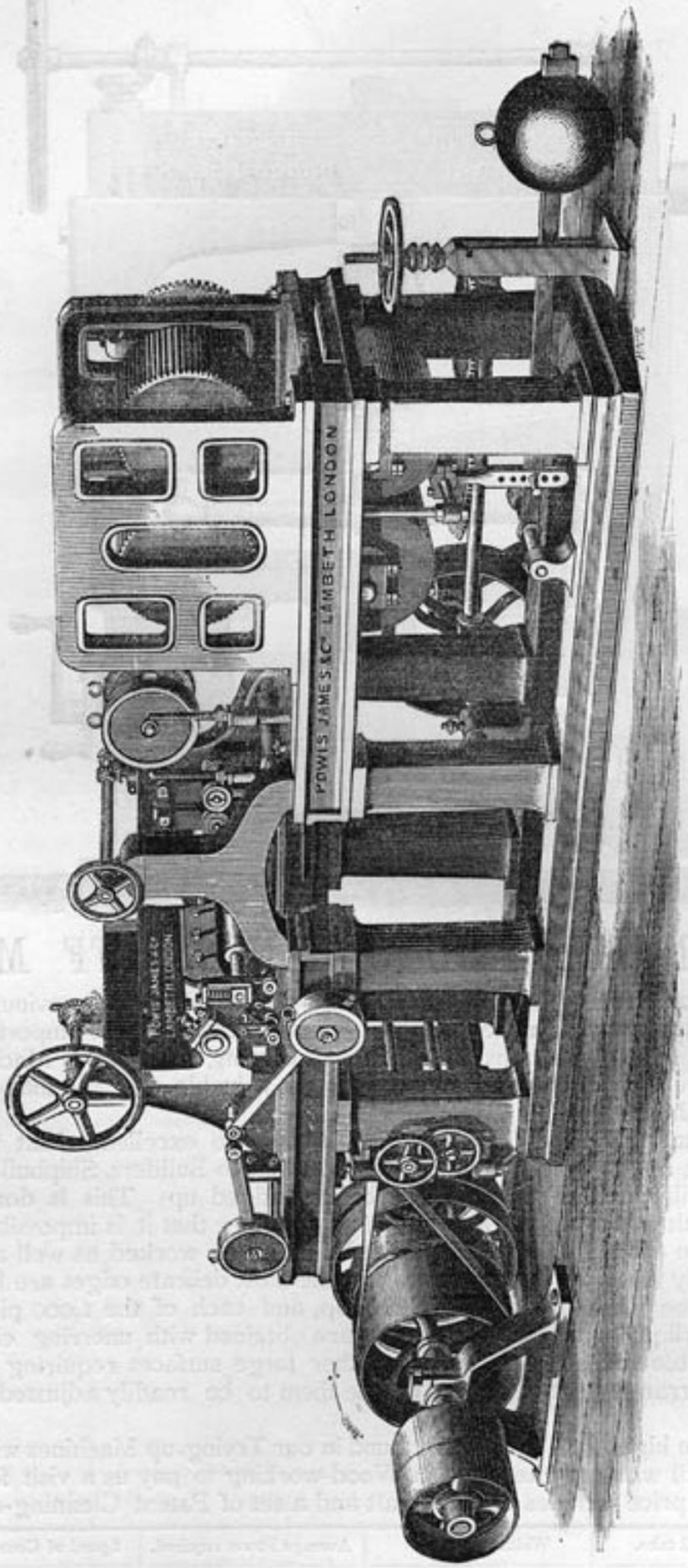
500 Door Panels per hour may be jointed ready for gluing up, and each of the 1,000 pieces made exactly parallel at the same time; in larger work proportionate advantages are obtained with unerring certainty.

For planing and cleaning-off Table and Counter Tops, or other large surfaces requiring exact truth, equal advantages are obtained. Our patent arrangement of Cutters enable them to be readily adjusted to suit hard and figured woods as well as soft.

Every improvement, as well as the high-class finish to be found in our Trying-up Machines will be found in this, and we have much pleasure in inviting all who are interested in Wood-working to pay us a visit for the purpose of seeing this machine in operation. The price includes Countershaft and a set of Patent Cleaning-off Knives.

Size.	Length will take.	Width will take.	Average Power required.	Speed of Countershaft.
No. 1	15 ft.	3 ft.	3-horse.	450
„ 2	15 „	3 „ 6 in.	4 „	450

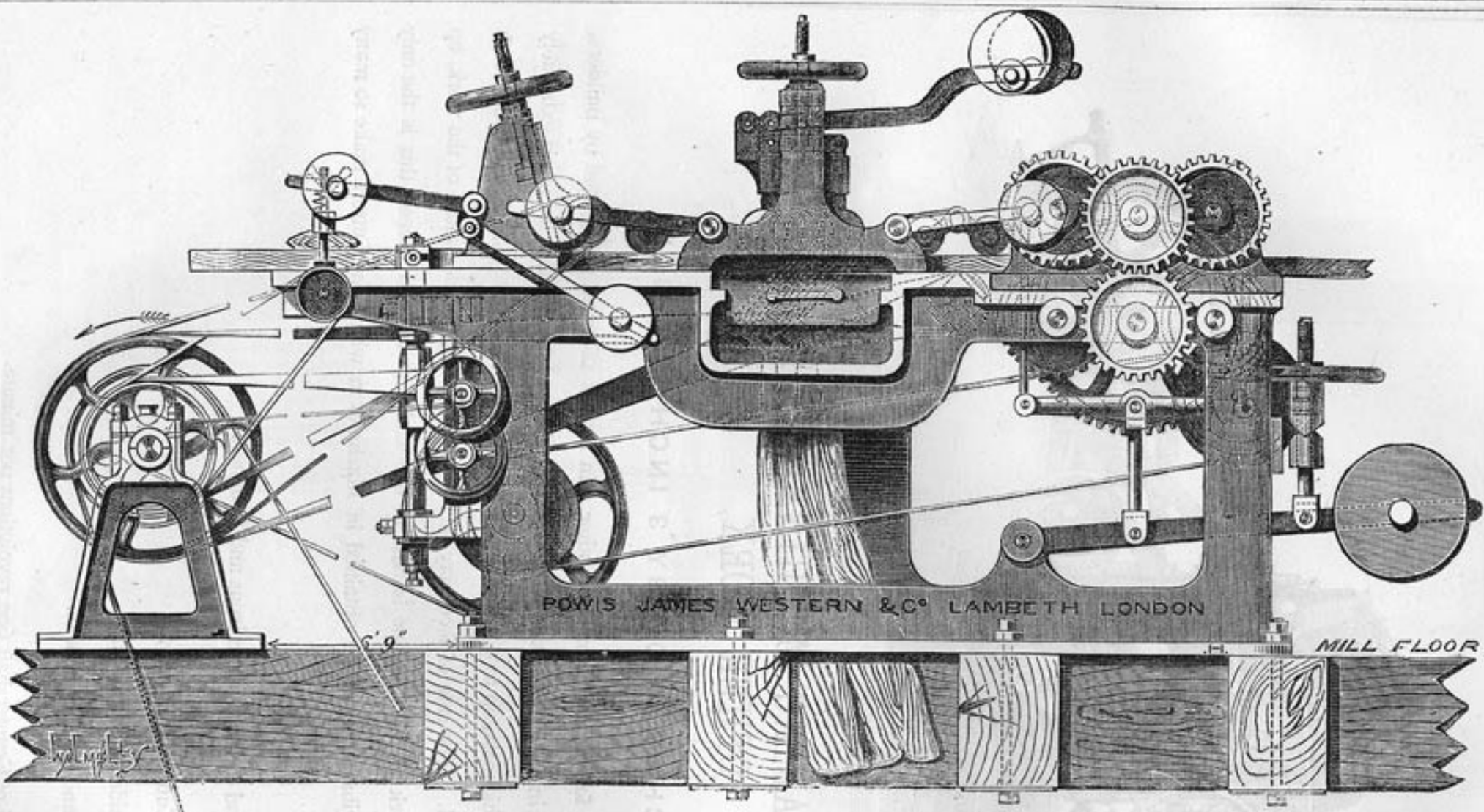
Particulars of other sizes may be had on application.



COMBINED ROLLER-FEED PLANING, JOINTING, TONGUING, GROOVING, AND MOULDING MACHINE.

FOR DECK PLANKS, FLOOR BOARDS, &c.,

Nos. 2, 3, 4.



COMBINED ROLLER-FEED PLANING, JOINTING, TONGUING, GROOVING, AND MOULDING MACHINE.

FOR DECK PLANKS, FLOOR BOARDS, MATCH BOARDING, &c.

IN this Machine the Timber is fed through by means of large Rollers—all of which are Geared-up—at the rate of from 20 to 40 feet per minute for Planing, and from 10 to 20 feet for Moulding.

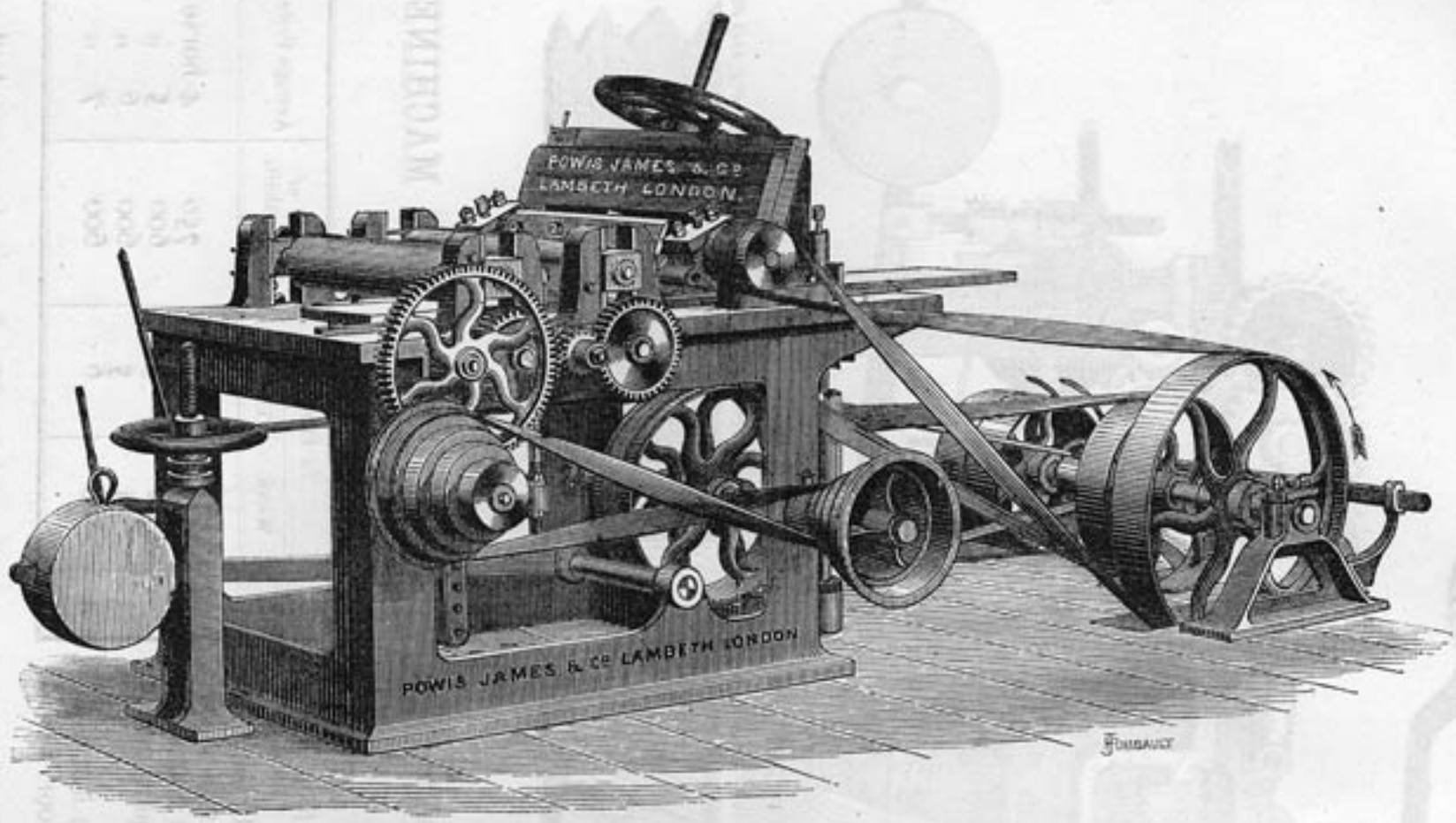
It is fitted with top, bottom, and two side Adze Blocks, which operate on all four sides of the Wood simultaneously; and is also provided with a Drawer containing two Fixed Finishing Irons, which take a fine shaving off the bottom-side of the Wood, after it has been Thicknessed by the bottom Adze Block. The Work as it leaves the Machine is quite ready for use without any hand finishing.

The small size is specially meant for Matched and Skirting Boards, up to 9-ins. wide. The larger sizes are for such heavy work as Shipbuilders', Wagon Builders', Floor Board Planing for the trade, &c.

No.	To Plane.		Speed of Countershaft.	Average Power.
	Width.	Thickness.		
1	9	2	750	4-horse
2	12	3	600	5 ,,
3	14	5	600	6 ,,
4	16	6	600	7 ,,

The Machine illustrated above is No. 1 size, and being cast all in one piece is very steady and substantial. The larger sizes are similar to the Drawing on the opposite page.

The price includes Countershaft, one complete set of Adze Irons, two Finishing Knives, and a set of Keys and Spanners.



ROLLER FEED PLANING MACHINE FOR PANELS AND OTHER WORK,

UP TO 24 INCHES WIDE BY 3 INCHES THICK.

THIS Machine is expressly designed for Planing Panels or other thin boards of great width used by Builders, Cabinet Makers, Contractors, and in the manufacture of Railway Carriages, but will also be found extremely serviceable for planing wood of greater thickness, up to 3 inches. All four Feed-rollers are geared, and are smooth on the surface so as not to mark the wood. The rate of feed may be varied according to the nature of the work, up to 12 feet per minute. The Frame-work of the Machine is cast in one entire piece, and indeed this is the only mode by which perfect freedom from vibration can be obtained in Machines in which the Cutters make so many revolutions.

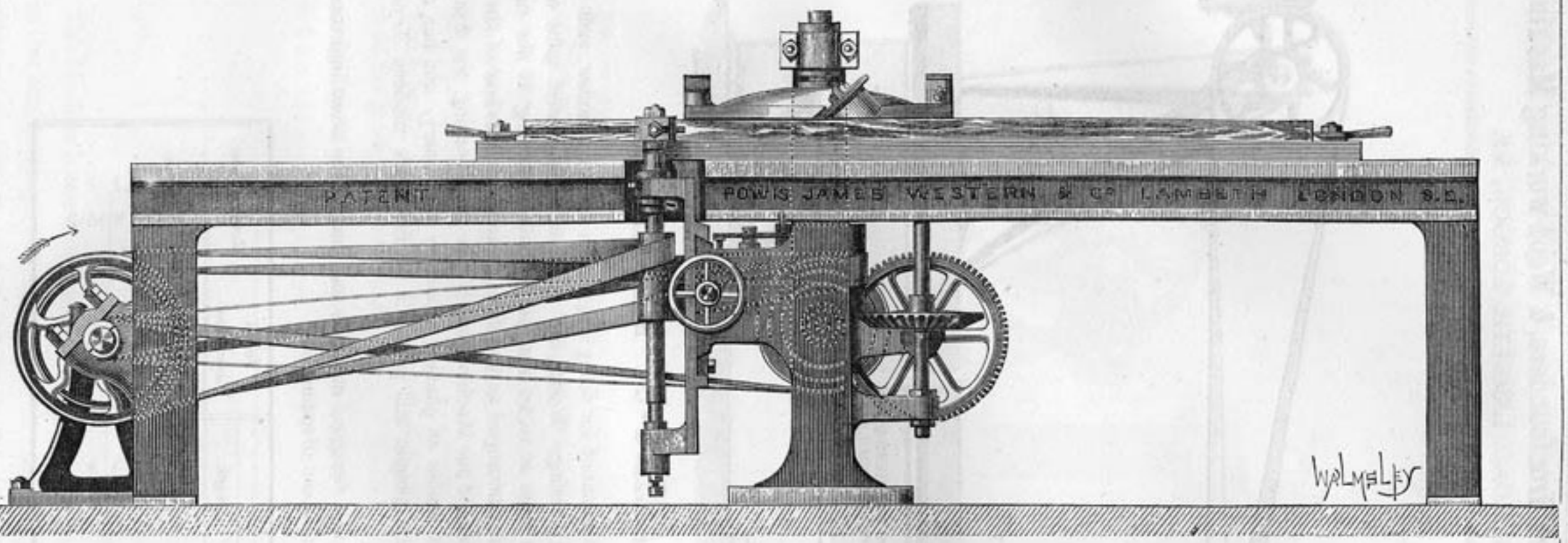
The price includes Countershaft and a Set of Plane Irons and Spanners

No. 1 Machine is fitted with top Cutter Block only.

2 „ with top and two side Cutter Blocks.

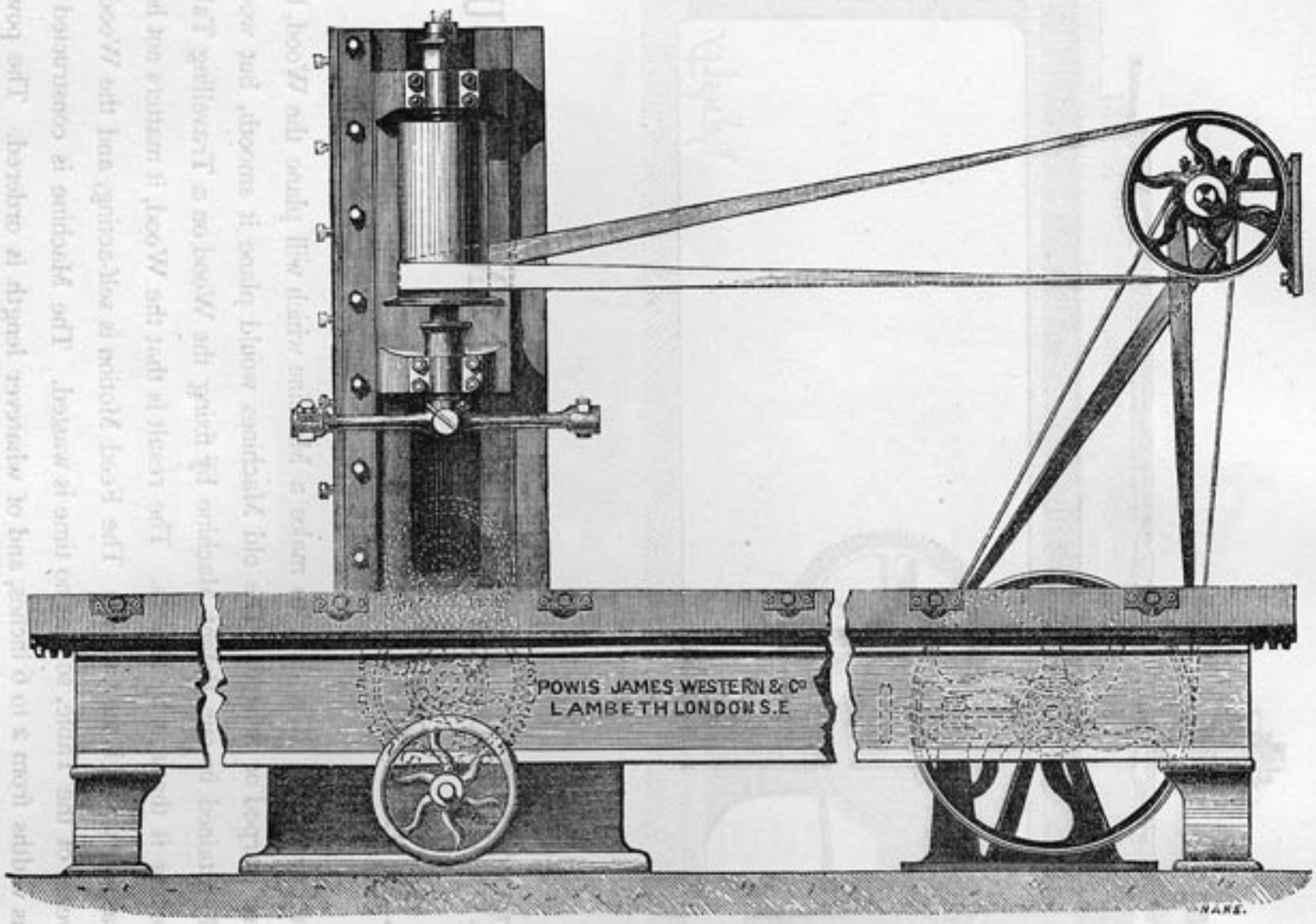
3 „ with top, bottom, and two side Blocks.

Speed of Countershaft 600 revolutions per minute.



PATENT MACHINE FOR PLANING, TONGUING, AND GROOVING AND TRYING-UP WOOD FOR PARQUET FLOORS, &c.

THIS Machine supplies a want long felt by Manufacturers of Parquetry. It is easy to make a Machine which will plane the Wood, but the difficulty has always been in dealing with Wood the least warped or twisted. The old Machines would plane it smooth, but would not take it out of winding. This very important point is perfectly attained in our Patent Machine by fixing the Wood on a Travelling Table which passes between the Cutters, instead of the old plan of Feeding it through by Rollers. The result is that the Wood, it matters not how twisted it is, is made quite true and taken out of winding by once passing through the Cutters. The Feed Motion is self-acting, and the Wood is Planed, Tongued, and Grooved at both forward and backward traverse of the Table, so that no time is wasted. The Machine is constructed to Plane the top and Tongue and Groove the sides of Wood of various widths from 2 to 6 inches, and of whatever length is ordered. The power required to drive is about 2-horse power. The price includes Countershaft and one complete set of Cutters. Speed of Countershaft, 750.



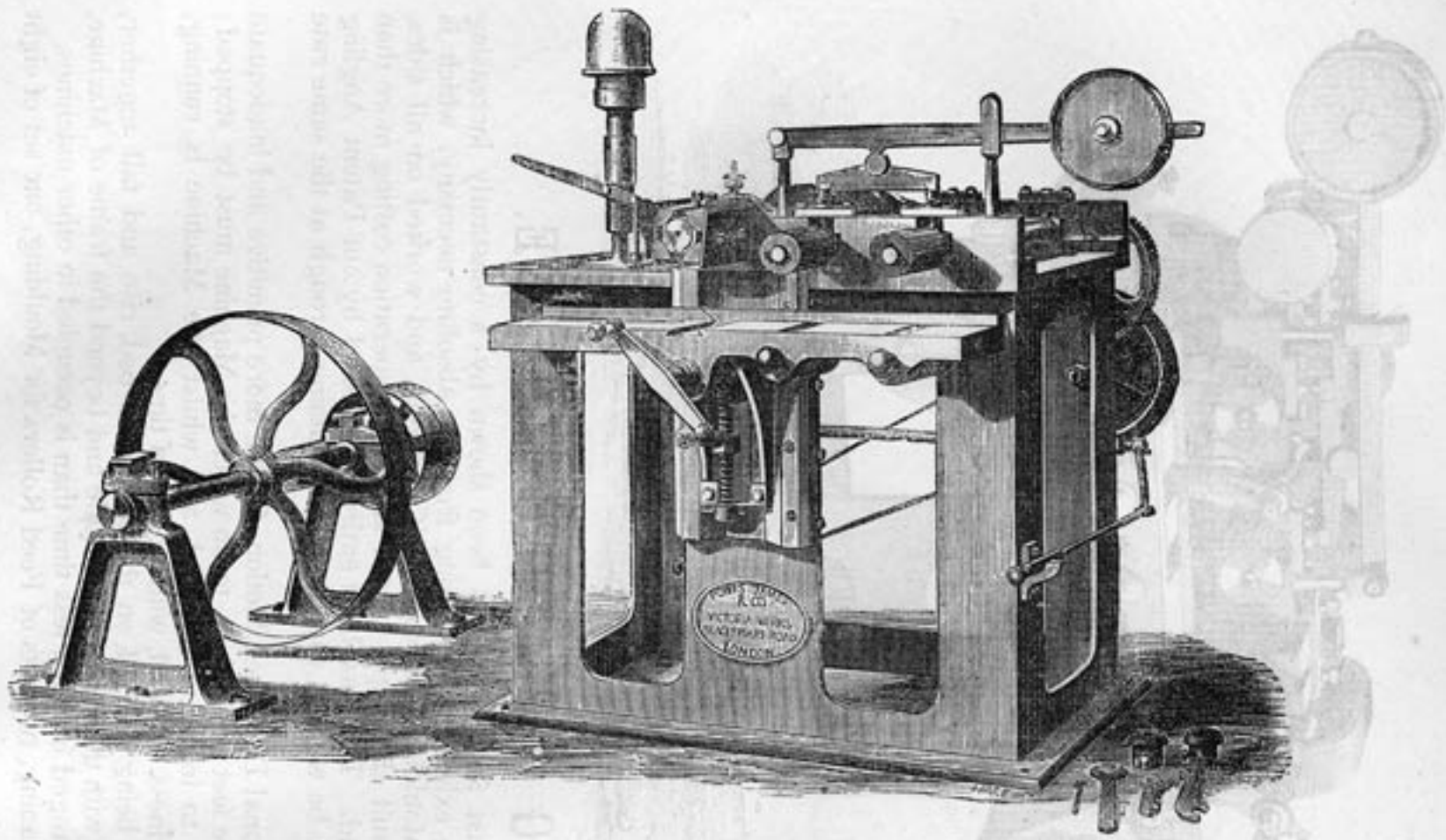
PLANING AND SQUARING-UP MACHINE.

THE above drawing represents a Planing Machine well suited for doing large pieces of hard timber, such as are used in Arsenals, Dockyards, Shipyards, Railway Carriage Works, &c. The wood is planed quite smooth and at the same time taken out of winding at the rate of from 10 to 20 feet per minute, according to the class of wood. The table has a self-acting feed, and the cutters are arranged so that they cut at either traverse of the table, thus saving much time. The driving gear is all placed behind the Machine out of the way, leaving the front side quite clear for the workman. This is one of the oldest modes of planing wood by machinery, and has always answered well for some kinds of work, so that many people still prefer it to the more modern Trying-Up Machine described on page 72.

In every respect it is a thoroughly well made and well designed machine and has all the latest improvements. The price includes countershaft, a set of cutters, and a set of spanners.

No.	To plane Wood.			Speed of Countershaft.	Average Power.
	Width.	Depth.	Length.		
1	18 in.	15 in.	15 ft.	450	3-horse
2	24 ,,	18 ,,	15 ,,	450	4 ,,
3	30 ,,	18 ,,	15 ,,	450	4 ,,
4	36 ,,	24 ,,	15 ,,	450	5 ,,
5	42 ,,	24 ,,	15 ,,	450	6 ,,

These Machines can be made to plane whatever extra length is required.



IMPROVED SINGLE CUTTER MOULDING AND PLANING MACHINE.

THE economy of cost in this Machine will commend it in many cases where a moderate quantity only of Moulding or Planing is required. Joiners, Pianoforte Makers, Cabinet Makers, and others, will find it a very useful tool, easily worked and driven with small power.

The Feed is self-acting and is variable.

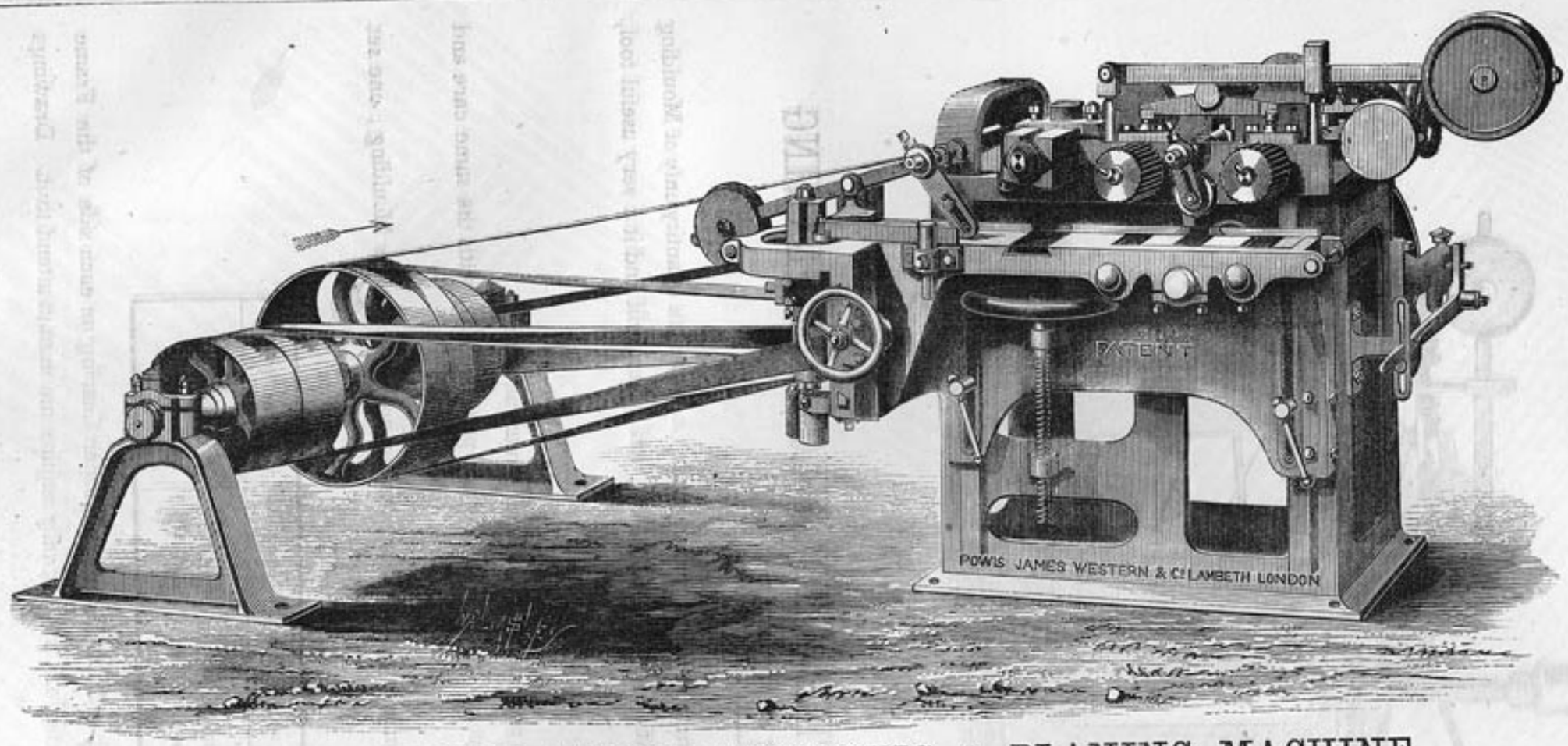
In certain classes of work as much as 50 feet per minute of Moulding may be stuck.

The Framing is cast in one entire piece of great strength, and every part fitted up with the same care and accuracy as the more costly machines.

The Price includes Countershaft and one set of Feed Rollers for Planing, with one set for Moulding; one set of Plane Irons and a set of Spanners.

Size.	Will take up to	Speed of Countershaft.	Average Power.
No. 1	5 in. wide.	600	2-horse.
„ 2	7 „	600	2 „

This Machine is sometimes made double, with a Cutter Block and proper Gearing on each side of the Frame work, so that double the quantity of work can be turned off, and yet only require one man to attend to it. Drawings and particulars can be had on application.



PATENT OUTSIDE-CUTTER MOULDING & PLANING MACHINE.

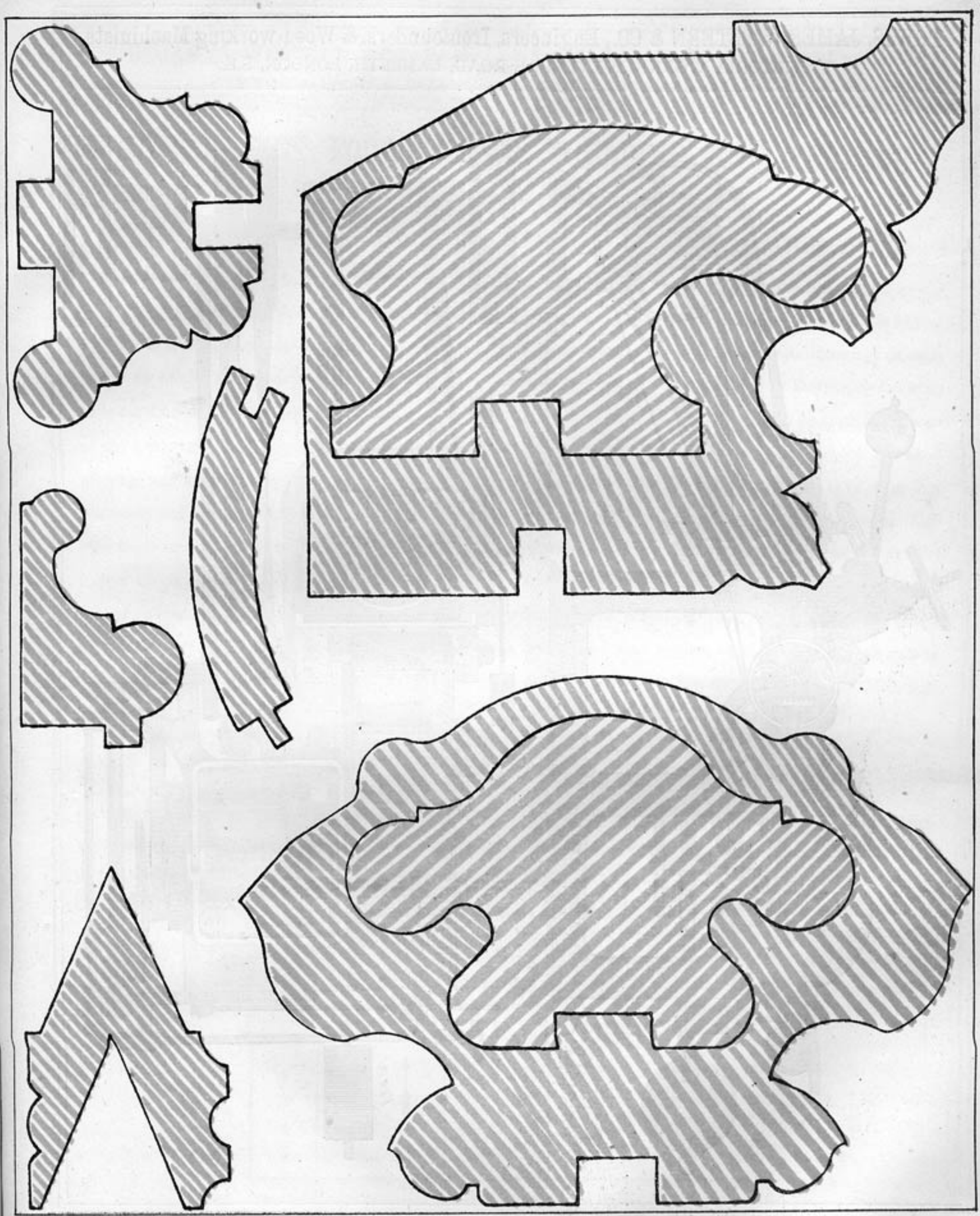
THE rapid development of Machinery for working in Wood during the last few years has been shown by a constantly increasing demand, not only for new machines, but for great improvements in existing ones arising from an absolute necessity, which is unlimited. Previous to the introduction of the above Machine, an elaborate Moulding, particularly if undercut, and worked on all sides, had to be passed through two, three, and even four times, and saddled up to suit the shape. Each successive operation costing more than the first, rendered a high-class Moulding, almost as costly as if produced by hand. This has been entirely remedied by our Patent Angling Side Cutters; and a Moulding, no matter how much elaborated or undercut, can be worked with only once passing through at the same rate of feed as in an ordinary Four Cutter Machine, and with much greater accuracy.

Another important improvement is in the substitution of our Patent Frictional Disc Feed Motion, for the more primitive and inadequate speeded cones, which would only admit of the feed being regulated by four or five feet gradations, to do which the Machine must be stopped; in our case, however, the feed may be regulated to the greatest nicety, even to inches, if required, and whilst the Machine is running, so that the rate of feed may be exactly suited to all the varieties of grain and hardness of wood, without loss of time.

Another feature in our Patent is that the Vertical and Bottom Cutters, being carried on the moveable bed, rise and fall together, requiring no fresh adjustment of irons for varying thicknesses of wood, and being, with the top cutter, outside and beyond the frame of Machine, admit of being easily sharpened without removal, and when necessary, can be changed in much less time than is occupied in other machines.

The price includes Countershaft complete, one set of Feed Rollers for Planing, two sets of Feed Rollers for Moulding, one set of eight Plane Irons, and a set of Spanners.

Size.	Will work up to	Speed of Countershaft.	Average Power Required.	Size.	Will work up to	Speed of Countershaft.	Average Power Required.
No. 1	5 in. wide.	700	3-horse.	No. 3	9 in. wide.	600	4-horse.
„ 2	7 „ „	600	3 „	„ 4	12 „ „	„	5 „



NEW PATENT FOUR CUTTER MOULDING AND PLANING MACHINE,

WITH COMPOUND ANGLING SIDE CUTTERS, AND FRICTIONAL DISC FEED.

THE special object we have had in view in designing this Machine has been to combine the advantages of our Outside Cutter Machine just described, with those of the more old-fashioned Centre Feed Machine. It will be seen in the drawings opposite that both the top and bottom cutter spindles run in long gun-metal bearings on each side of the blocks, and yet are so arranged that they are just as convenient of access for fixing or sharpening the irons as in our Outside Cutter Machine. All the gearing is at the back of the Machine so as not to be at all in the way of the workman. The bottom as well as the top rollers are geared up to prevent any possibility of the wood slipping, and are driven by our Patent Friction Disc, described on p. 80. The side cutters are made to angle so that elaborate and undercut mouldings can be worked with the same ease and rapidity as the most simple sections. One very important feature is, that the Top Feed Roller Spindles overhang from the Main Frame, so that the parallel rollers which are used for Adzing, or for Sticking Linings, Skirting, Mouldings, &c., can be easily removed and conical rollers substituted to suit the shape of the wood which is to be propelled. The advantage of this will be evident to a practical man, as in Sticking Architrave, Ogee, and indeed most sections of Mouldings, a great deal of wood may be saved by cutting it up on the Saw Bench as near as possible to the size of the required Moulding, instead, as is usual, of cutting it simply square, and leaving the Moulding Machine to do all the work.

We have no hesitation in offering this Machine, not only as the most advanced Moulding Machine ever yet made, but as the most profitable that can be employed, either for general or high-class work, being capable of sticking Mouldings at from five to fifty feet per minute. The large section of hand-rail on accompanying sheet, undercut on both sides, was worked at five feet per minute in Pitch Pine; it would be worth 3s. 6d. per foot to work by hand.

The price includes Countershaft, one set of Feed Rollers for Planing, two sets of Feed Rollers for Moulding, one set of eight Plane Irons, and a set of Spanners.

Size.	Will Work	Speed of Countershaft.	Average Power Required.
1	3 ins. wide.	800	2-horse
2	5 „ „	700	3 „
3	7 „ „	600	3 „
4	9 „ „	„	4 „
5	12 „ „	„	5 „

For Sections of Mouldings worked on this Machine by ONCE *passing through, see page* 81.

CURVILINEAR MOULDING AND SHAPING MACHINES.

INTRODUCTORY.

SO simple in construction are these Machines, small in cost, and requiring but little power to drive; whilst they are so easily worked, capable of an almost universal application in many trades, and possessing money-earning capabilities of so unusual a character, it is impossible to convey an adequate idea of their value in these pages.

Those who have not yet adopted their use are advised to visit our Works to see them in operation. We must here content ourselves by pointing out a few only of the important purposes to which they are applied by some of our customers in various trades, with an approximate estimate of their value, first remarking that they were designed and introduced especially for rapidly executing that class of work which next to carving itself is most costly in skilled labour—the Shaping and Moulding of all varieties of Curved lines from the most delicate Cabinet or Show-case work, to Gothic Roofs of Churches or Moulded Ship Timbers; since, however, the capabilities of these Machines have become better known, we have added a variety of useful appliances calculated to extend their scope and value: these will be seen by a perusal of the description of each Machine on the next few pages.

In H.M. Dockyards and in other Ship-building Establishments they are used for Moulding the lower edges of Deck Beams and other heavy Timbers, straight and circular Cornice Mouldings, sticking all finer Mouldings and Beads for Cabin Fittings and Furniture.

For Builders, from £10 to £20 worth of Gothic Moulding for Roofs of Churches, &c., may be done in a day. Segment or Circular Headed Sashes may be Shaped, Rebated, and Moulded in one minute, no matter how quick the sweep, Stop Chamfering, Grooving, Rebating, Thicknessing, &c., is accomplished with equal rapidity; as also general Shaping, moulding Trefoils and Quatrefoils and work of a like character.

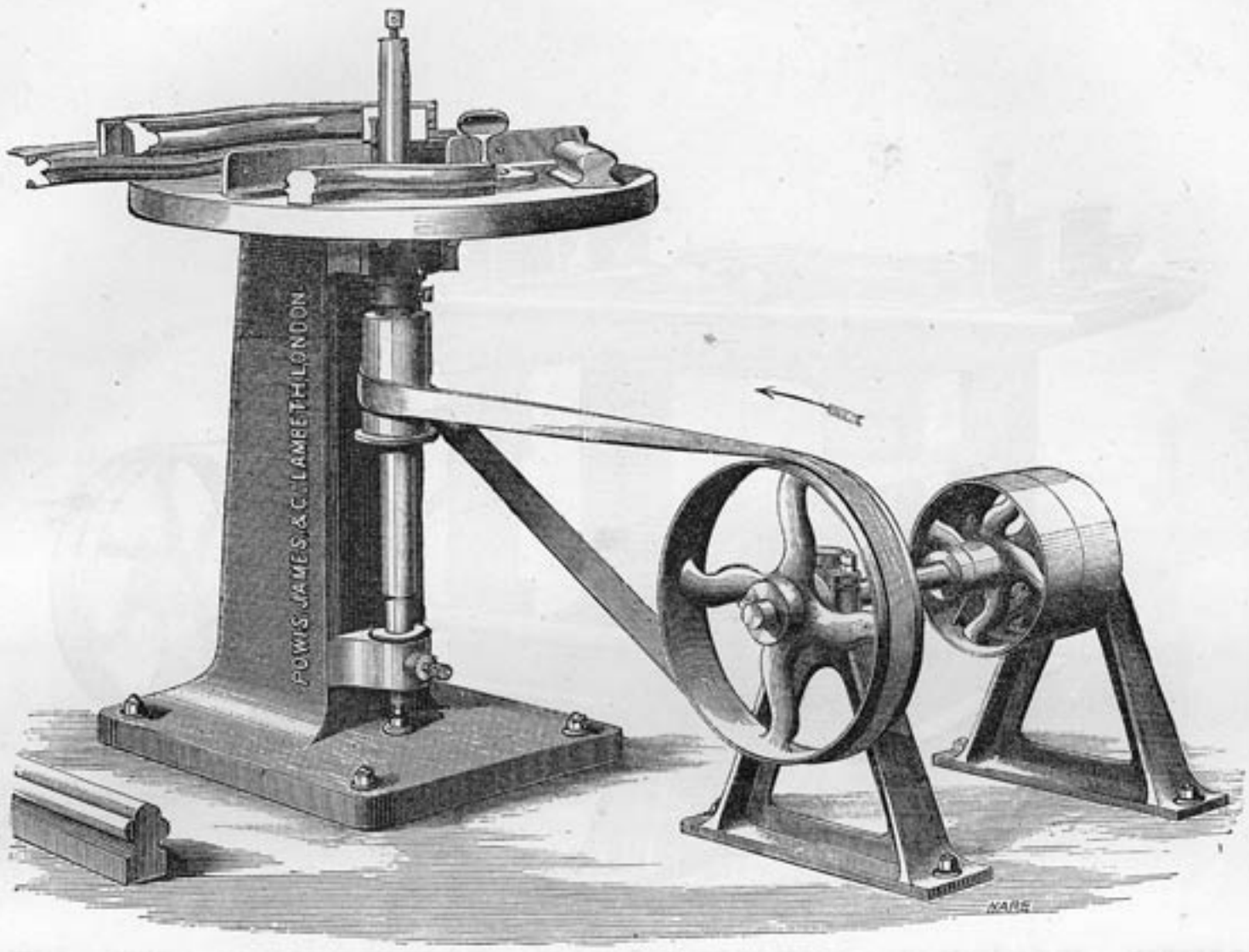
Where no other Moulding Machine is kept it will stick Sash Bars or Architraves up to six inches wide, in Pine, Oak, or other woods, Stop Chamfer, &c. Cabinet and Chair Makers find these Machines afford equal advantages for Moulding Sideboard Backs of elaborate designs; Bed and Wardrobe Cornices, straight or shaped; Table and Sideboard Tops, Chair and Sofa Frames, Looking-glass Frames and Trays; they will also stick all general Mouldings and Beads, Stop Chamfer, &c.

For Pianoforte Manufacturers and Action Makers no more useful Machine can be employed for a variety of tedious and costly detail, as well as producing all the hard wood Mouldings used in a large Manufactory.

Railway and other Carriage Builders use these Machines with the most profitable results for Shaping Curves and Sticking both Straight and Curvilinear Mouldings, which often present too many varieties to be done with advantage on any other Machine: Tool Makers, for Shaping all kinds of Saw Handles, Bow Saw Frames, and Blocking the faces of Moulding Planes, &c.

Brush Manufacturers, for dressing Brush Backs, Shaping the Sides, and other work.

These Machines, in fact, are so generally useful, that we frequently find our customers putting them to a variety of purposes of which we had no idea when we designed them.



IMPROVED SINGLE CURVILINEAR MOULDING AND SHAPING MACHINE.

THIS Machine is capable of working Straight or Curved Mouldings up to 6 inches wide; will Plane, Shape, Rebate, Groove, Stop Chamfer, and do all that can be accomplished by the larger Machines described further on, but, of course, not with the same rapidity.

For Shaping or Moulding to a Curved Form, the work is fixed on a thin template of hard wood, and is worked with great ease.

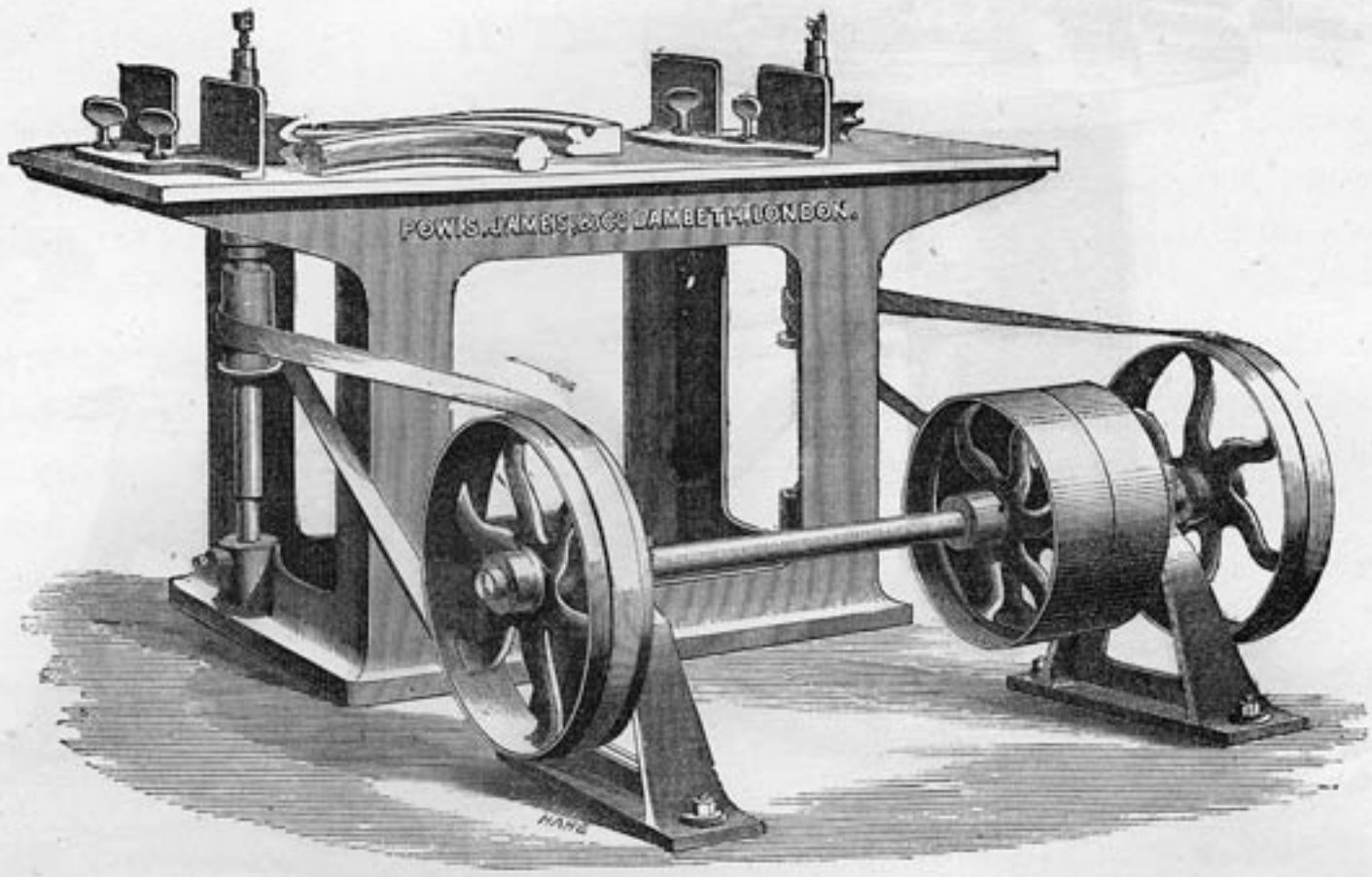
For Straight Work, a suitable Fence is provided with Springs and Rollers for keeping the work close to it; this Fence is made to come before the Spindle, or may be kept back, so that the work may pass between it and the Cutters. By this means, the work is reduced to an uniform thickness at the same time. This will be found the best plan for Sash Bars, Architrave Mouldings, &c., whilst Sash Rails and Stop Chamfering will be done best before the Spindle.

Whilst doing Gothic Work, we have known this Machine to earn nearly half its cost in one day; in other words, to Mould sixty pieces in ten hours that would have cost 5s. each. A pattern of this may be seen in our office.

The Countershaft, one pair of Plane, and one set of Sash Irons, and set of Spanners are included in the price.

A fully competent man may always be had to instruct in the working of this or any Machine sent out by us. The Fence may be arranged for working Curved Mouldings on plan, at small extra cost.

Speed of Countershaft.	Average Power required.
700	1-horse.



IMPROVED DOUBLE CURVILINEAR MOULDING AND SHAPING MACHINE.

THIS Machine is an improvement on the one just described, and more largely sold. Although for doing precisely the same kinds of work, a great advantage will be found in its having a second Spindle. Straight Mouldings may be done at one Spindle, while Curved ones are worked at the other, or one Spindle may be employed for Chamfering, Thicknessing, or Grooving, whilst the other is used for Mouldings, &c. In working Curved Mouldings the two spindles may run in opposite directions, and the work be passed from one to the other to meet the Grain, and completed without changing the template.

This Machine does all kinds of work with far greater accuracy and cleanness than could possibly be accomplished by hand, or by any other machine hitherto in use for the same purpose.

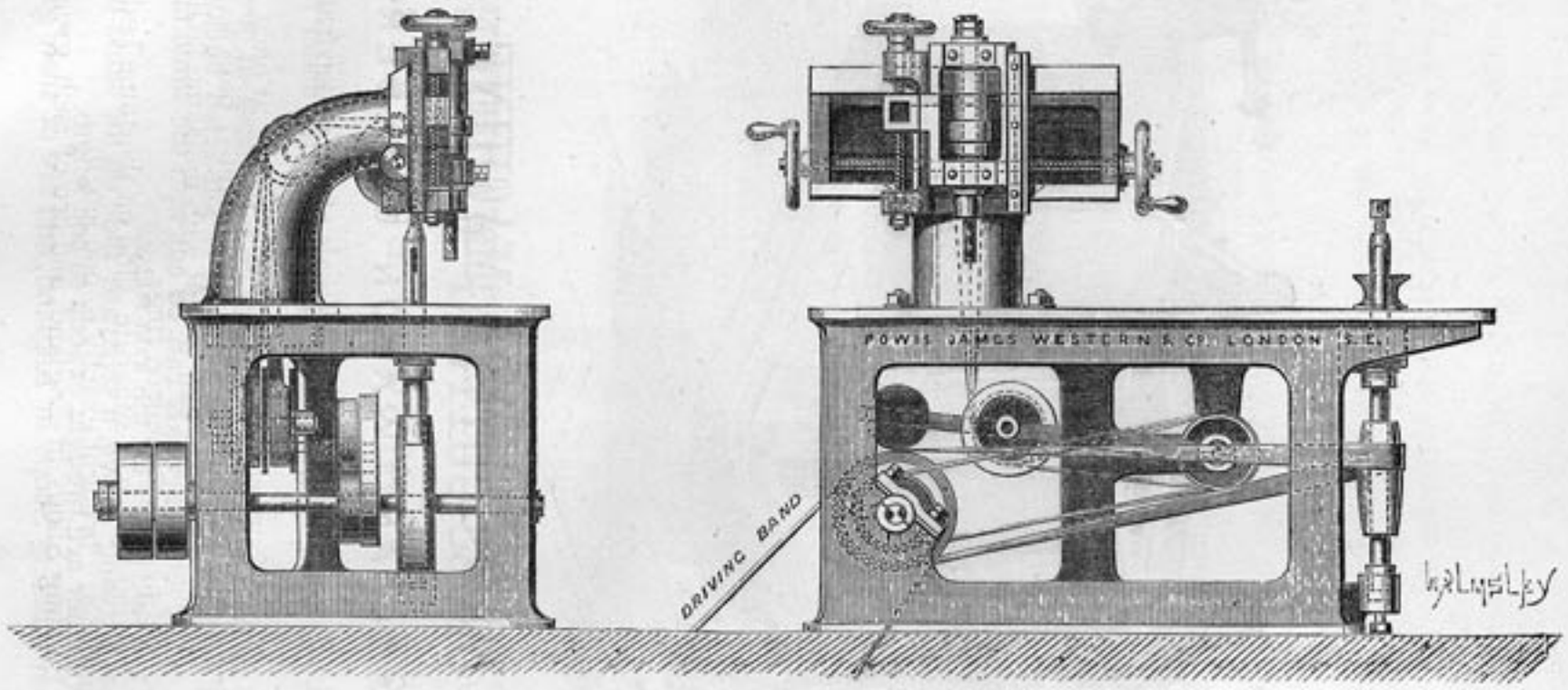
Two straight Fences are supplied, one for each Spindle, which, with Springs, Countershaft, one set of Plane and two sets of Sash Irons and Spanners, are included in the price.

A competent workman may be had to fully instruct in the working of this or any Machines sent out by us.

At small extra cost arrangements are added for working Circular Mouldings on the plan.

Speed of Countershaft.	Average Power required.
700	2-horse.

For a larger Machine as supplied to H. M. Dockyard, see list of Machines at end of Catalogue.



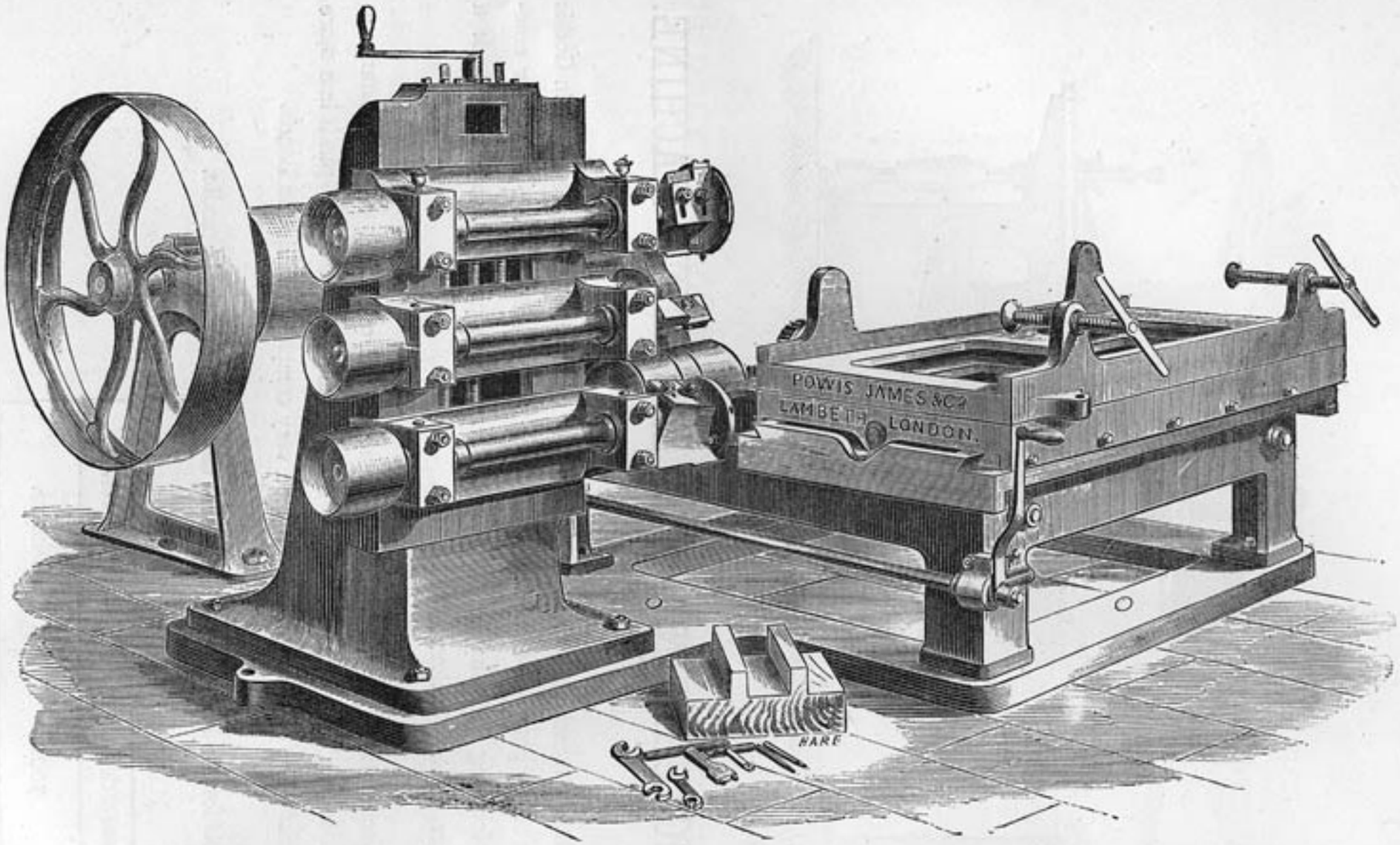
UNIVERSAL MOULDING, SHAPING, AND RECESSING MACHINE.

THIS Machine was designed originally for trenching and housing the string boards of stairs, grounding in Gothic carved panels, sinking mouldings of any patterns, and other work of a similar nature. We have now combined with it our Single Curvilinear Moulding and Shaping Machine, described on page , so as to make it a more generally useful Machine to Builders, Cabinet-Makers, &c.

The Frame-work is cast in one piece, and very strong. The Recessing head overhangs a great distance to allow the work to be freely moved about in any direction, and can be moved round on its centre to put it in a more convenient position for some kinds of work. The Countershafts are placed very compactly inside the Bench.

The price includes one Set of Tools for the Recessing Spindle, and one for the Vertical Spindle.

Speed of Countershaft.	Average Power.
700	2-horse.



PATENT DOUBLE TENONING AND CROSS-CUTTING MACHINE,

FOR THE USE OF RAILWAY CARRIAGE AND WAGON BUILDERS.

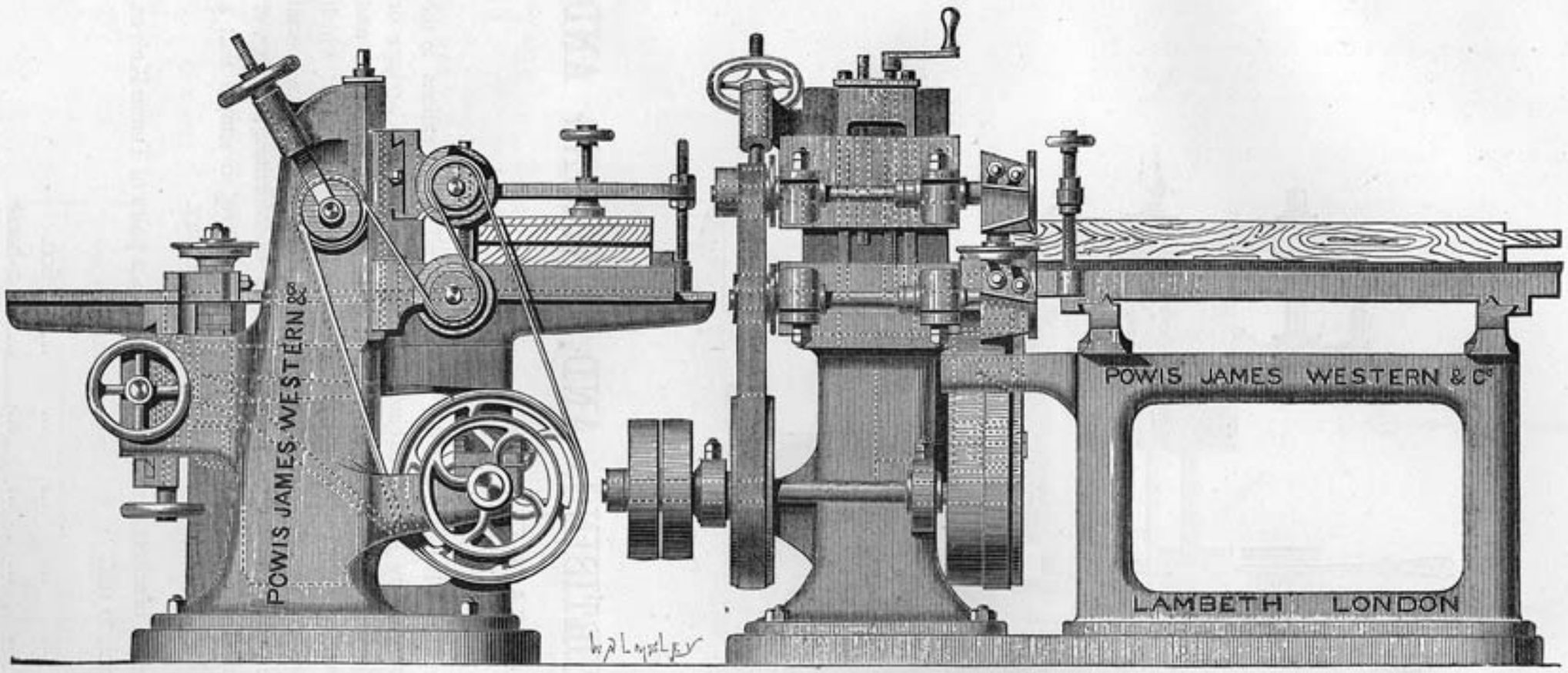
THIS Machine is specially designed for cutting Single or Double Tenons on the Sides, Bearers, and Diagonals of the under frames of Wagons and Carriages, and all heavy work of this class.

The Table, which is self-acting backwards and forwards, is wide enough to take in four ordinary wagon sole-plates at once, and can cut the Double Tenons on them at once passing through the Machine; the Table is then swivelled round, and, while it is self-acted backwards, the Tenons are cut on the opposite ends. The Table is also constructed so that the Tenons on the Diagonals can be cut with the same facility. When the middle cutter head is removed, the Machine can be used for rebating the ends of the sole-plates for the iron rings.

The latest improvement consists in adding to the Machine, as shown in the drawing above, a separate slide on the same bed-plate, carrying a Cross-cutting Saw, so that at the same time the tenons are cut, all the pieces of timber are brought exactly to one length.

These Machines are in use in nearly all the large Carriage and Wagon Building Shops in England, and are of such great value that no works should be without them.

The Price includes Countershaft, and one complete Set of Cutters and Saw.



IMPROVED TENONING MACHINE.

THIS will be found one of the most generally useful Tenoning Machines for Builders and other similar purposes that can be designed. It has all the appliances of more costly machines with much greater simplicity. The Blocks are fitted with a special form of cutter, originally designed by ourselves, which has all the advantages of the twisted cutters generally used, without the disadvantage of being very difficult to sharpen and set. These Knives are quite flat, and therefore are as easily sharpened as an ordinary adze iron.

The Machine is made in two sizes. No. 1 is designed to suit the purposes of Builders, and for the joinery work done by Railway Carriage Builders, Shipbuilders, &c., and to do all general work. No. 2 is larger and heavier, has cutter blocks 6 in. long, and is best suited for railway carriage framings, roof work, Contractors, &c.

This Machine may be had either with or without the Vertical Cutter Spindle, which is fitted with collars for a "drunken" saw, for making double tenons, and a Disc with Cutters for scribing sash-work.

The whole of the Cutters are driven from a self-contained Countershaft, and admit of the easiest adjustment by a simple tightening arrangement for the Driving Belt.

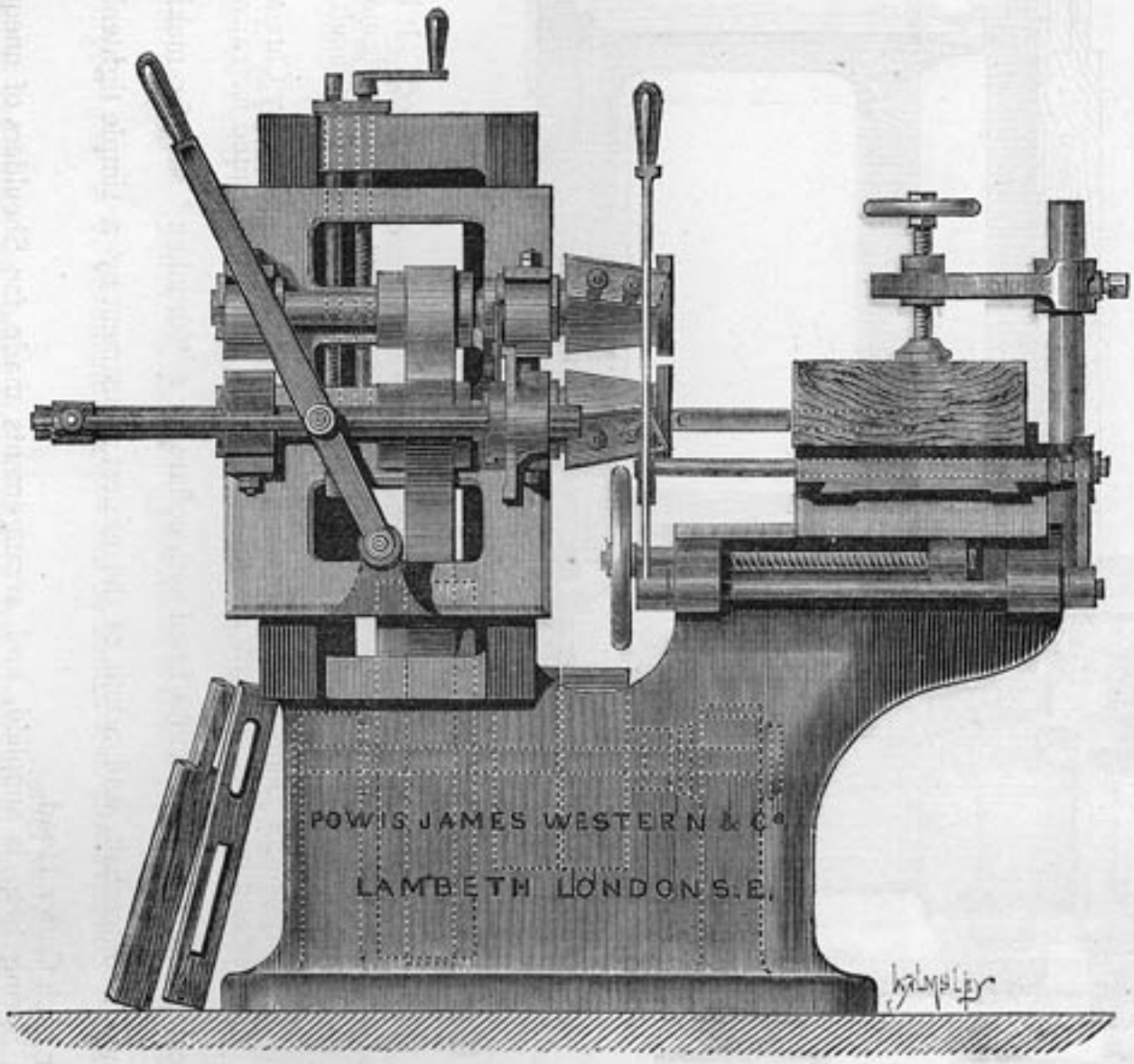
Separate Adjusting Screws are provided to raise and lower each Cutter Head.

For Bevelled as well as straight Shoulders a setting-out Spring Stop is supplied, and arrangements made for Shoulders of unequal lengths. In fact, although larger Machines are made by us, as will be seen by a reference to the List of Machines at end of Catalogue, none are more complete than the one now under consideration, in every detail, suited to the convenience of the workman for ease and rapidity in turning out large quantities of this important class of work of the best quality that can be produced.

It is, therefore, worth the attention of a large class of buyers, whose interests will be furthered by a careful inspection of its comparative merits as a first-class Tenoning Machine.

The price includes Endless Belt, Countershaft, and a complete set of Cutters.

Speed of Countershaft, 700; average Power required, 2-horse.

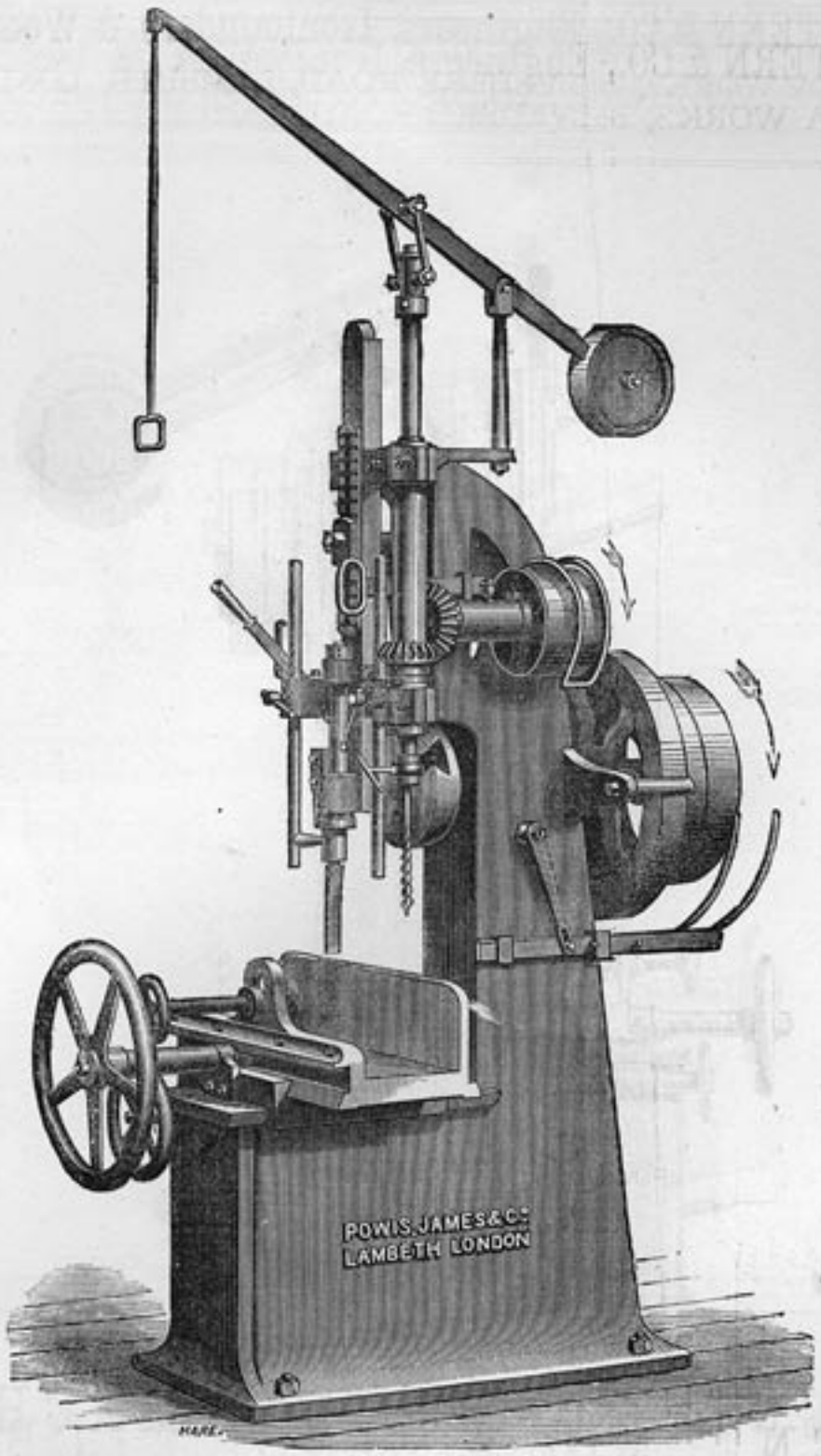


COMBINED STEAM-POWER MORTISING, AND TENONING AND BORING MACHINE.

MORTISING and Tenoning are so inseparably connected, being in fact the principal of all the operations in the construction and framing together of wood, whether by Joiners, Cabinet Makers, Shipbuilders, Carriage or Wagon Builders, that we confidently recommend the Machine shown above as one that will save as much time and earn as much money, compared to its cost, as any machine which we make. There are still many shops in which there is no Tenoning Machine at work, because the master is afraid of not having enough work to employ a special machine for the purpose. This need no longer be the case, as any one of the operations of Mortising, Boring, or Tenoning can here be effected with equal perfection, while the changes from one to the other are so simple that a couple of minutes is all the time that is occupied, and a lad can learn to work the machine in a day.

The price includes Countershaft, which is carried on brackets cast on to the Machine, 2 pairs of Tenon Knives, a set of eight Mortising Augers, and Squaring-out Chisels to suit.

Speed of Countershaft	600.
Average power required	2-horse.



NEW PATENT STEAM POWER MORTISING & BORING MACHINE.

THE value of Mortising by Steam Power is now so universally recognised that a variety of these Machines are required, suited to the different trades in which they are employed.

The one we illustrate is especially adapted to all kinds of Joinery Work, Cabinet and Pianoforte making, &c., and will make Mortises equally well in hard or soft wood up to 1 inch in width by 6 ins. in depth at one stroke, and 12 ins. by reversing the wood. A Boring Bit is placed in the line of the Chisel, by the use of which the Chisel will readily enter to the full depth required at one stroke, and save much time, as well as the almost certain risk of speedy breakage, which must occur in Machines where no boring apparatus is provided.

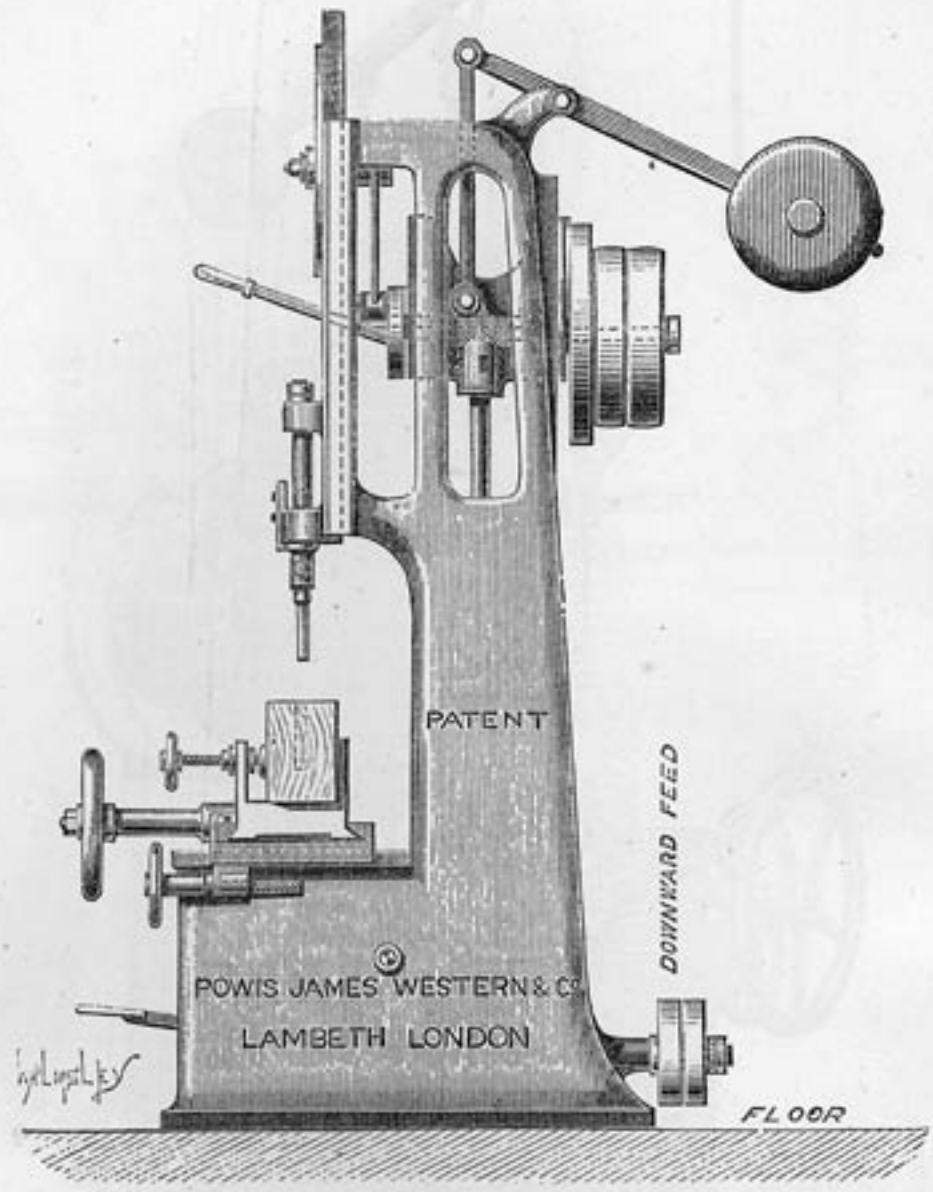
The Chisel is made to reverse readily and to stop when clear of the Mortise, or at any part of the stroke, by a powerful brake under the control of the lad working the Machine.

A novel and important feature peculiar to this Machine is an arrangement for making the Chisel when reversed fall exactly into the same cut.

Simple arrangements are also provided to regulate the stroke of the Chisel to any depth of Mortise, thus forming a thoroughly useful tool at so small a cost as to ensure its general adoption where steam power is employed.

A set of eight best Cast-steel Chisels and eight Patent Screw Augers are included in the price, with a complete set of Spanners.

Size of Wood will take.	Average Power required.	Speed of Pulleys.	
		For Chisel.	For Auger.
12 in. × 6 in.	1-horse.	120	500



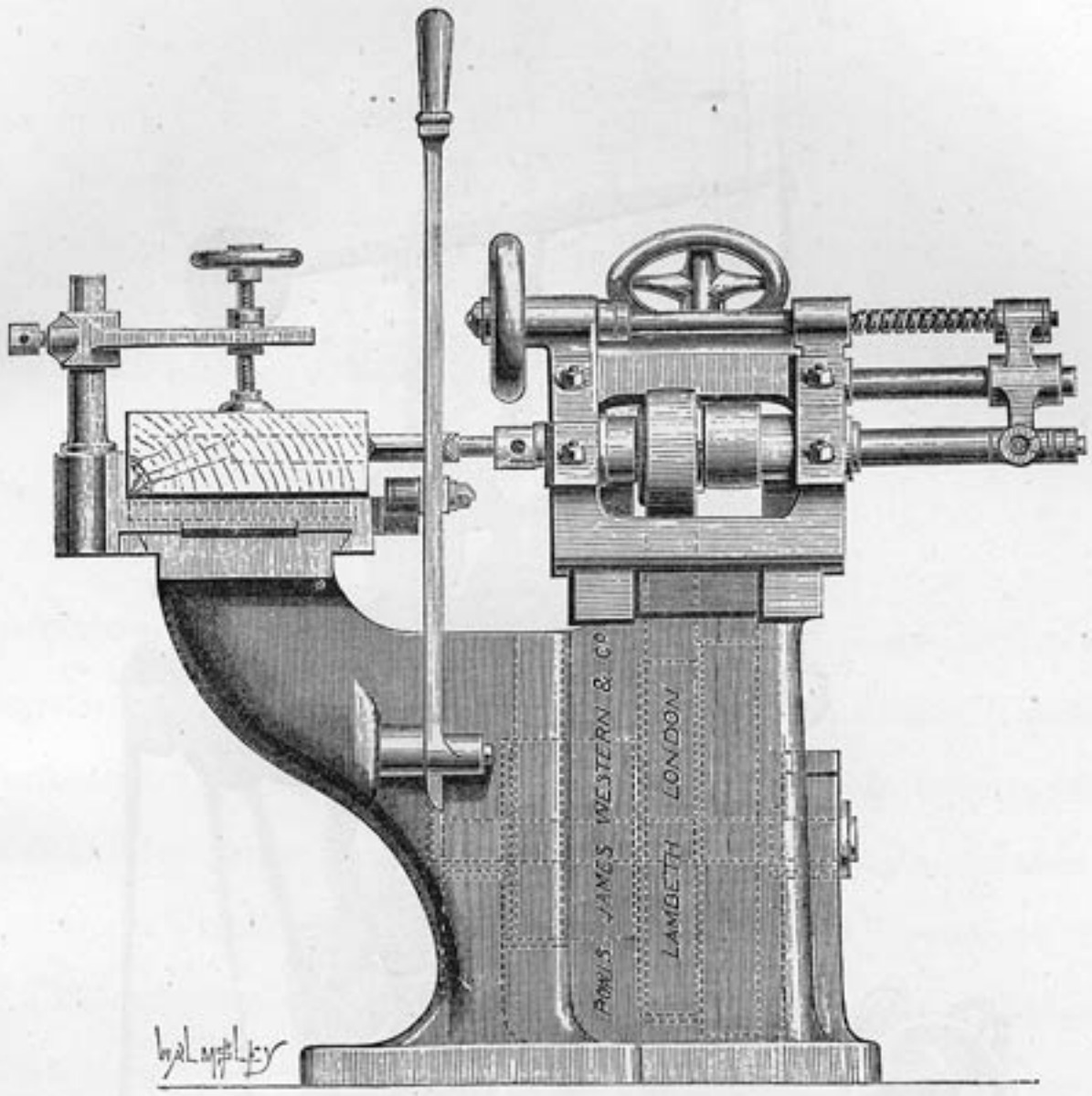
PATENT MORTISING MACHINE,

WITH SELF-ACTING DOWNWARD FEED.

THIS Machine is for doing precisely the same kinds of work as that just described, but the necessity of first boring a hole so as to clear the back of the Mortise Chisel, is here done away with. The Hand Lever starts the Chisel to work in the usual way, but it is so arranged that even at the bottom of its stroke it clears the Wood to be Mortised. The foot is then placed on the treadle which throws a screw into gear, and this gradually brings down the Chisel into the Wood without any jarring to the Machine or unpleasant motion to the leg of the Workman who is attending it—commonly the case in other Machines like this, through a defective arrangement of the parts.

The Price includes a set of eight best cast steel Mortise Chisels and Spanners.

No.	Size of Wood will take.	Mortise will cut at one stroke.	Speed of Pulleys.		Average Power.
			For Chisel.	For Feed.	
1	12 in. by 6 in.	6 in. by 1 in.	120	60	1-horse.
2	9 „ 4½ „	4½ „ ¾ „	120	60	1 „



NEW HORIZONTAL SLOT MORTISING AND BORING MACHINE.

THIS valuable and inexpensive little Machine is capable of doing all the ordinary Mortising and Boring for Joiners, Cabinet Makers, Chair Makers, Gentlemen's Estates, &c., at an immense saving of cost, and at the same time ensuring far greater accuracy than handwork. It should therefore find a place in every such Establishment where Steam or other power is used. They have hitherto been chiefly used in Continental workshops and with great success.

The principle of construction is similar to the Mortising Apparatus supplied to our General Joiners, but it is here in the form of a separate machine. The mode of working is most simple, and easily accomplished by a lad, who by its means may readily do all the Mortising and Boring required in an establishment employing from twenty to thirty men. The power required to drive is merely nominal, so that the cost of working is but a trifle in excess of a lad's wage.

Two sizes are made:—No. 1, for light work, will make Mortises up to 1 in. wide; No. 2, for heavy Roof work, Contractors, Railway Carriage Builders, &c., will Mortise up to 2 in. wide.

The Price includes Countershaft, with cone pulleys, a set of eight Mortising Augers and a set of Spanners. Speed of Countershaft, 800.

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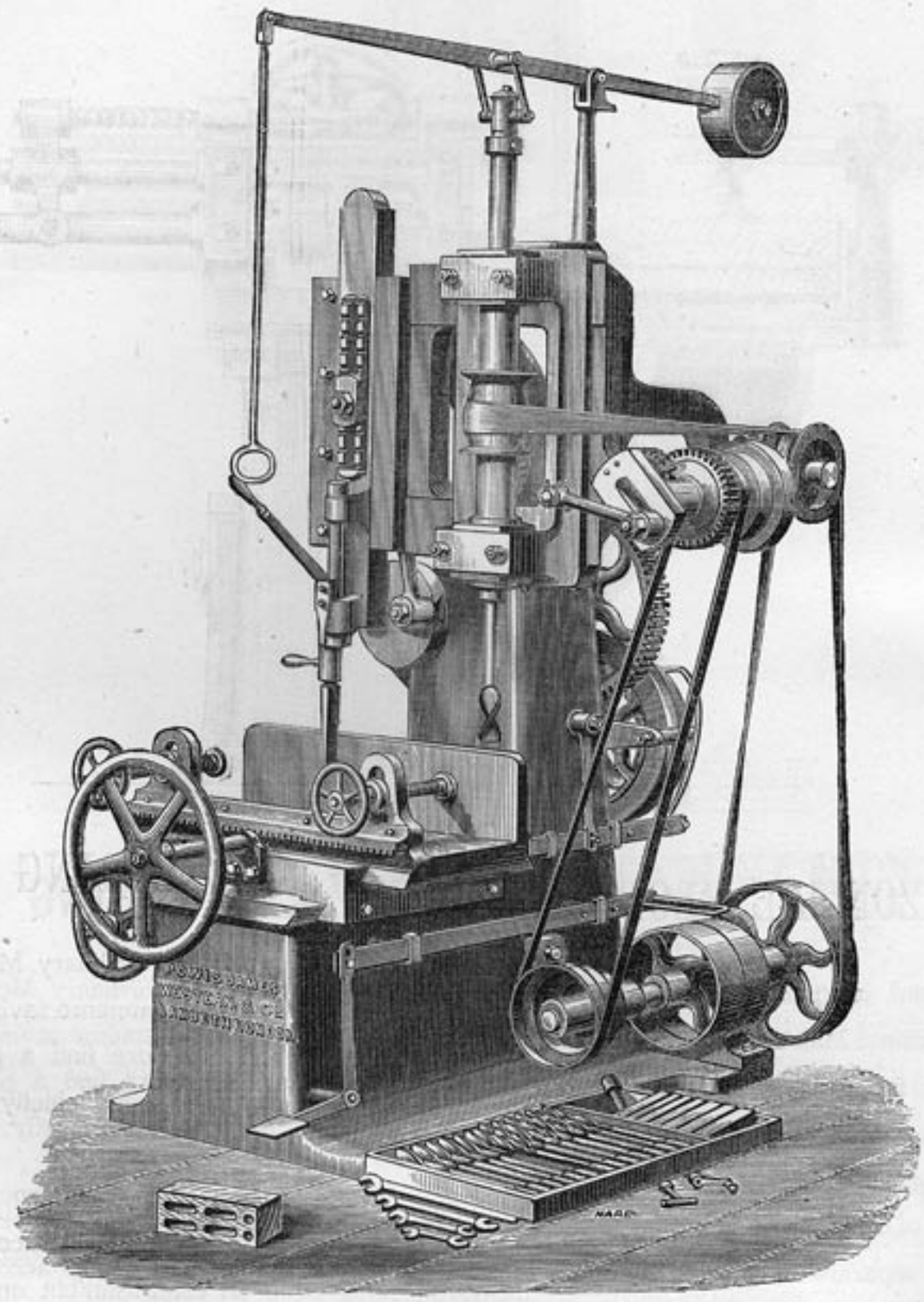


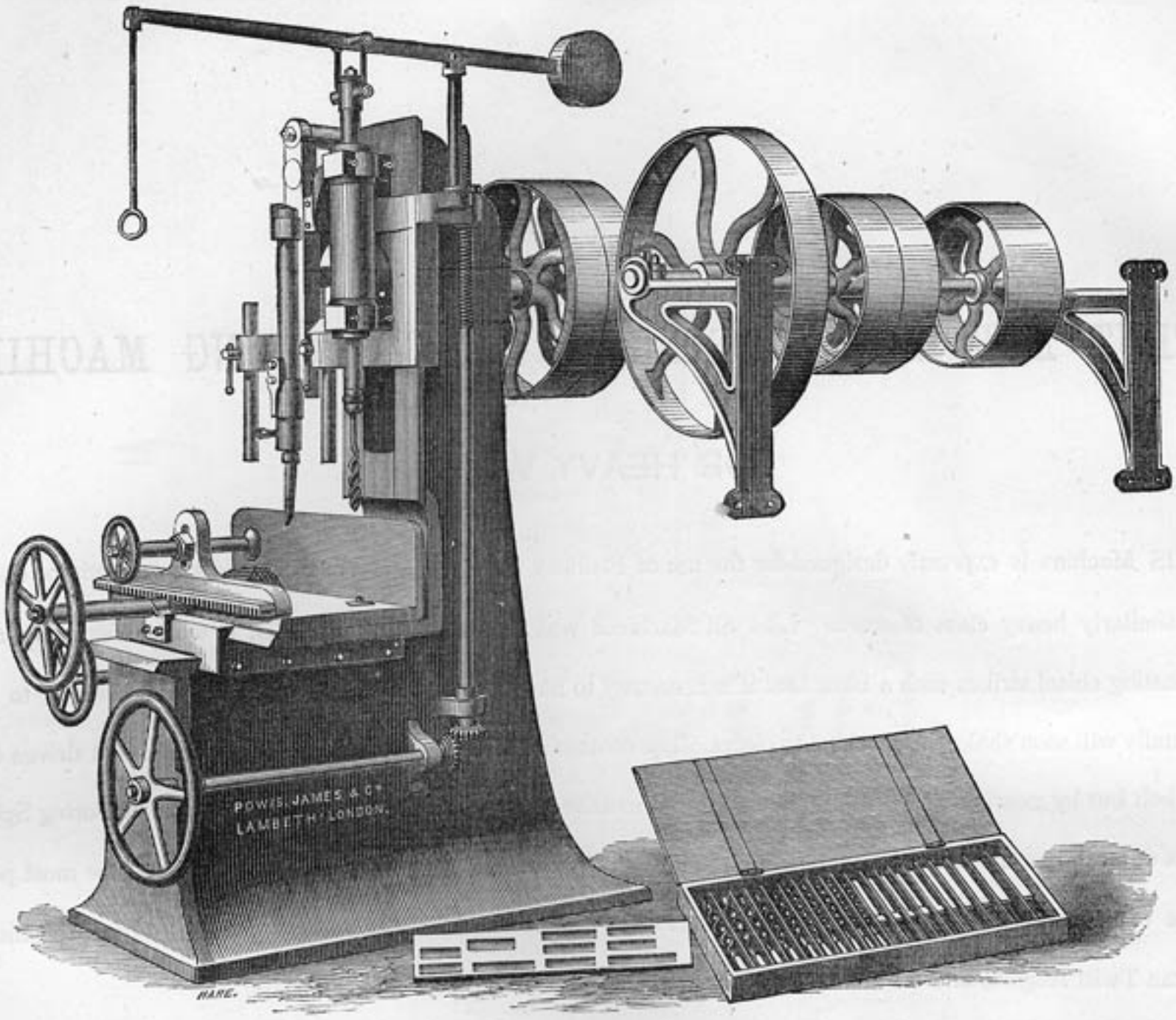
PATENT MORTISING, BORING, AND SLOT-MORTISING MACHINE.

PATENT MORTISING, BORING, & SLOT-MORTISING MACHINE,

FOR HEAVY WORK.

THIS Machine is expressly designed for the use of Railway Carriage and Wagon Builders, and others doing a similarly heavy class of work. Like all Machines which Mortise with a chisel, it works vertically, as the reciprocating chisel strikes such a blow that it is necessary to have a firm foundation under it, and if made to work horizontally will soon shake the machine to pieces. The column is of very great strength; the spear is not driven direct with a belt but by gearing, and is capable of cutting a mortise 3 or 3½ in. in width in hard wood. The Boring Spindle, which is of steel, has a self-acting motion for making slot holes. In every respect, it will be found the most perfect machine of the kind which has yet been made. The price includes a set of 6 Best Cast Steel Mortise Chisels, 6 American Twist Augers, and 6 Patent Mortising Augers, and a set of Keys and Spanners.

No.	Constructed to Carry Timber.	Speed of Pulleys.		Average Power Required.
		For Mortising.	For Boring.	
1	12 in. square.	450	400	3-horse.
2	15 „ „	450	400	3 „



IMPROVED MORTISING AND BORING MACHINE,

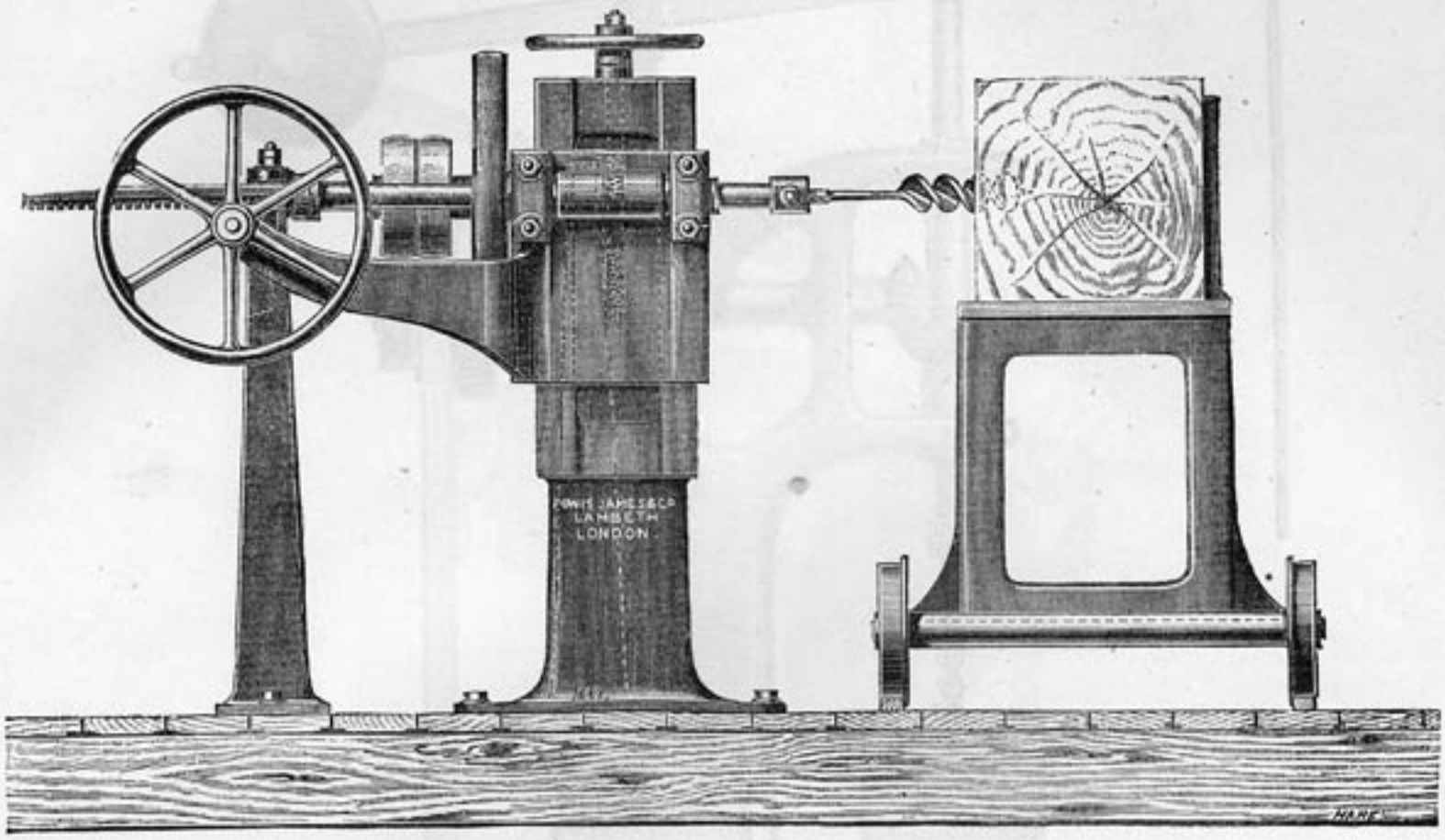
WITH ADJUSTABLE SPEAR-SLIDE.

THIS machine differs from that shown on the preceding page, principally in the mode of adjusting the spear which carries the chisel, so as to suit the various depths of wood which have to be mortised. In the sketch above it will be seen that the Mortise-spear and the Boring Spindle are both carried on a Slide, which is adjustable up and down the main column by turning the large hand wheel in front. This slide should be lowered as near as possible to the top of the wood to be worked to prevent the spear and boring spindle from projecting far beyond their bearings.

It will also be found convenient to lower the slide gradually while the chisel is at work, as by this means the depth of mortise can be adjusted to a nicety. If made to drive direct with a belt, as shown above, 1½ Mortises can be cut, but if it is required to cut greater widths it must be geared up like the previous machines.

The price includes Countershaft and a set of six best cast steel Mortise Chisels, six American Augers and Spanners.

No.	Constructed to carry Timber.	Speed of Countershaft.	Average Horse-power.
1	12-inch square.	120	2-horse
2	12in. by 6in.	120	2 ,,

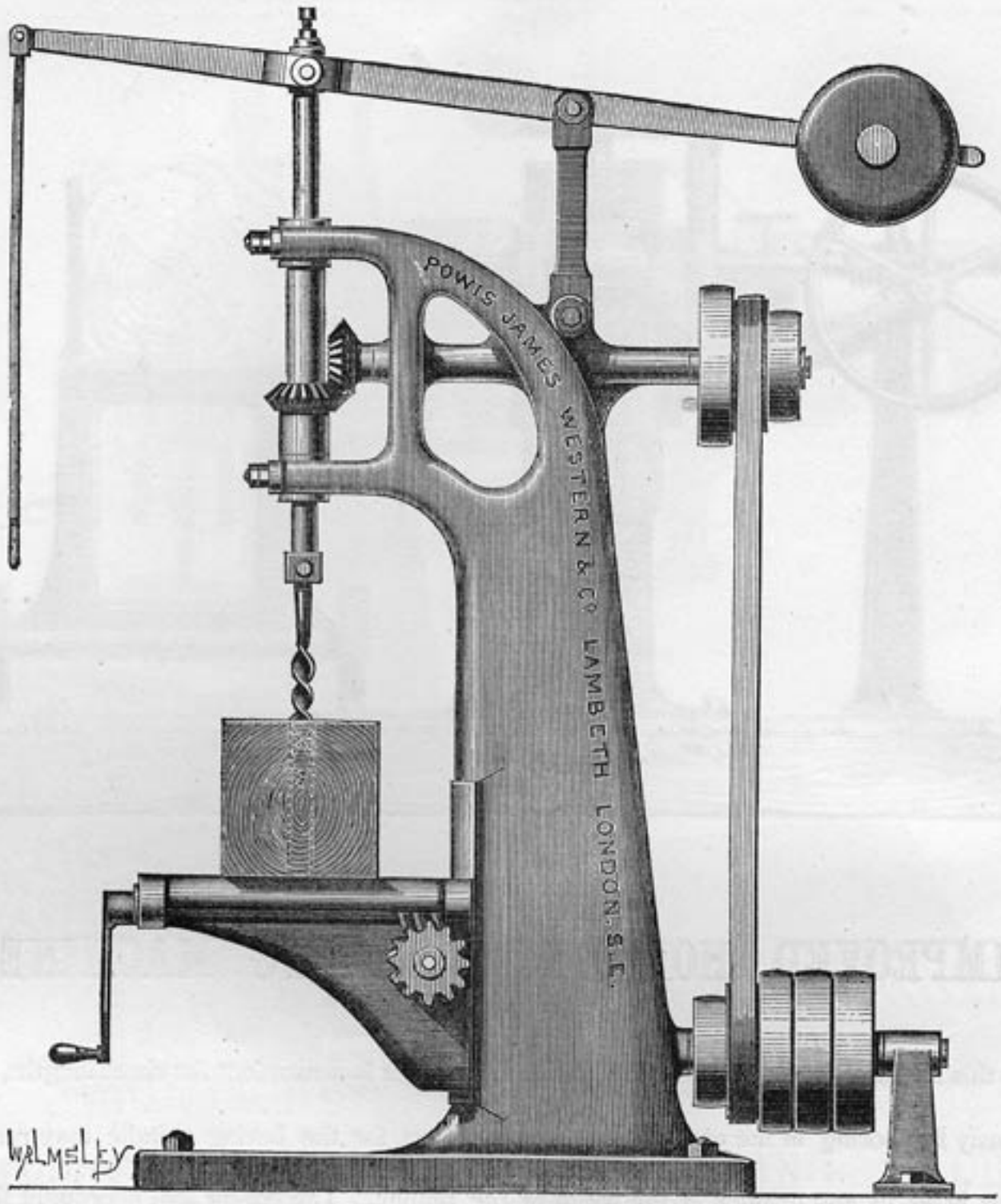


IMPROVED HORIZONTAL BORING MACHINE.

IN some cases this mode of boring is preferred to the vertical; it is convenient for short lengths, and may be used advantageously for boring in the end grain. The carriage for the boring spindle may readily be raised or lowered for boring holes in any position in the width of the timber. The boring tool is brought forward by a rack and pinion, regulated by a large hand-wheel.

A pair of strong timber carriages and 30 feet of rails are supplied with the machine and included in the price, also a set of six Screw Augers and Spanners.

No.	To Bore Holes.	Speed.	Average Power Required.
1	12 by 2	600	2-horse.
2 "	16 by 3	500	3 "



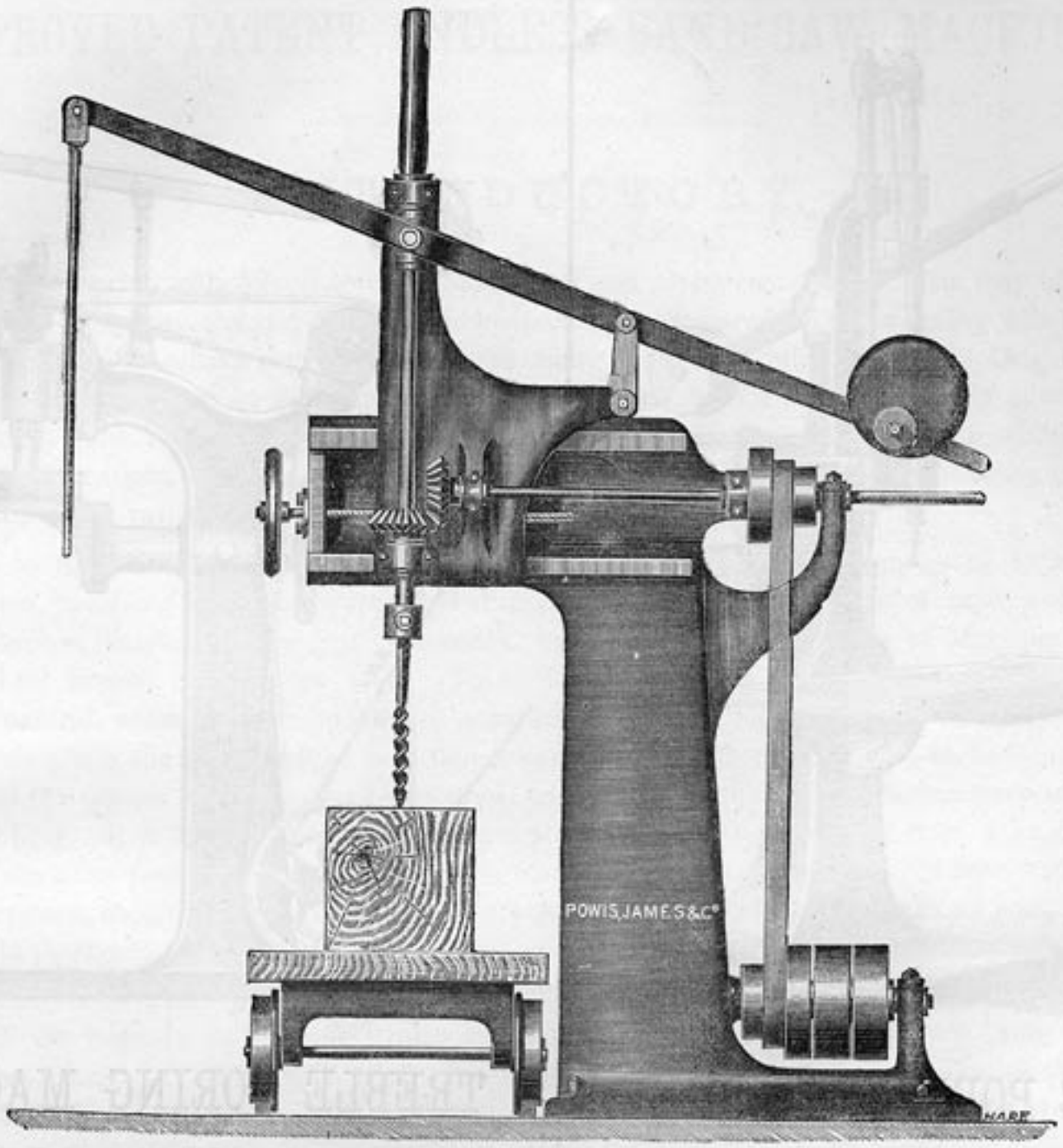
VERTICAL BORING MACHINE.

THIS is a very strong and powerfully made machine, and will be found very serviceable to Railway and Wagon Companies, Contractors, &c., for boring holes in either hard or soft woods.

The columns of Nos. 1 and 2 are made like the drawing of a "Cored pattern," which gives great stiffness. No. 3 is made of a "Flanged pattern," but the metal is well distributed, and it will be found equally rigid.

The table can be raised or lowered by the handle in front, and is provided with rollers each side to facilitate moving the timber. The price includes Countershaft, and a set of six Augers and Spanners.

No.		To Bore Holes.	Speed.	Average Power.
1	Cored pattern	12 in. by 2 in.	500	2-horse.
2	"	16 " 3 "	500	3 "
3	Flanged "	16 " 3 "	500	3 "



IMPROVED VERTICAL BORING MACHINE,

WITH TRAVERSING SPINDLE.

THIS machine differs from that on the opposite page, principally in being fitted with a slide so as to move the boring spindle horizontally. This is very convenient where heavy timber has to be bored, and the holes are not all in one straight line, so that, by moving the timber lengthways and the bit crossways, a hole can be bored in any position. The column is of the " Cored pattern," and very stiff.

It may either be supplied with a timber carriage as shown, or a rising and falling table as on opposite page. The price includes the countershaft and a set of six Augers and Spanners.

No.	To Bore Holes.	Speed.	Average Power.
1	12 in. by 2 in.	500	2-horse.
2	16 in. by 3 in.	500	3 "

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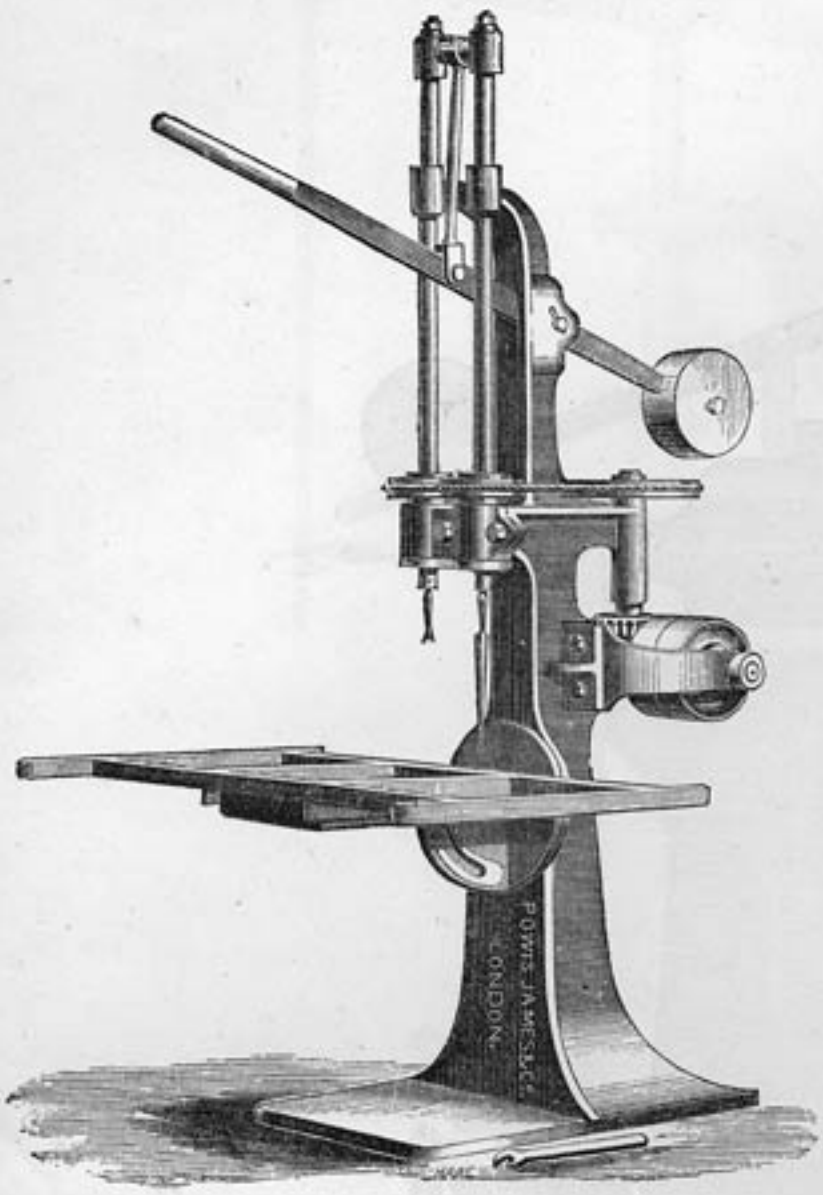
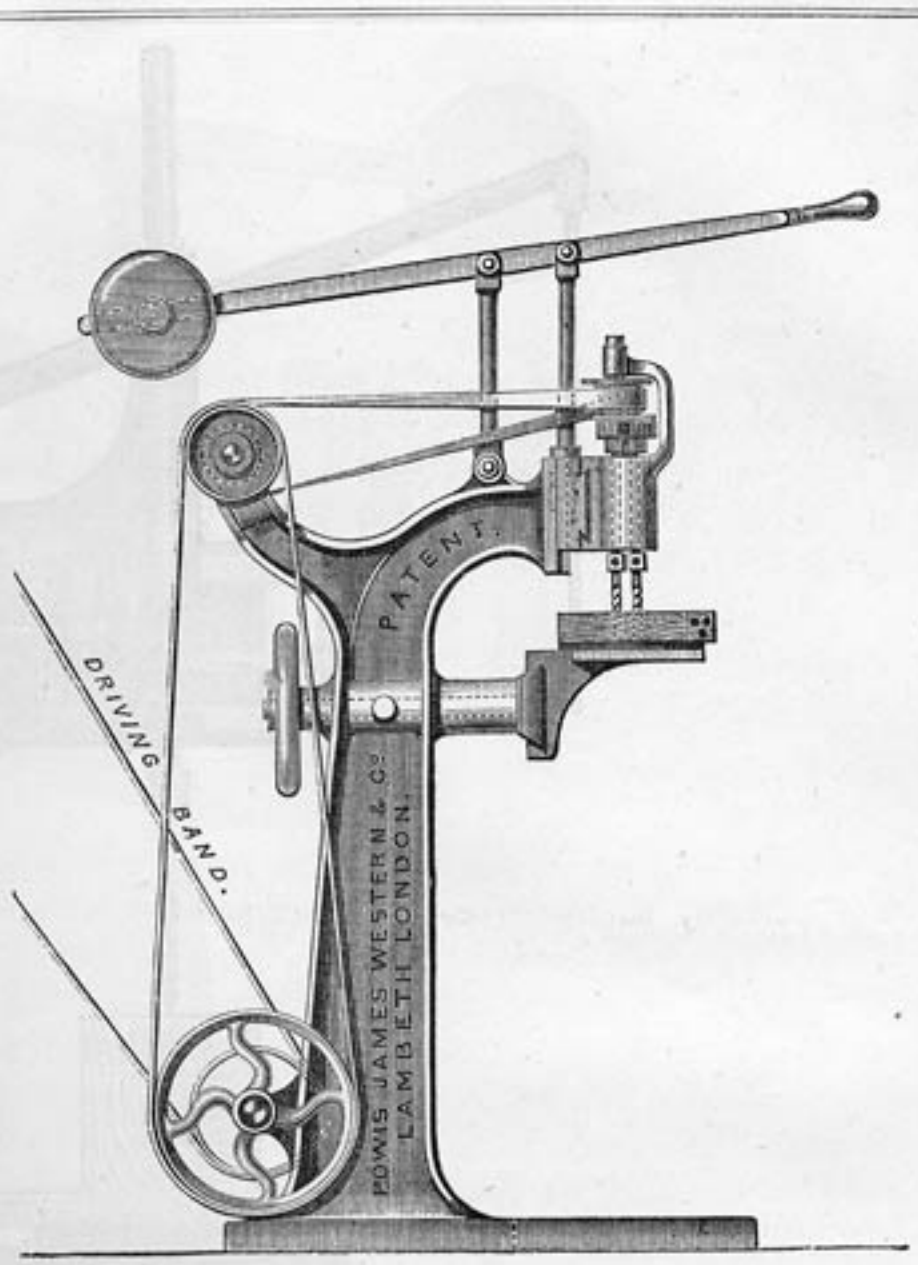


DOUBLE BORING MACHINE,

FOR PACKING CASES, &c.



TREBLE BORING MACHINE,

FOR CHAIRMAKERS, &c.

THE Double Boring Machine here shown was designed for the use of Coffee Planters in Ceylon, but will be found very useful to anyone whose business includes making Boxes or Packing Cases in large quantities. It will bore two holes at a time, 4½ inches apart; but this distance can, of course, be fixed, in ordering the Machine, to suit the kind of work for which it is to be used. The Table is made to cant in both directions, so that the nails may be driven in so as to form, as it were, dovetails, and thus make it very difficult to break open the box.

The Price includes a set of six Augers. Speed of Driving Pulleys, .

The Treble-boring Machine will recommend itself to Furniture Makers, especially for boring the dowel-holes for jointing the various parts of Chairs and Sofas. Either one, two, or three holes can be made at a time, and one of the bits is movable, so as to alter the distances between the holes. Besides the Rest shown in the drawing, which can he set to any bevel, a Cramp is provided suitable for holding bent chair arms and legs.

The Price includes Countershaft and a set of six Augers.

We make a small and inexpensive Dowel-turning Head, which we recommend to go with the above Machine.

The Price quoted includes Countershaft and two Cutters.

IMPROVED PATENT ENDLESS BAND SAW MACHINES.

INTRODUCTORY.

NO invention connected with Wood-working Machinery can claim more success than that of the Band Saw Machine for simplicity, general utility, and cheapness, as compared with the saving effected in their use. No Machine is capable of so wide a range of work in so many and widely differing trades. Originally invented for Cutting Wood in irregular forms, its peculiar advantages have been extended to a variety of other materials, Iron, Brass, Stone, Ivory, Bone, Paper, Cloth, Leather, &c. In Wood Cutting, the principle has extended to the sawing of Logs of large dimensions, Deals and Staves of Casks, &c.; in fact, wherever this Machine is introduced, it is found of great utility in a variety of ways, and for numberless purposes.

Previous to the year 1862, there existed a formidable drawback to its many advantages, which, too, was a costly item, involving much annoyance and disappointment, as well as loss of time and money. We refer to the constant liability of the Saws to break, even where the best make of Machines was employed, as well as the best French Saw Blades used. To all Machines of the old type this objection still exists, and it is perfectly natural when the conditions are considered under which ordinary Band Saw Machines are made. In the first place, the Saws must be very thin to work, their width varies from $\frac{1}{8}$-in. to 6-in., the length from 10 to 50 feet, and the utmost tension, without actually reaching the breaking point, is necessary to put the Saw in condition for working. It is easy to imagine, that the first slight extra strain arising from a knot, sharp curve, or any momentary deviation from the regular line of work, completes the overstraining of the Saw, and breakage is the inevitable consequence, necessitating in some cases, the brazing of three or four Saws in an hour. Many attempts had been made to overcome this difficulty, without meeting the real solution of the case.

The Machine was made perfectly rigid: the Pulleys accurately turned and balanced, the best French Blades used, still the necessity of extreme tension remained without any relief whatever being given under the circumstances above noticed. Others have tried a lever with a more or less ponderous block at the end to suit the various substances of the Saws. This plan is a complete failure, the same tension must be applied by a proportionate weight, which cannot in the first place be accurately adapted to the varying strength of the Saws. In the next place, it can afford no relief in the case of additional strain.

A glance at any of the following drawings, will at once show the manner in which this difficulty is fully obviated by our PATENTED COMPENSATING SPRING ARRANGEMENT, which is supplied to every Machine made by us, and by which means the breaking of a Saw is rendered a rare exception, even in the most difficult work or stubborn material.

In the first place, a much smaller amount of tension is required for the Saw, the spring being sufficiently strong to take up any slack that may arise from the heating, at the same time yielding readily to the slightest extra strain arising from knots, sharp curves, or varying density of the material. Secondly, by means of adjusting Screws and Hand-wheels the tension necessary for any size of Saw, may be regulated to the greatest nicety.

One of these Patent Machines has been working more than twelve months at the workshops of the South Kensington Museum, without the breakage of a single Saw, although the work is much varied, and small Saws are chiefly used.

The great repute we have attained in the manufacture of Band Saw Machines for general excellence, renders it unnecessary to do more in this place, than call the attention of our friends and the public generally to the importance of our Patented inventions, without which one of the most useful Machines ever introduced would have remained essentially imperfect.

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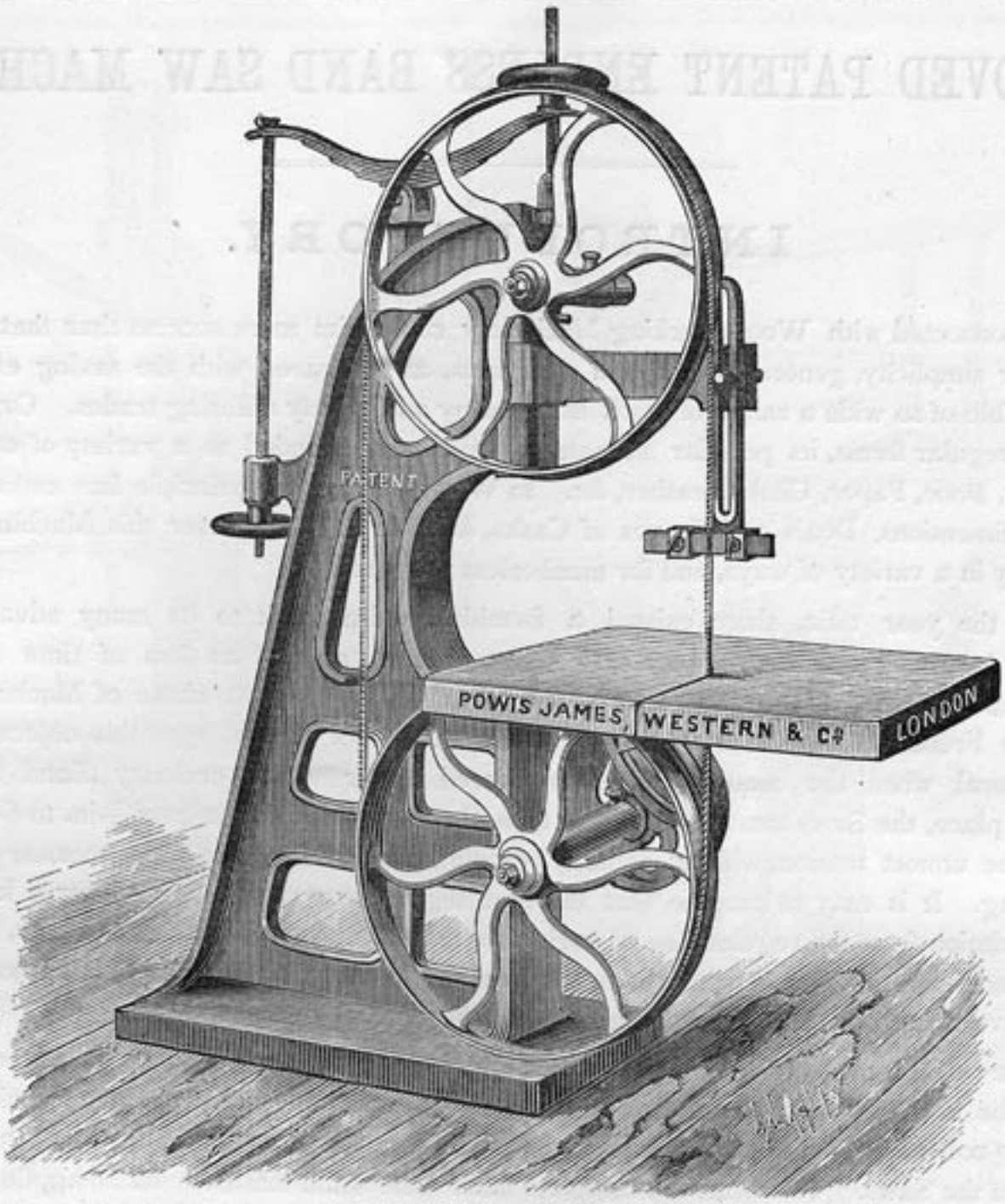

IMPROVED PATENT ENDLESS BAND SAWING MACHINE.

Nos. 1 and 2.

THIS Machine is fitted with our Patent Compensating Spring arrangement for lessening tension and preventing breakage to Saws.

Without this important improvement no Band Saw Machine can be considered practically complete.

It is capable of sawing 1,000 4-in Wheel Felloes in a day of ten hours, and is the kind frequently selected by Builders, Coopers, Steam Wheel Makers, Coach Builders, Cabinet and Pianoforte Makers, Brush Makers, Bone and Ivory Workers, and by Wholesale Clothiers and Army Contractors for cutting Cloth, &c., where the work is not large and heavy.

The Table is made to cant to any angle by a simple and complete arrangement.

When required a Fence can be supplied for cutting Straight Work, Barrel Staves, &c., or a Radial Arm may be added for Sweep Cutting.

The Framing of this Machine is of great strength. The Saw Pulleys are accurately turned and balanced, after being keyed on the Spindles; and the whole of the workmanship throughout is of the very best description.

Being importers, a large stock of the best French Band Saw Blades is kept with suitable Teeth for Sawing Wood, Iron, Ivory, and Bone, also Knife-edge Blades for Cloth and Paper.

Two Saws are included in the price of the Machine, with all necessary spanners.

Size.	Diameter of Saw Pulleys.	Depth will Cut.	Speed of Driving Pulleys.	Average Power required.
No. 1.	27 in.	10 in.	450	1-horse.
„ 2.	30 „	12 „	400	1 „

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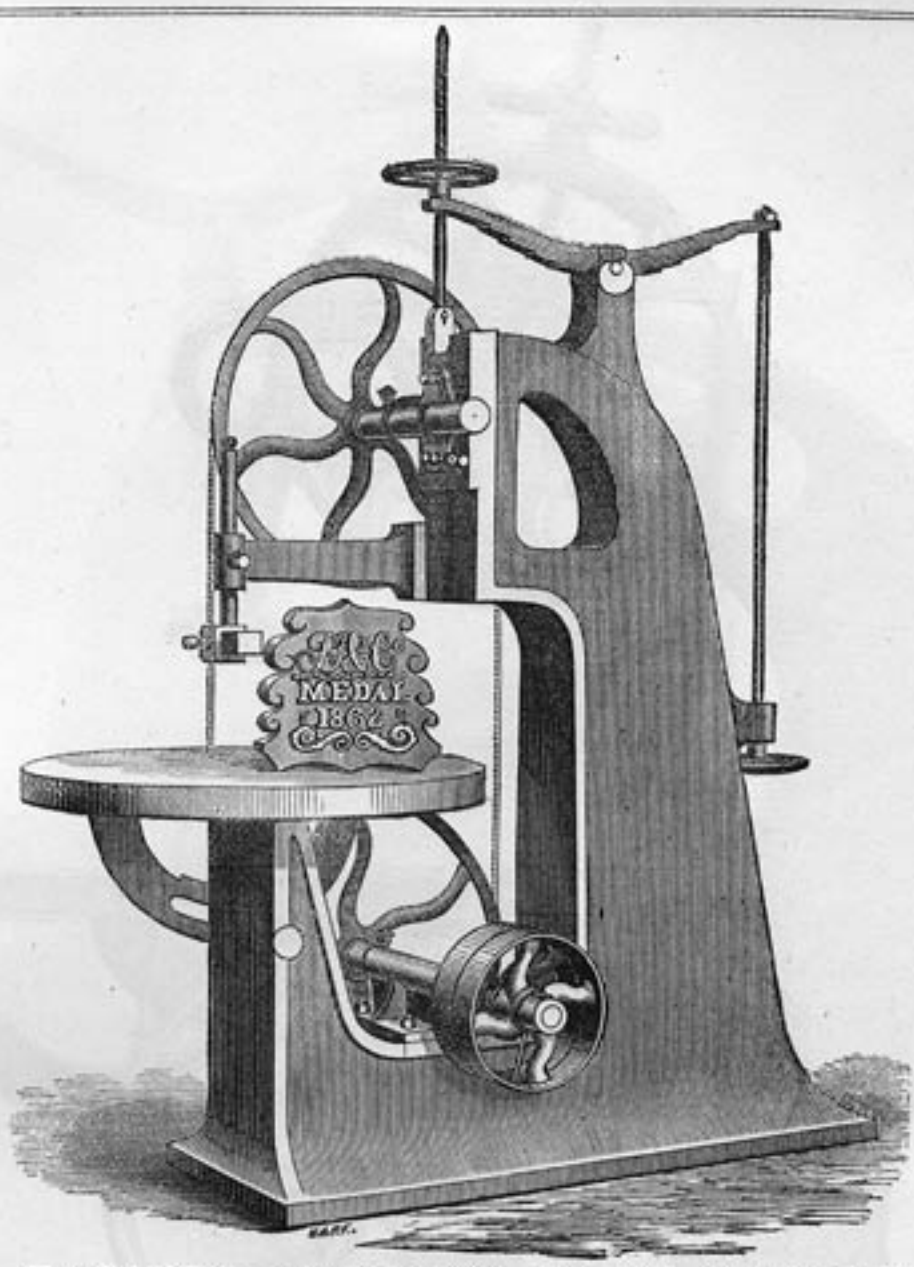


IMPROVED PATENT ENDLESS BAND SAW MACHINES.

Nos. 3, 4, and 5.

THESE Machines have also our Patent Compensating Spring arrangement for reducing tension and preventing the breakage of Saws. The value of this Patent increases in proportion to size of Machine. The cost of the Saw Blades being greater, whilst they require the same care and relief in point of tension and provision from accidental strain.

The Frame consisting in ordinary machines of separate standard, base, and bracket for table, is here made in one entire hollow casting got up with great care, giving strength, rigidity, durability, and convenience. The Machine only requires to be bolted to the floor when it is at once ready for work, being entirely self-contained.

Another feature in these Machines is their simplicity of design combined with the highest class of workmanship and material, equally fitting them for doing the heaviest kinds of work ever required, as well as the most delicate.

The largest size is usually supplied to Ship Builders and others requiring to cut heavy timbers. The smaller and intermediate Machines are suitable for cutting heavy work for Gothic and other Church Roofs, Buffer, and Break Blocks, Curved Supports for Railway Carriage Roofs, Felloes and other Wheelwright's work, for Army Clothing Contractors, as alsoBuilders, Cabinet, Pianoforte Makers, Machinists, Pattern Makers, &c.

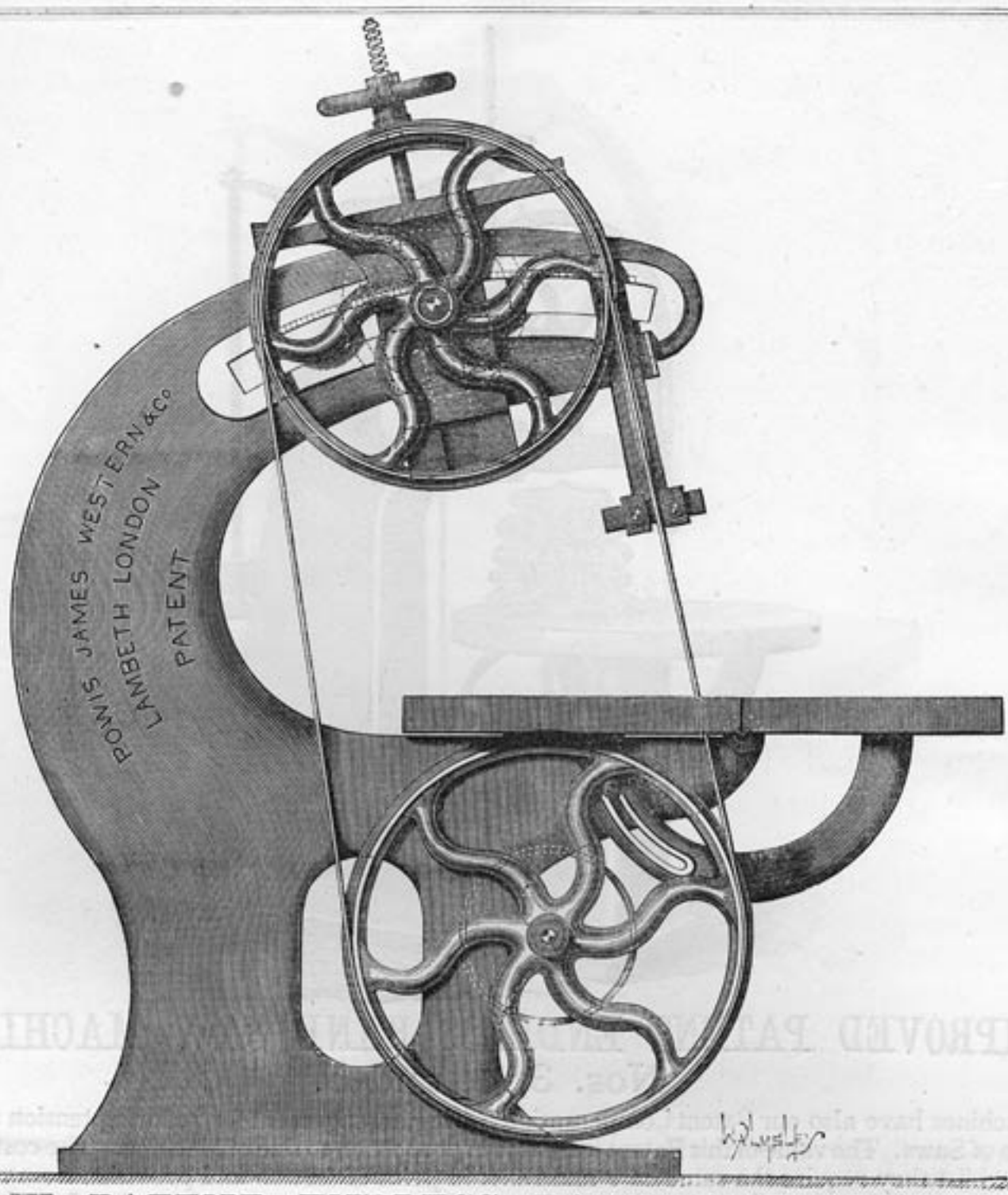
The arrangement for Canting the Table is very complete.

Self-acting Continuous Feed Motion and Fence may be supplied to either size for Sawing Deals, or a variable Fence suited to Stave Sawing for Casks, &c.

In cutting Chair Tops and other work much wood may often be saved by sawing out of deep Timber and dividing after having made the sweep cut.

Being Importers, a large Stock of best French Band Saw Blades are kept with Teeth suited to Wood, Iron, Ivory, and Bone Sawing, also Knife Edge Blades for Cloth, Paper, &c.

Size.	Diameter of Saw Pulleys.	Depth will Cut.	Speed of Pulleys.	Average Power Required.
No. 3	30 in.	14	400	1-horse.
„ 4	36 „	18	350	2 „
„ 5	42 „	22	310	2 „
„ 6	48 „	24	280	3 „



NEW PATENT ENDLESS BAND SAW MACHINE,

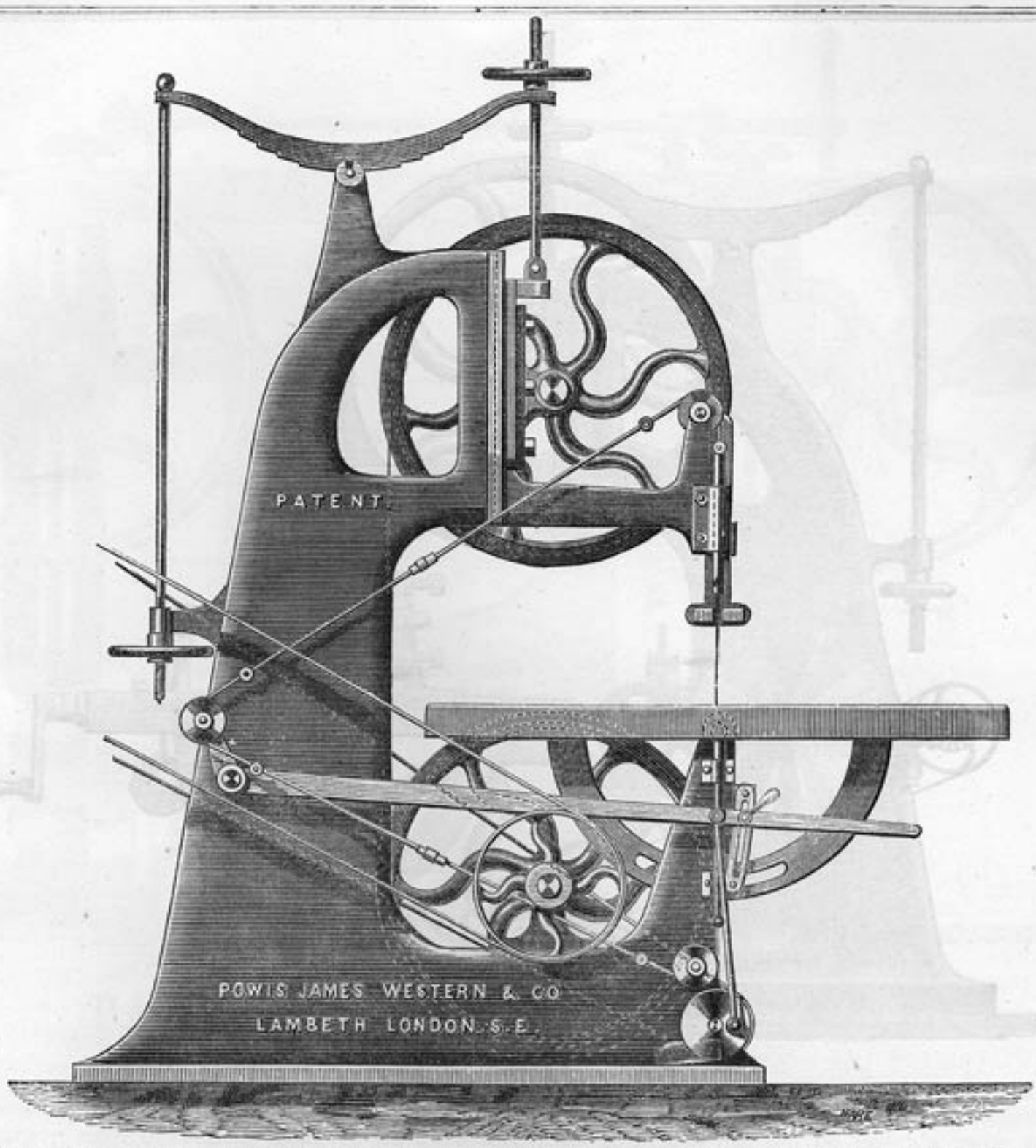
WITH ADJUSTABLE SAW PULLEYS FOR BEVELLED CUTTING.

BAND Saw Machines being now used very much for bevelled cutting as well as for straight work, especially by Cabinetmakers, Chair and Furniture Makers, Builders, &c., the Machine shown above will be found in this respect a great improvement on anything that has yet been introduced. It combines all the advantages of the Machines just described, with an entirely novel and perfectly successful arrangement of canting the top Saw Pulley, so that bevelled work can be cut with the same convenience and facility as straight work. The Drawing shows a Machine in which the saw can be canted so as to cut at an angle of 60°, which is large enough to include almost every kind of bevelled work. If, however, a still greater angle is required, it can be readily obtained by canting the table in the usual way. Thus, by canting the table to a very small extent, so as not in any way to cause inconvenience or difficulty in handling the wood to be cut, a far greater angle can be obtained than is ever wanted in practice.

The angle is altered by turning the hand-wheel at the back of the top Saw Pulley, and for straight cutting it is only necessary to bring this pulley to the outer end of the curved slot which is made so that the saw shall then be perpendicular, and the Machine be used for ordinary work just as if it was one of the regular Machines.

Our well known Patent Spring arrangement, so successful in preventing the breakage of the saws, is here applied in a modified form to suit the special needs of the case. It is found to answer its purpose equally well as that shown on the previous pages, and with anything like moderate care a saw need never be broken. The Price includes two best French Saws and Spanners.

No.	Diameter of Driving Saw Pulley.	Depth will Cut.	Speed of Pulleys.	Average Power Required.
1	30	12 inches	400	1-horse
2	36	16 „	350	2 „



NEW PATENT COMBINED ENDLESS BAND AND JIGGER SAW MACHINE.

THIS useful and economical combination is designed to meet the requirements of Cabinet Makers, Builders, and others, who have Tracery, Fret-Work, and other internal cutting to do, as well as external Sweeps, and it effects a considerable saving in cost and space.

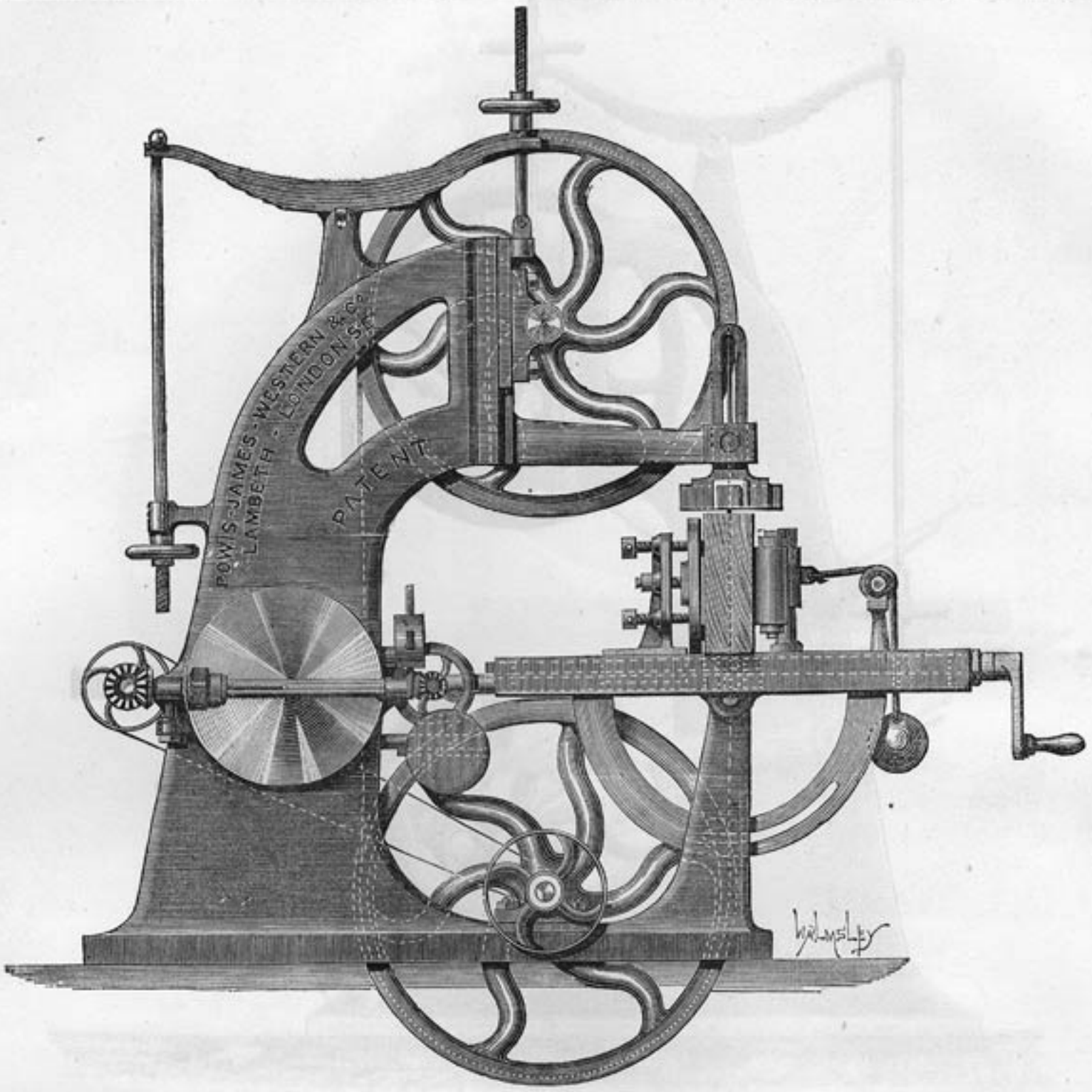
Each part is complete in itself, whether used as a Band Saw or Jigger Saw Machine.

It is provided with our Patent Compensating Spring arrangement for lessening the tension and preventing the breakage of Saws. 12 inches in depth may be cut by the Band Saw and 8 inches by the Jigger Saw, and the Table is made to cant readily for Sawing on the angle.

A large stock of best French Saw Blades is always kept on hand suited to Wood, Iron, or Ivory; also endless Knives for cutting Cloth and Paper.

Diameter of Saw Pulleys.	Speed of Saw Pulleys.	Speed of Jigger Saw.	Average Power Required.
30 in.	500	300	2-horse.

A smaller size Machine of lighter pattern is also made, drawings and particulars on application.

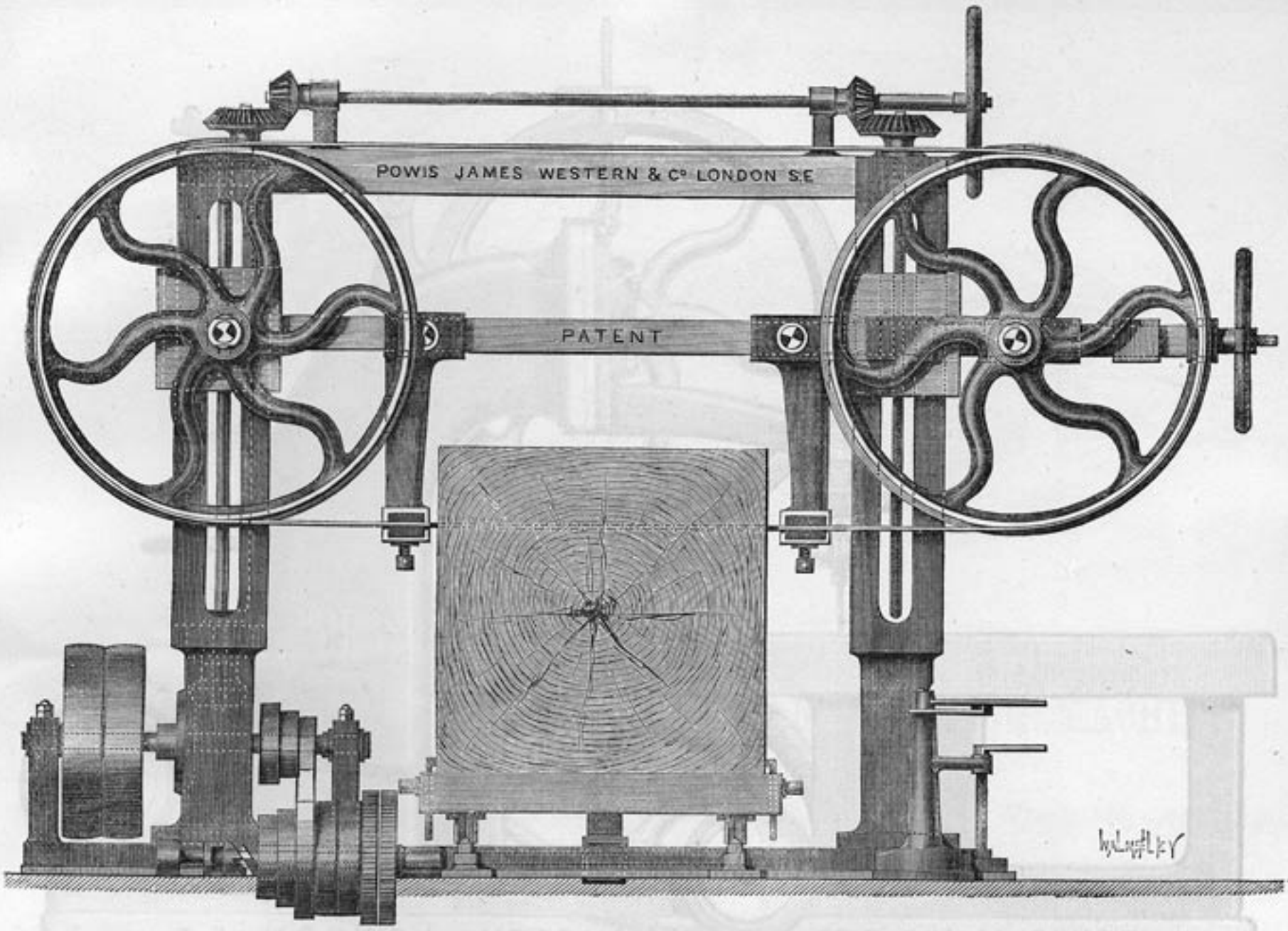


PATENT ENDLESS BAND SAW MACHINE,

FOR SAWING FLITCHES, DEALS, &c.

IN the sketch shown above the Deals are drawn through the Saw by means of an endless chain in a similar manner to the Chain Feed Deal Frame on page 34. A Roller Feed can be fitted if preferred, but we recommend the Chain Feed as being simpler, more certain in action, and can be readily removed to enable the Machine to be used as an ordinary Band Saw Machine for curved cutting. Our Patent Spring adjustment, to prevent the breakage of saws, is fitted to this Machine, and also our Frictional Disc Feed, by means of which the rate of cutting can easily be altered, even while the Machine is working. The price includes sufficient chain to work a 20ft. deal, two saws, and a set of Spanners.

No.	Diameter of Saw Pulleys.	Depth will Cut.	Speed of Pulleys.	Average Power required.
1	36 ins.	18 ins.	350	2
2	42 „	22 „	310	3
3	48 „	24 „	280	3



PATENT BAND SAW MACHINE,

FOR SAWING LOGS.

THIS Machine is well adapted for sawing up round or square Timber into Planks, Flitches, or Scantling; and when larger sizes of Timber have to be dealt with than 36 inches, this will be found a more economical Machine, both in cost and in power used, than the Rack Circular-saw Bench, although the rate of cutting is not so great. It can also be used for slabbing logs of valuable wood, where it is desired to examine the figure after each board is taken off, in order to decide on the thickness of the next.

The Timber is carried on a strong iron travelling-bed provided with clips, and the Saw Pulleys, to which our Patented Spring Adjustment for preventing the breakage of the Saws is fitted, are raised and lowered simultaneously by a hand wheel, to which a dividing-plate and pointer are attached, so that the thickness of cut can be accurately gauged.

The Price includes one best Band-saw and a set of Spanners.

No.	To Cut Timber.	Speed of Countershaft.
1	36 in. by 36 in. by 25 ft.	350
2	42 „ 42 „ 25 „	„
3	48 „ 48 „ 25 „	„

Quotations given for other Sizes.

We make a special Machine on this principle for Sawing Ships' Timbers to the required curved forms. Particulars on application.

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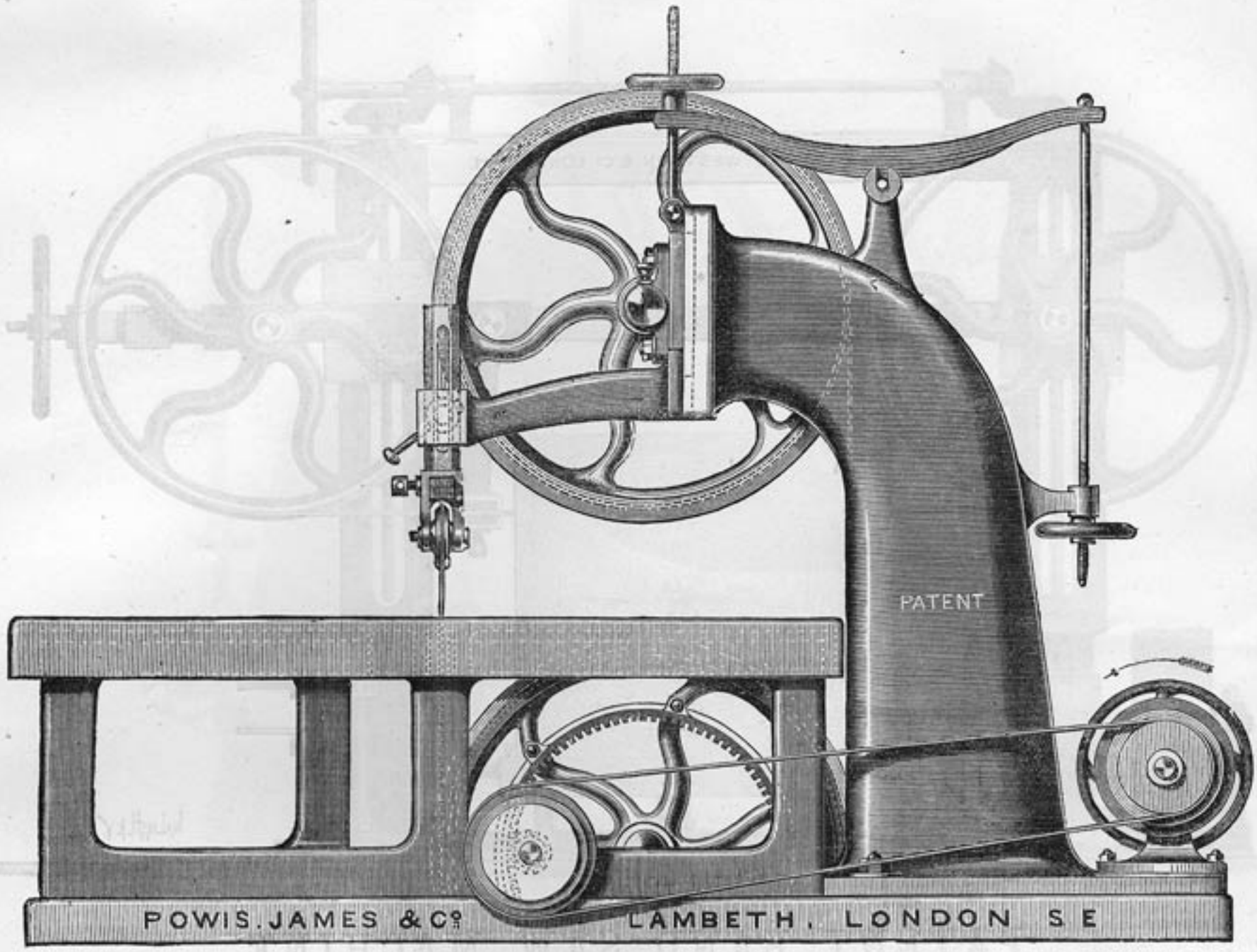


PATENT ENDLESS BAND SAW MACHINE,

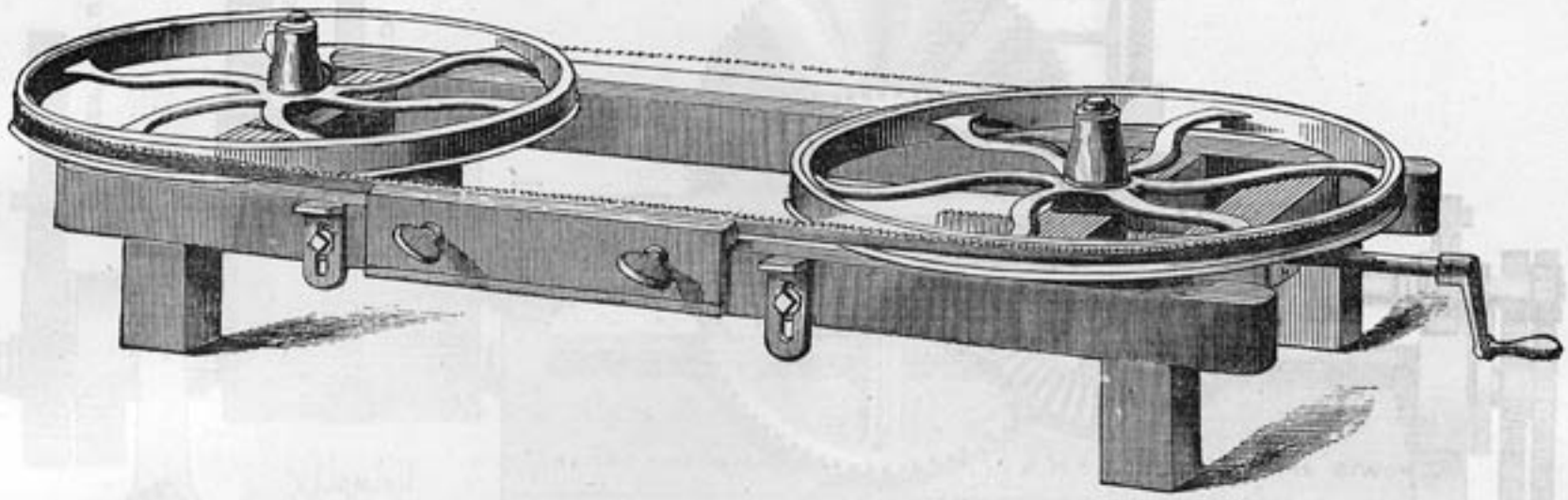
FOR CUTTING IRON AND OTHER METALS,

For Manufacturers of Gun Carriages, Locomotives, Ship and Bridge Builders, Engineers, &c.

OUR Patent Band Saw Machine, so universally appreciated for cutting wood, is here offered in a modified form for cutting Cold Iron or other Metals. For this purpose it is driven at a very slow speed; about 250 feet per minute being found most suitable. The Saws, which are specially made and tempered, will last without sharpening 4 or 5 hours in cutting Iron; and will easily cut Two superficial inches per minute. The liability to break the Saw, by expansion and contraction, through heating, or by the carelessness of the workman, is entirely obviated by means of our Patent Spring arrangement for supporting the top Saw Pulley. The iron to be sawn is easily moved to the Saw by means of a Lever and Chain attached to the top Saw Guide. The work as it leaves the Saw is quite smooth, and in most cases will not require any hand labour.

This Machine will be found invaluable for cutting-out Brackets, Transoms, and all irregular forms in the manufacture of Gun Carriages, Bridges, Ships and Locomotives. The Price includes two best Cast Steel Saws and a set of Spanners.

No.	Diameter of Saw Pulleys.	Driving Pulleys—Revolutions per minute.	Average Power.
1	36	250	1-horse
2	42	250	2 ,,
3	48	250	2 ,,



ENDLESS BAND SAW SHARPENING AND SETTING MACHINE.

THIS Machine is used for Sharpening and Setting Endless Band Saws. The Two Wheels are covered with Leather, and are made to revolve. The Saw is placed upon them, allowing it to pass freely through the Clams, which holds it at the time of sharpening. The Wheels are drawn apart, which stretch the Saw, by means of a Handle shown on the end of the Screw. The two small Brackets shown on each end of the Clams are to adjust the Saw to a proper height for Sharpening and Setting. By using this simple Machine a great saving is effected over the old method of Sharpening in common Vice; besides the Saws are not so liable to be cramped or broken: when once placed on the Machine, they can be properly Sharpened and Set before you remove them; the Jaws of the Clams are so arranged as to give the Saw a proper Set, and not more.

These are made in four sizes to suit the various length of Saws for our Patent Endless Band Saw Machines.

No. 1 will take Saws from 14 feet to 17 feet long.

„ 2 „ „ „ „ 17 „ „ 20 „

„ 3 „ „ „ „ 20 „ „ 24 „

„ 4 „ „ „ „ 24 „ „ 28 „

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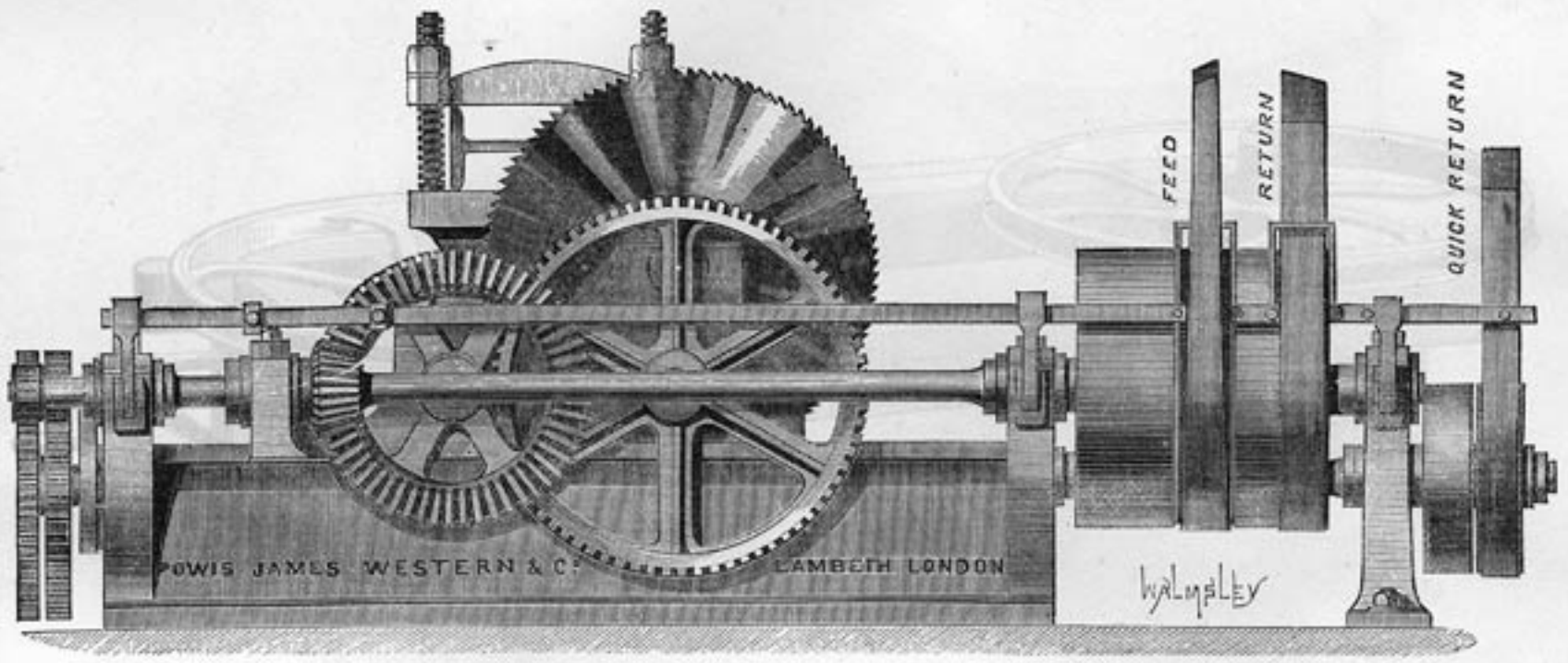


PATENT CIRCULAR SAW,

FOR CUTTING IRON AND OTHER METALS (COLD).

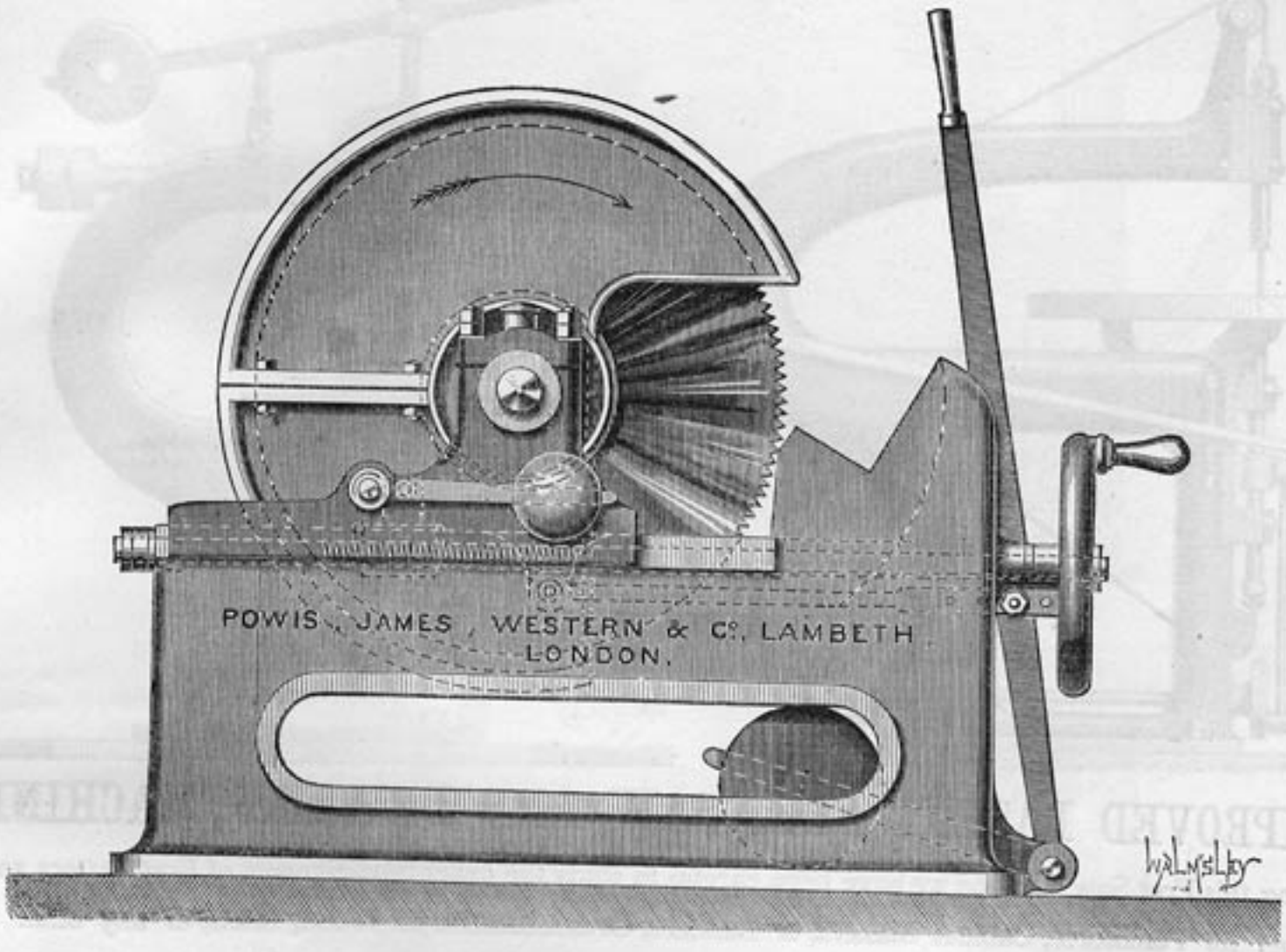
TO Railway Wagon Building Companies, we recommend this Machine for Cross-cutting and Squaring off Angle Irons, H irons, T irons, &c., used in the construction of Wagons and Carriages. Engineers and Machinists will find it as useful as any tool in their shop, as it will cut cold steel, wrought or cast iron, and gun metal, all equally well, the work being as smooth and true as if planed, while the rate of cutting is a great deal faster.

The Saws are made of steel and specially tempered, and will last a week or ten days in constant work without requiring to be sharpened.

No Machine can be more simple of management that this. The work has only to be held fast on the table by the straps and bolts, and the driving belt thrown on, when the saw advances by self-acting motion at a speed variable, according to the nature of the work.

The usual sizes made are given below, but quotations will be given for Machines to cut any other size.

No.	To cut Sections of Iron up to	To carry Saw Diameter.	Average Power Required.
1	9 in. by 3 in.	18 in.	1-horse.
2	12 „ 4½ „	22 „	1½ „
3	16 „ 6 „	28 „	2 „

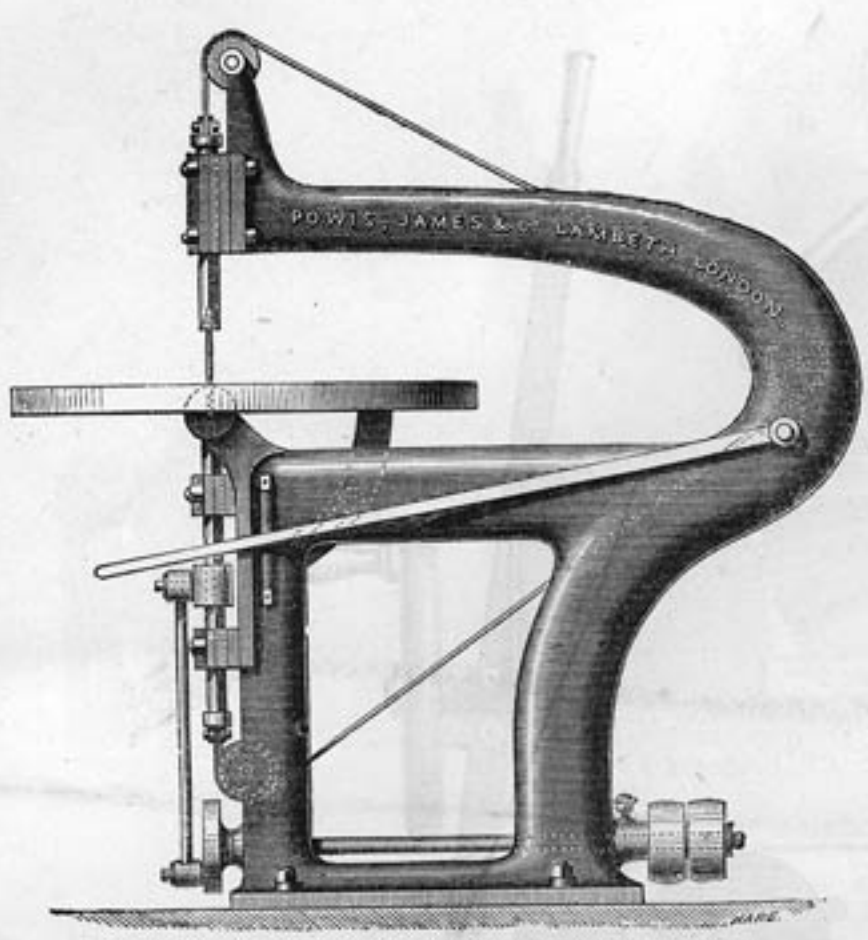


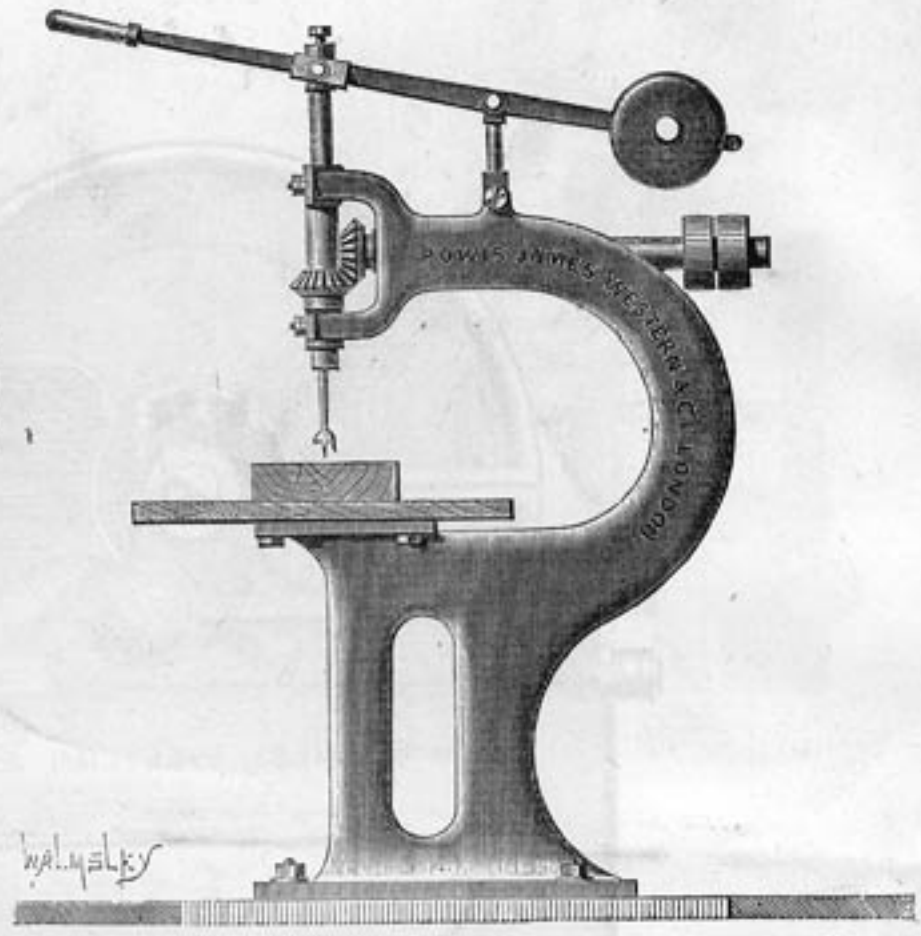
IMPROVED CIRCULAR SAW FOR HOT IRON.

THIS Machine is largely used in Rolling Mills, Forges, Shipyards, &c., for cross-cutting, to the required lengths, Rails, Bars, Girders, &c. As the work leaves the Rolls it is taken still hot to this Saw, and the rough ends are squared off in the most perfect and expeditious manner. The Saws are driven at a high speed from a Countershaft fixed above the Machine (not shown in the drawing), and are traversed through the hot iron, either by the hand-wheel or the foot-lever. The former is for use in cutting large sections, such as solid round bars, while for lighter work, such as Angle Irons, time will be saved by using the foot-lever. The price includes the Countershaft with Pulleys and Hangers, one Saw and a set of Spanners.

No.	To Cross-cut.	Diameter of Saw.	Speed of Countershaft.	Average Power Required.
1	5 in. diameter	30 ins.	500	5
2	7 „ „	36 „	„	6
3	9 „ „	42 „	„	7

If preferred, a special Direct-acting Engine can be fitted to either size.





IMPROVED PATENT FRET SAW AND DRILLING MACHINES.

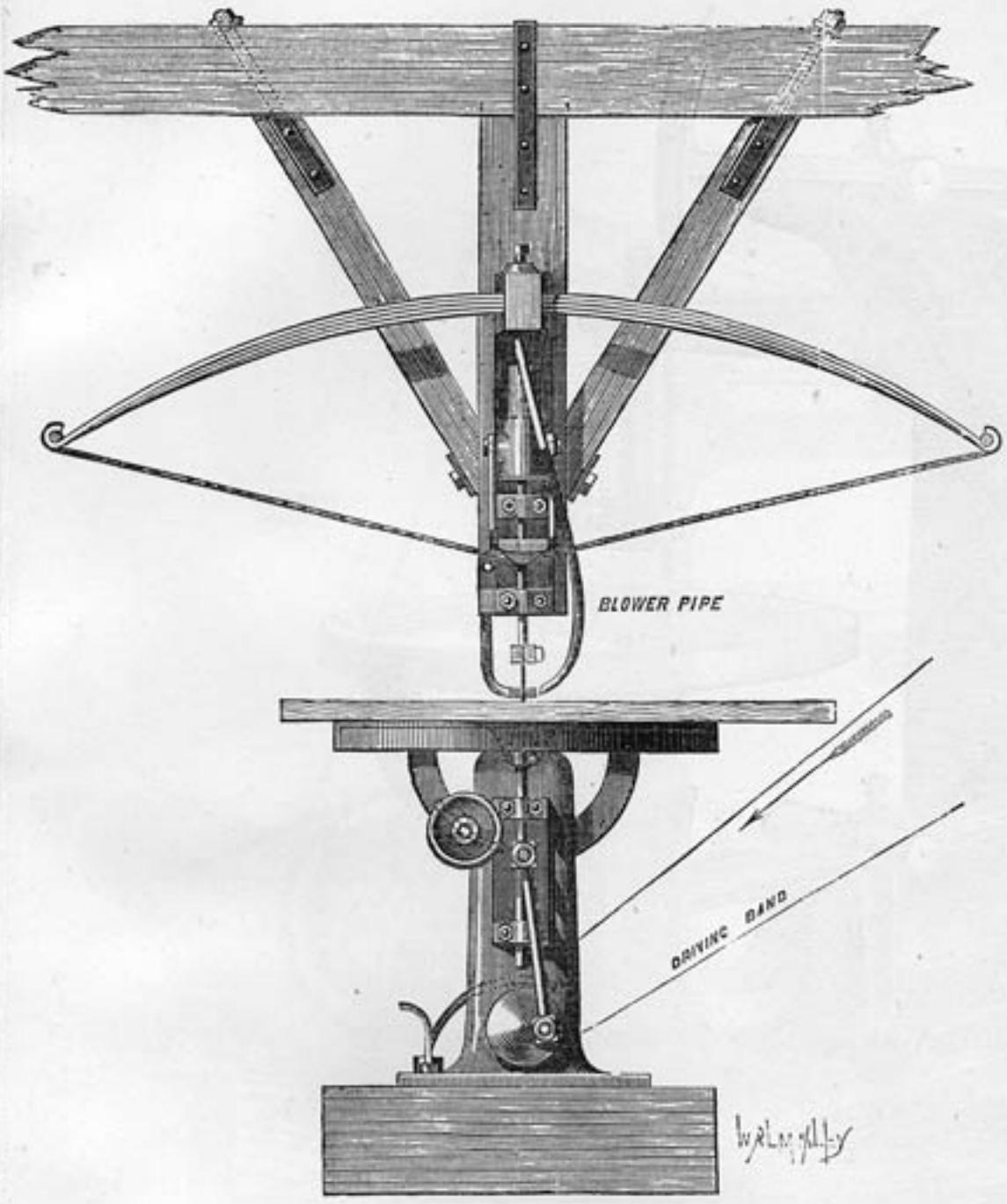
IN making this Fret Saw Machine we have been careful to study the exact requirements of Fret Cutters and others, whether for Pianoforte, Cabinet Makers, or Builders, Ornamentation in Wood, Brass, or any other material. In construction it is so rigid, and in working so exact, that it is admirably adapted for Buhl or Marquetrie Work whether in Wocd, or Wood and Metal combined.

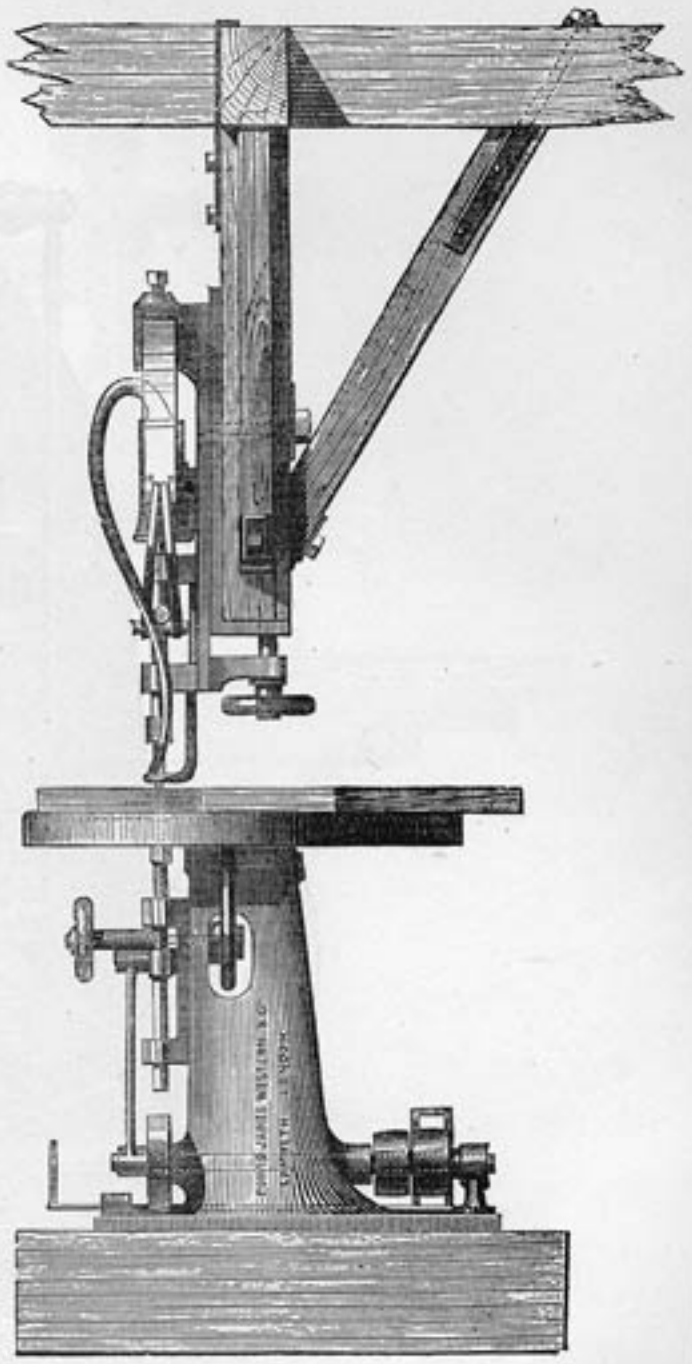
The turning space from Saw to Standard is 4 feet, in Nos. 1 and 2, so that Pianoforte fronts can be worked. No. 3 is for smaller work, and has only a distance of 16 inches from the Saw to the Standard. The Table may be canted with great ease. If required, a Drilling Machine can be attached for piercing holes in Wood or Metal. Arrangements are supplied for giving the nicest tension to the Saws.

No.	Depth will Cut.	No. of Strokes.	Power required.
1	3 in.	500 per minute.	Nominal.
2	6 „	500 „	
3	6 „	500 „	

The Drilling Machine, shown above, is for readily piercing the holes in Wood or Metal Fret Work, to allow of the Saw being passed through. It has a space of 30 in. from the drill to the standard, so that wide work can be easily dealt with.

No.	Depth will Drill.	Power required.
1	3 in.	Nominal.
2	6 „	



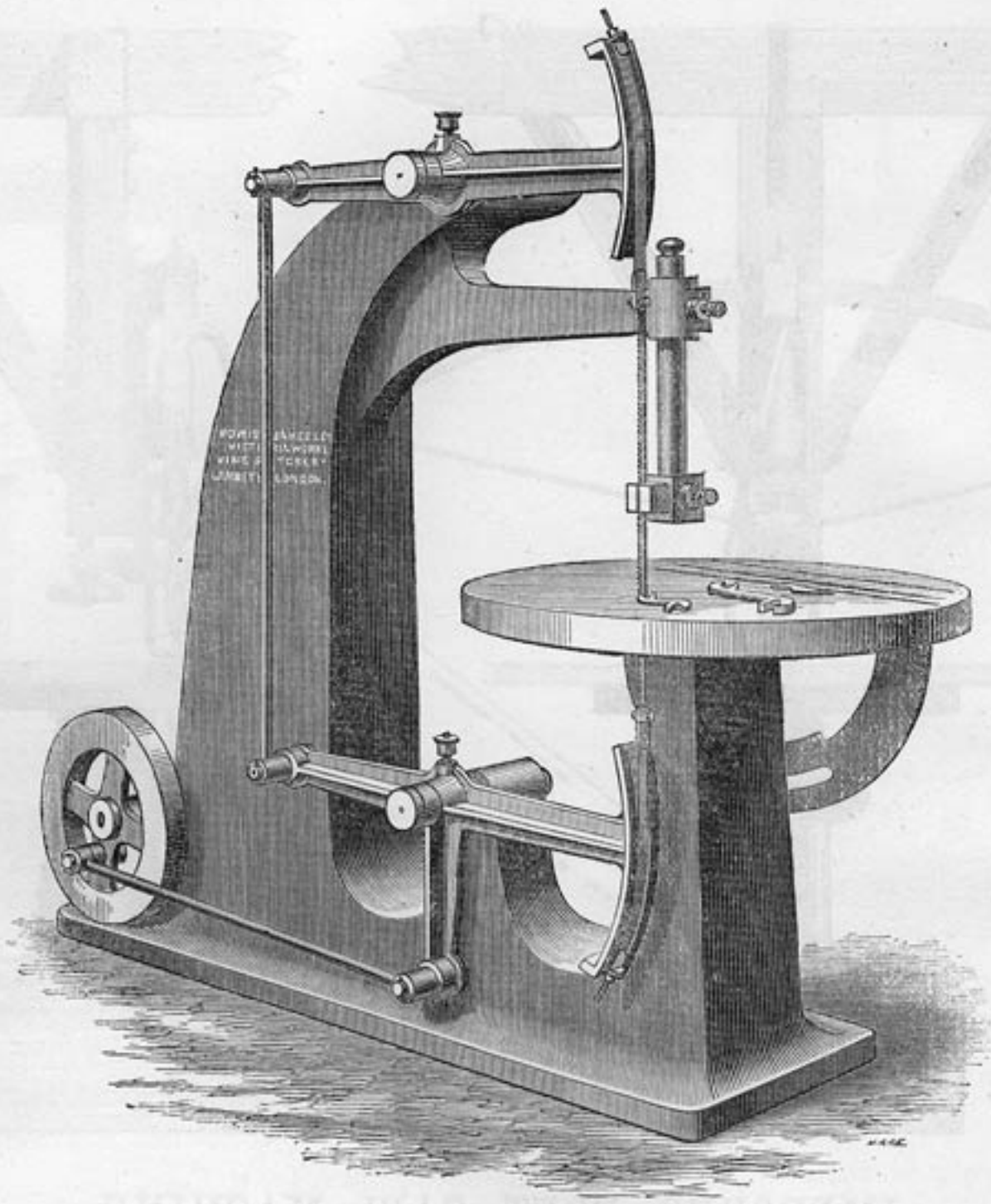


IMPROVED FRET SAW MACHINE.

THIS Machine differs from that just described, principally in having the upper guide carried on a wooden Framework suspended from the Roof, instead of being complete in one casting. The advantage of this arrangement is that work of any size can be cut in this Machine, whereas in the other the back of the column, which is 4 feet from the Saw limits the size of Wood that can be worked. The Saw is kept taut by a large spring-bow, and a small Air Pump is provided to blow away the sawdust from the line of cut. The Table can readily be canted for Bevelled Cutting.

The Price includes 6 Saws and a set of Spanners, but not the Wooden Framing.

No.	Depth will Cut.	No. of Revolutions per Minute.	Power required.
1	3 inches.	500	Nominal.
2	6 „	500	„



IMPROVED JIGGER SAW MACHINE,

FOR SWEEP-CUTTING AND TRACERY, &c.,

THIS Machine is designed for Cabinet Makers, Builders, and others, in whose establishments there is a necessity for cutting Tracery and open work for Carvings, Roofing-timbers, and the like, for which purposes a Band Saw is inapplicable.

It will cut up to 8 inches in depth, and can carry a fine Saw for small work; it will often be an advantage to cut ornaments in thick pieces and separate them afterwards on a circular or other Saw-bench. The space for moving the work is much larger than usual, which is an important consideration in a Jigger or Fret Saw.

Great strength is given to the casting and all working parts, so that the Machine is very rigid and steady in work. The Table may be readily canted for Bevel-cutting.

Four Saws and a set of Spanners are included in the price.

Diameter of Driving Pulleys.	Speed.	Average Power Required.
12 inches.	About 300.	1-horse.

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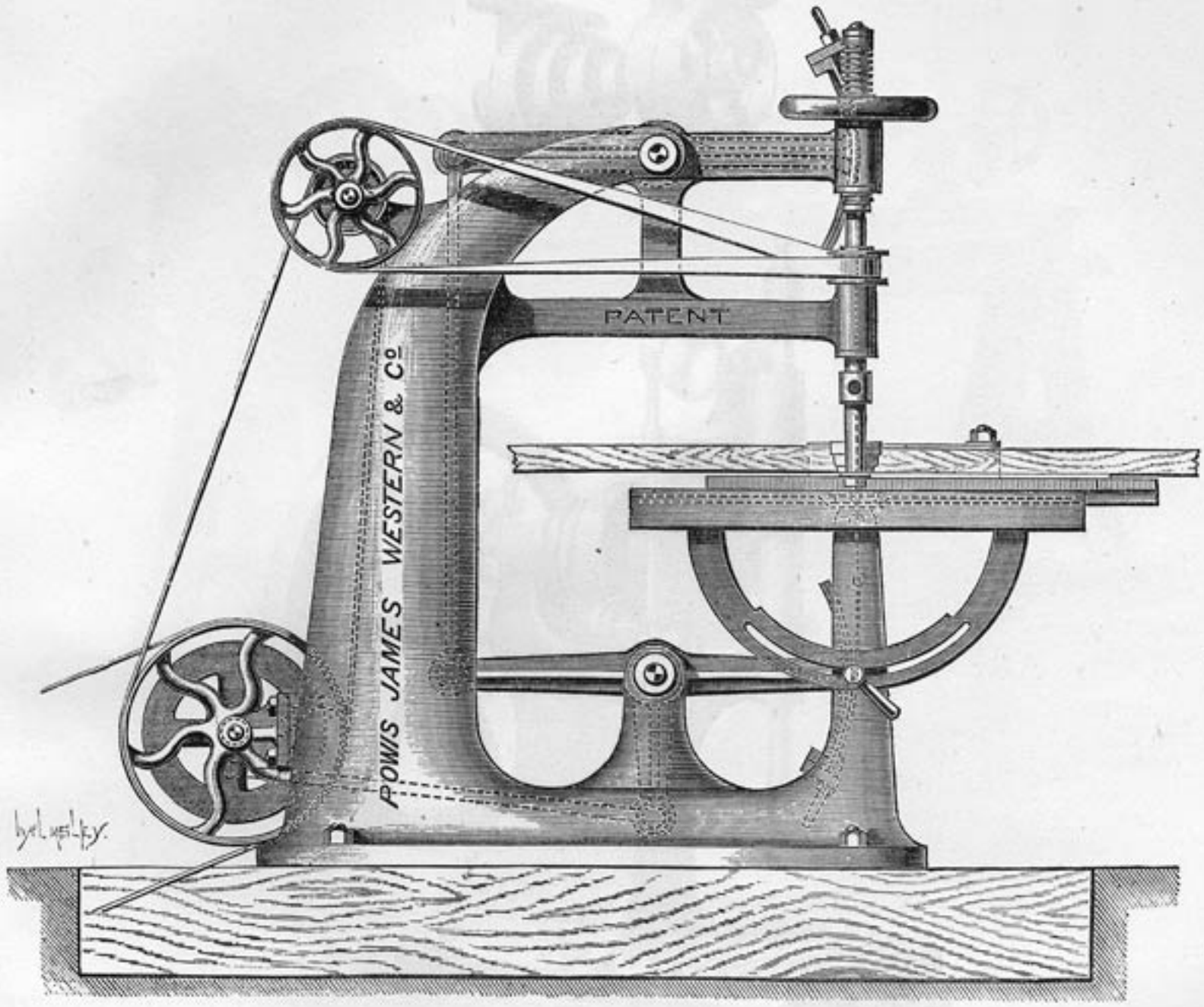
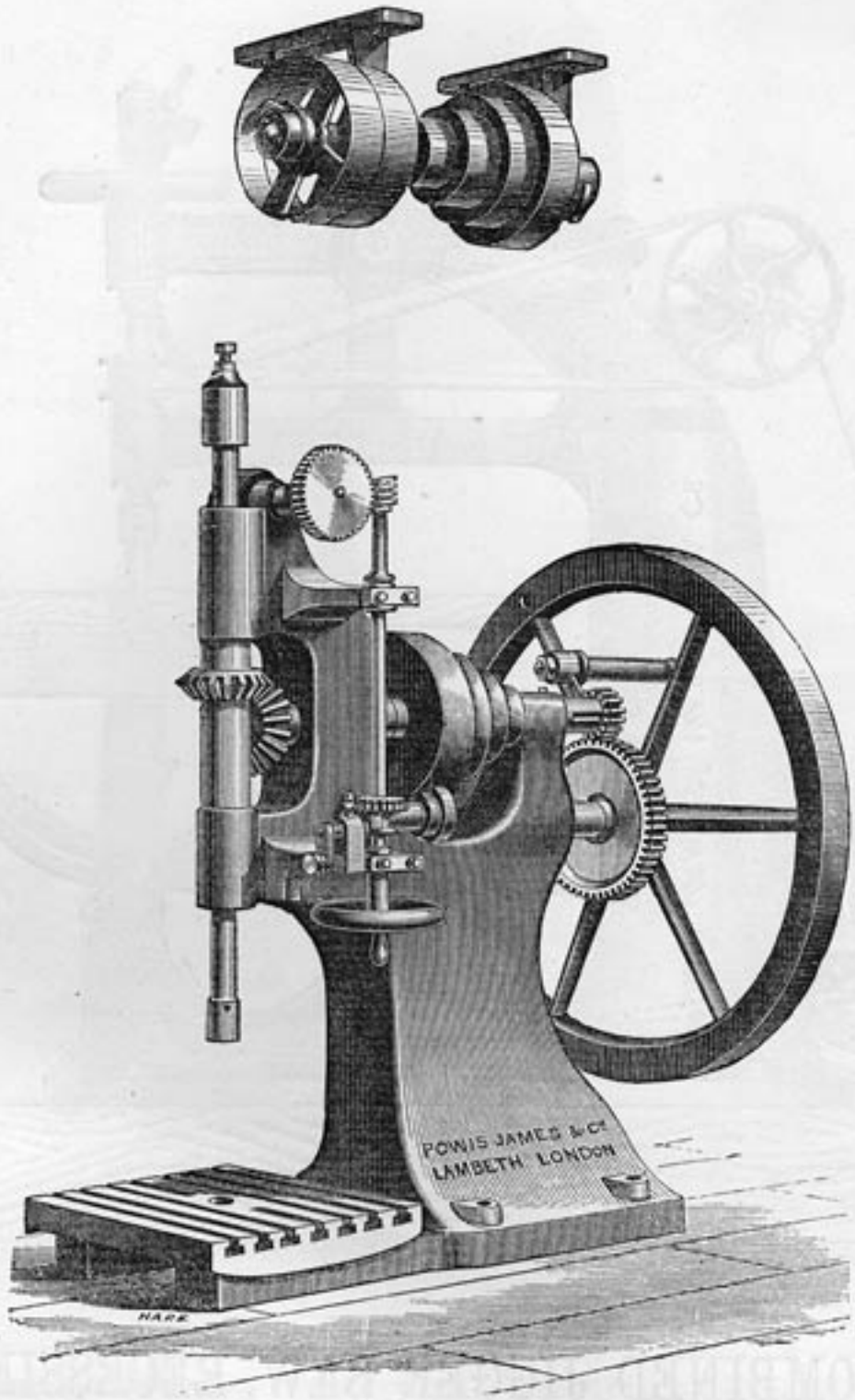


NEW PATENT COMBINED JIGGER SAW, RECESSING, MOULDING, AND SHAPING, AND DRILLING MACHINE.

THIS is a combination of four most useful Machines to a Builder, Cabinet-maker, or Carver, and its advantages will be much appreciated by any one who has not sufficient work of each kind to keep the four distinct Machines always going ; or in a shop which is confined tor space or short of steam power.

It will saw 8 inches deep, and mould and shape, or recess 4 inches. It is fitted with a sliding table and fence for stair-stringing, cross-grooving, moulding the edges of panels, &c. The table is made to cant to various angles. The price includes one pair of shaping irons, one pair of moulding irons, 4 saws, 1 drill, and a set of spanners.

Speed of Countershaft, ...	300.
Power required, ...	1-horse.



IMPROVED BENCH DRILLING MACHINE,

FOR HAND OR STEAM POWER.

THIS is a substantially made Drill, and will be found suitable for Engineers, Wheelwrights, Contractors, &c.

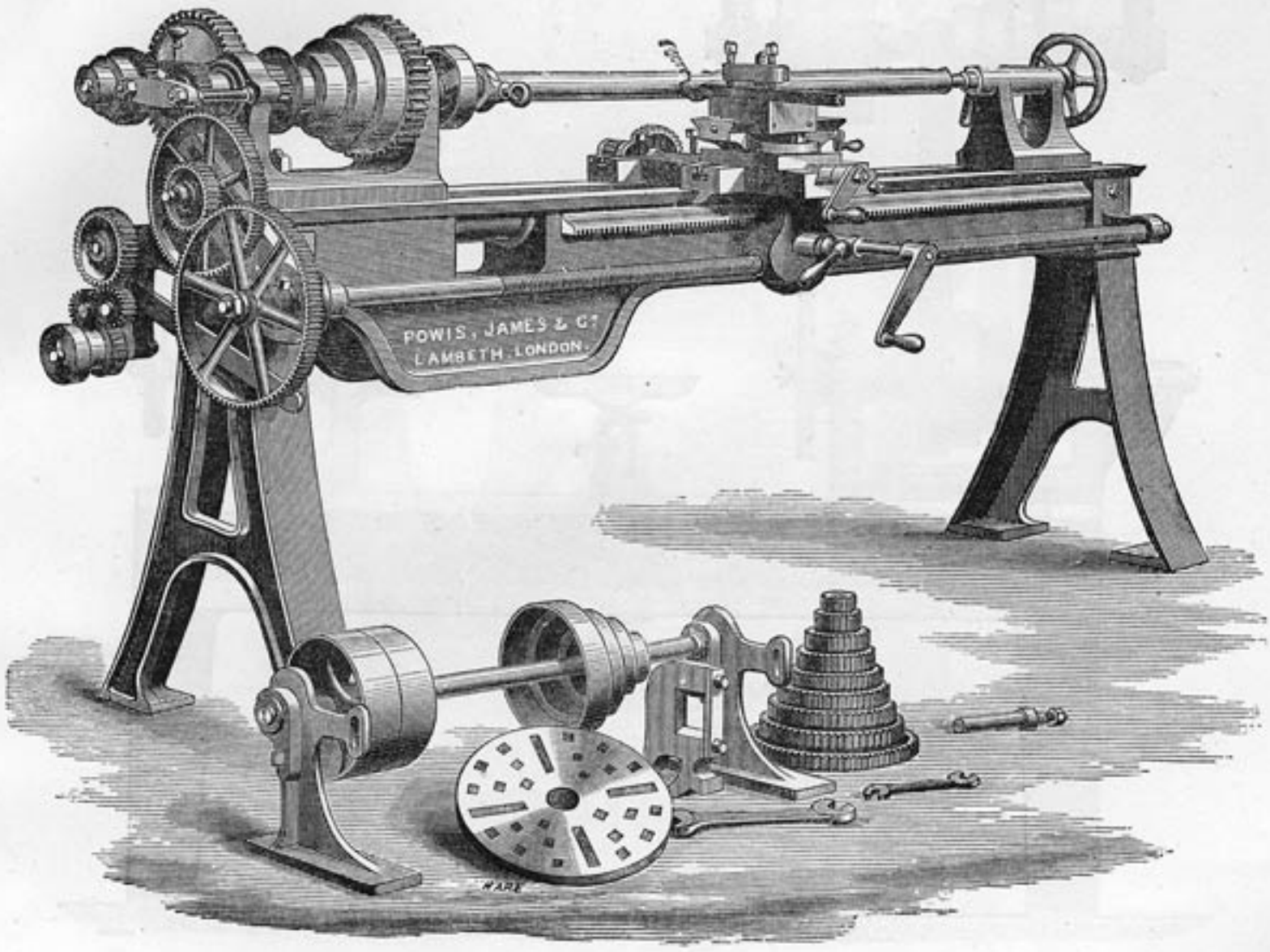
The spindle is of steel, $1\frac{3}{8}$ diameter, and is 9 inches from the column. It will drill holes up to $1\frac{1}{4}$in. diameter, by 6in. deep.

No. 1, for Steam-power only, with cone pulleys and countershaft.

„ 2, for Hand-power only, with fly-wheel.

„ 3, for both Hand and Steam-power.

Quotations given for other kinds and sizes of Drilling Machines.

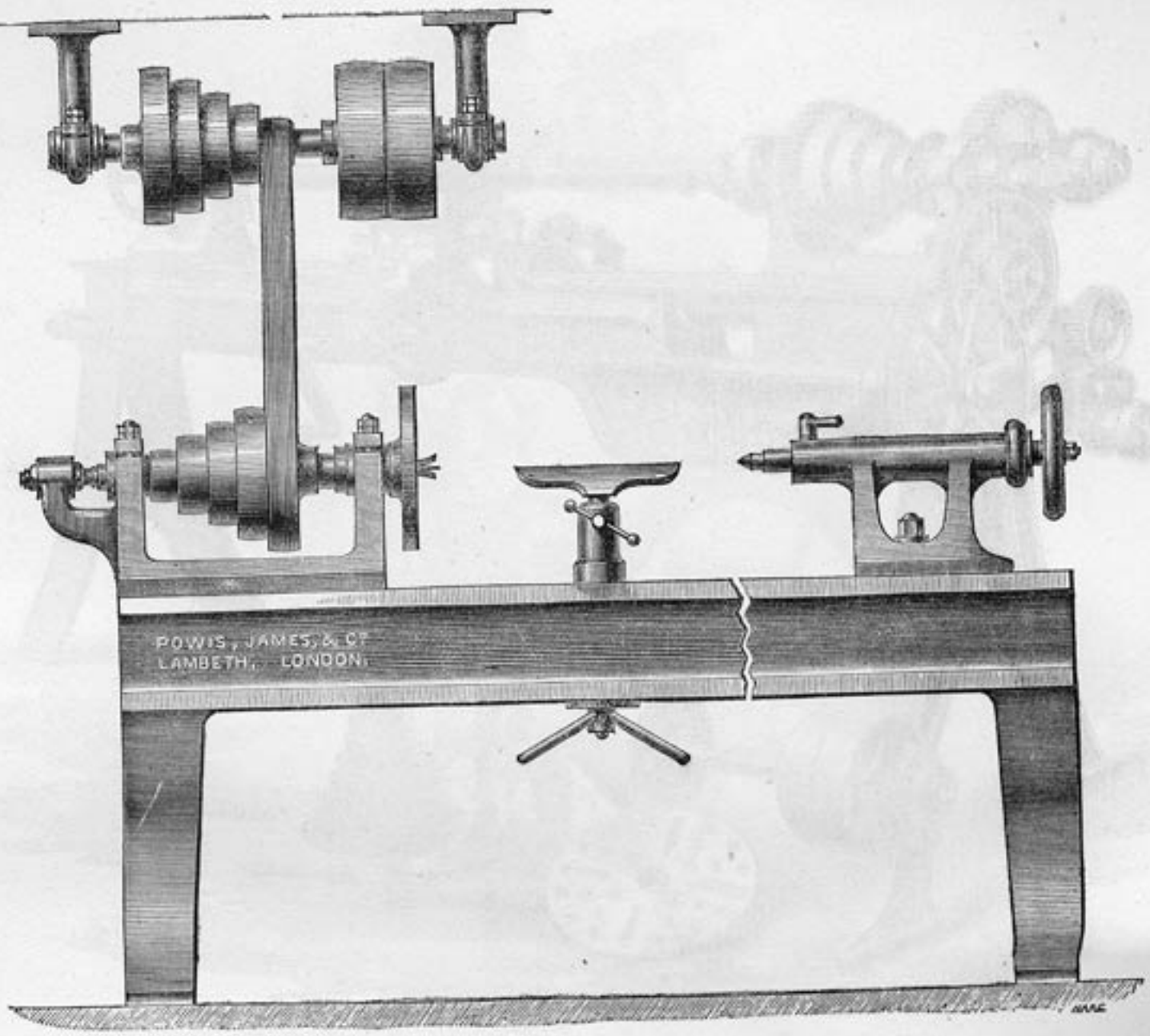


IMPROVED SELF-ACTING SLIDE & SCREW CUTTING LATHES.

THESE Lathes will be found of the best design, materials, and workmanship in all their details. The Headstocks are double geared, and fitted with steel spindles. Each Lathe is supplied with a set of change wheels for Screw Cutting, Face Plate, following Stay, Compound Slide Rest, Overhead Motion, Hangers, Screw Keys, &c., complete.

No.	Height of Centres.	Length of Bed.	Speed of Countershaft.
1	7 inches.	8 feet.	120
2	8 ,,	10 ,,	120
3	10 ,,	12 ,,	120
4	12 ,,	14 ,,	120

Quotations given for other sizes and kinds of Lathes.



PLAIN WOOD LATHE.

THIS is a strong, useful, and well made tool, and is suitable for turning iron or brass, as well as wood. A slide rest may be fitted on it if desired, with or without a self-acting motion.

The bed is of iron and 10 feet long, but can be made whatever length is wanted.

The price includes countershaft, hand rest, and chuck plate.

No. 1.	8 inch	Centres	10 feet bed.
„ 2.	10 „	„	„
„ 3.	12 „	„	„

Speed of Countershaft, 250 revolutions per minute.

Drawings and particulars of our Patent Taper turning Lathe, fitted with slide rest for cutting at both traverses, will be forwarded on application.

For other lathes see list at end of Catalogue.

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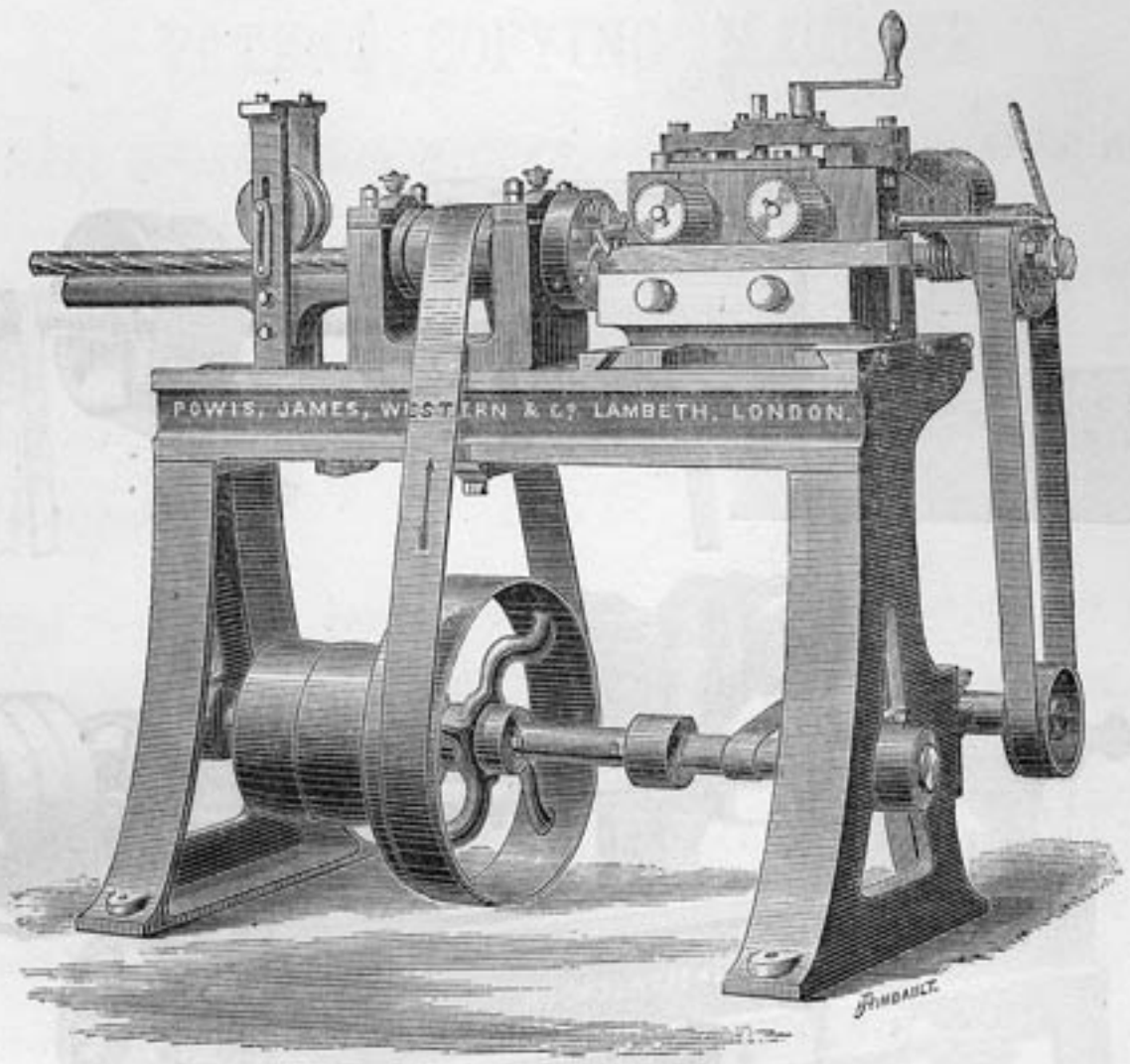


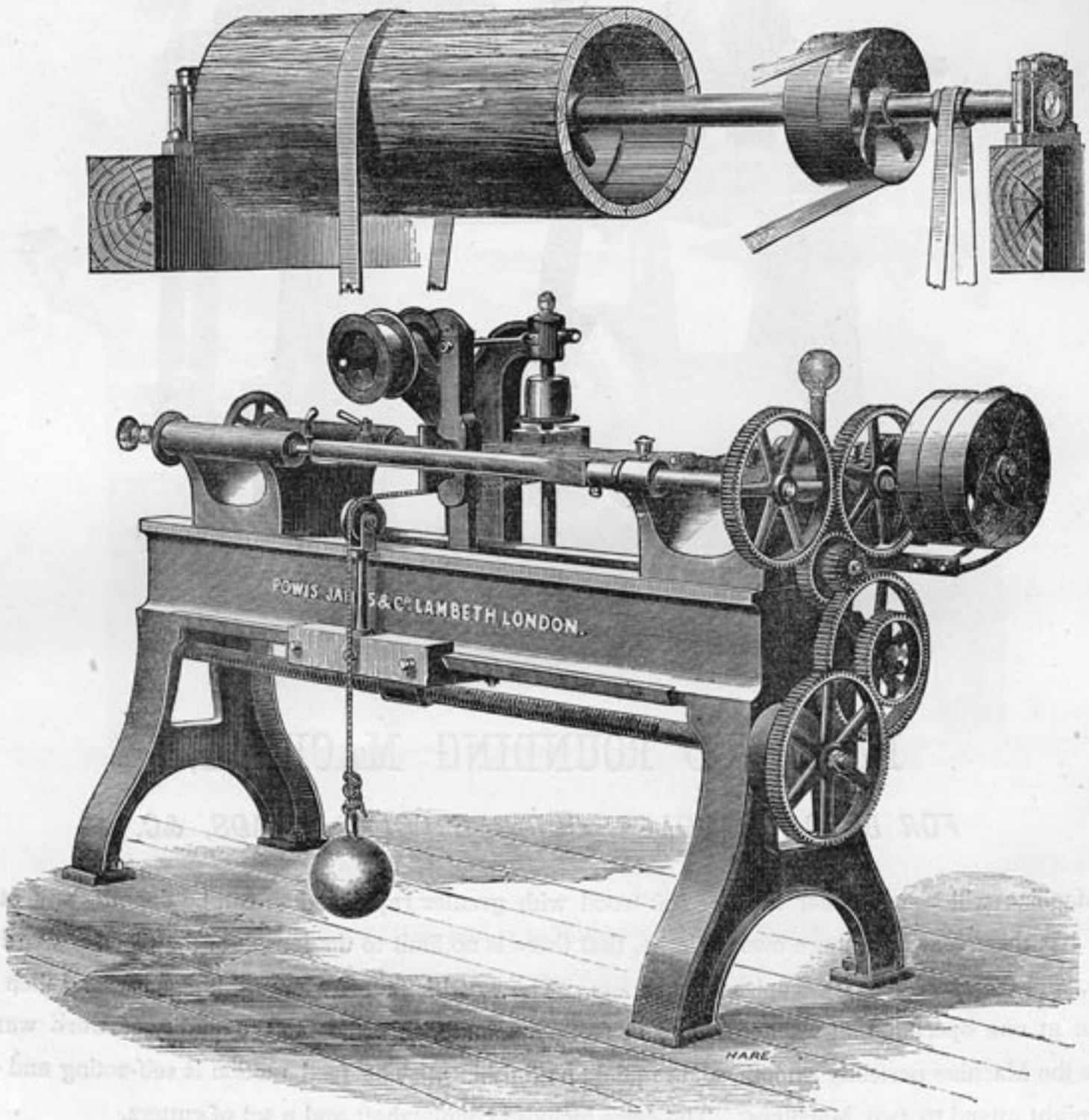
IMPROVED ROUNDING MACHINE,

FOR BROOM HANDLES, CORNICE POLES, BEADS, &C.

THIS Machine will round either hard or soft wood with greater rapidity than can be done by any other means, and has this great advantage over a lathe, that there is no limit to the length of the piece of wood which can be rounded, and the space that it occupies is much less. The wood is first sawn roughly square, and then rounded iu this Machine at one operation, at a space of 5 to 15 feet per minute, according to the quality of work wanted. The wood leaves the Machine perfectly smooth, and requires no finishing. The feed motion is self-acting and continuous, and a boy might attend to two Machines. The price includes countershaft and a set of cutters.

No.	Will round wood up to.	Speed of Countershaft.	Average Power.
1	1 in. diam.	600	1
2	2 „ „	500	1
3	3 „ „	500	2

If preferred the small size can be had without the self-acting feed.



PATENT SINGLE COPYING MACHINE.

PATENT COPYING MACHINE,

FOR MAKING WHEEL SPOKES, GUN STOCKS, AXE & HAMMER SHAFTS, SHOE LASTS, &C.,

THE great value of this Machine in abridging skilled labour, the superior finish, keen edges, and exact truth of the work produced, resulting from the Patented improvements to which we invite notice, render it deserving the especial attention of Carriage Builders, Steam Wheel Manufacturers, Gun, Shoe Last, Axe and Hammer Handle Makers, and others.

By this improved Machine from 200 to 300 spokes, or other articles, per day may be produced from the pattern or dummy in use, with the most unvarying exactness, while the workingi s rendered so easy that a lad may attend two Machines at the same time.

These results are, to a great extent, effected by cutting the wood "with" instead ot across the grain, the difference in smoothness being precisely similar to wood when planed lengthways or straight across. The cutters in place of being gouge-shaped (which render them costly and troublesome to keep in order) are simply flat, may be easily sharpened on the block; only requiring to be removed when grinding is necessary.

Arrangements are made for producing copies of various sizes from one pattern or dummy.

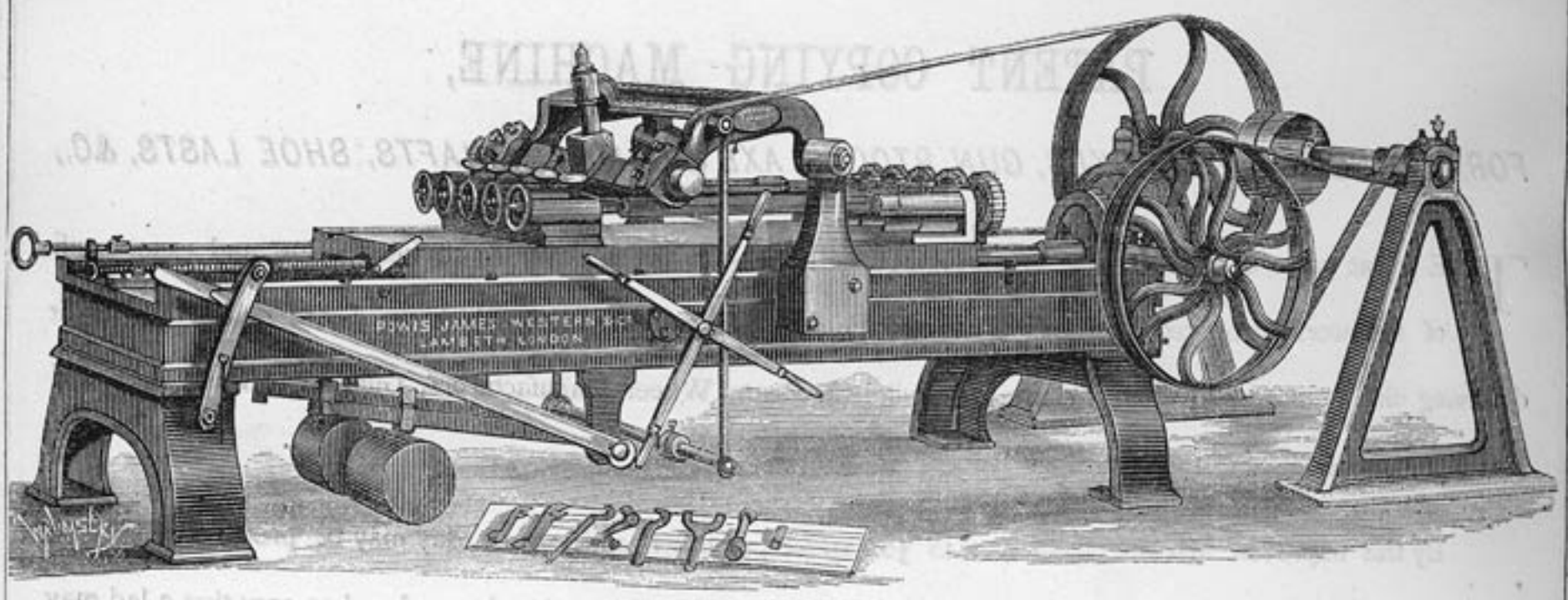
Self-acting Striking Gear is supplied for stopping the Machine when the piece in operation is finished.

For making Shoe Lasts, a modification is introduced, whereby a right and left foot Last is turned at the same time from one dummy.

The price includes Countershaft with Drum, 2 Dummies, a set of Cutters, and a set of Spanners.

No.	To Work.	Length.	Speed of Countershaft.	Average Power required.
1	One Spoke only	30 inch.	500	1-horse
2	Two Spokes at once	" "	"	2 "

The Machine can be lengthened to take in any desired length.



PATENT MULTIPLE COPYING MACHINE,

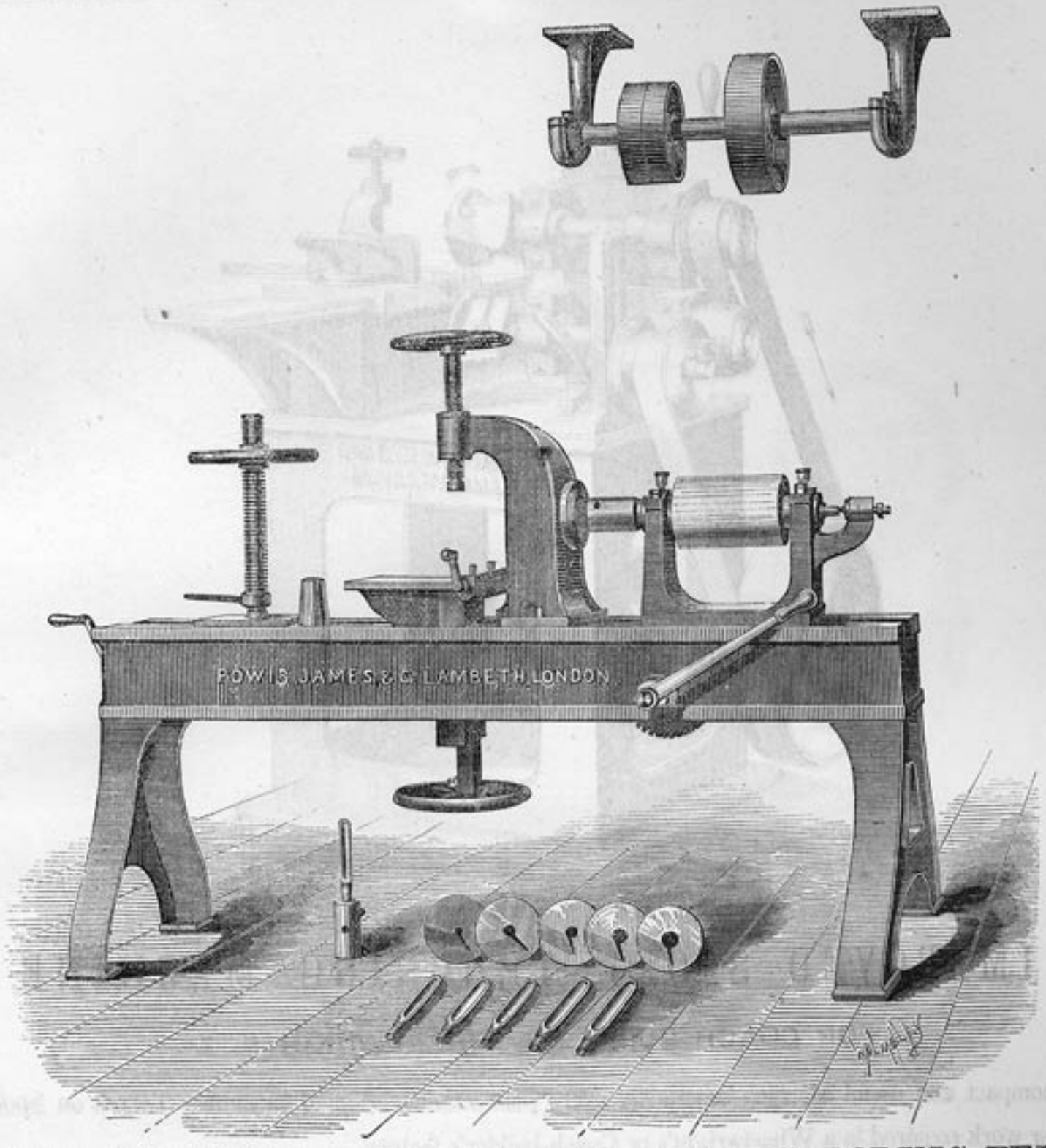
FOR MAKING FOUR SPOKES, GUNSTOCKS, &c., SIMULTANEOUSLY.

THIS Machine is for doing precisely similar work to that last described, but is meant for Manufacturers who require to produce very large quantities, it being constructed to shape four pieces ot wood at once, and in the same time that the single Machine will make one. The work produced is equally good, but the principle of working differs. In this the four pieces of wood and the Dummy are carried on a table which travels under the Cutters, while, in the single and double Machines, the Cutters themselves are made to travel and the wood only revolves.

Special arrangement is made for counterbalancing to a nicety the weight of the Cutter head, so that the lightest Velocipede Spokes can be shaped equally well as heavy Cart Wheel Spokes. It is usually constructed for Spokes 30 inches long, but this length can be increased if necessary.

The Price includes a Countershaft, 2 Dummies, a set of Cutters and Spanners.

Speed of Countershaft	500.
Average Power required	2-horse.



IMPROVED MACHINE FOR TANGING SPOKES, BORING FELLOES, AND SLOT MORTISING NAVES OF WHEELS.

IN using this Machine for Tanging, all the spokes should first be driven into the nave; this is then put on the upright spindle, which can be adjusted to suit wheels of different diameters up to 6 feet, and of different amount of dish, and one by one each spoke is brought opposite the chuck which cuts the tang. Great accuracy is thus obtained, and the wheel is put together with very little trouble, and with no undue straining from the tangs not being exactly opposite the holes in the felloes. The boring the felloes, both for the tangs and for the dowels, is done with equal ease and accuracy.

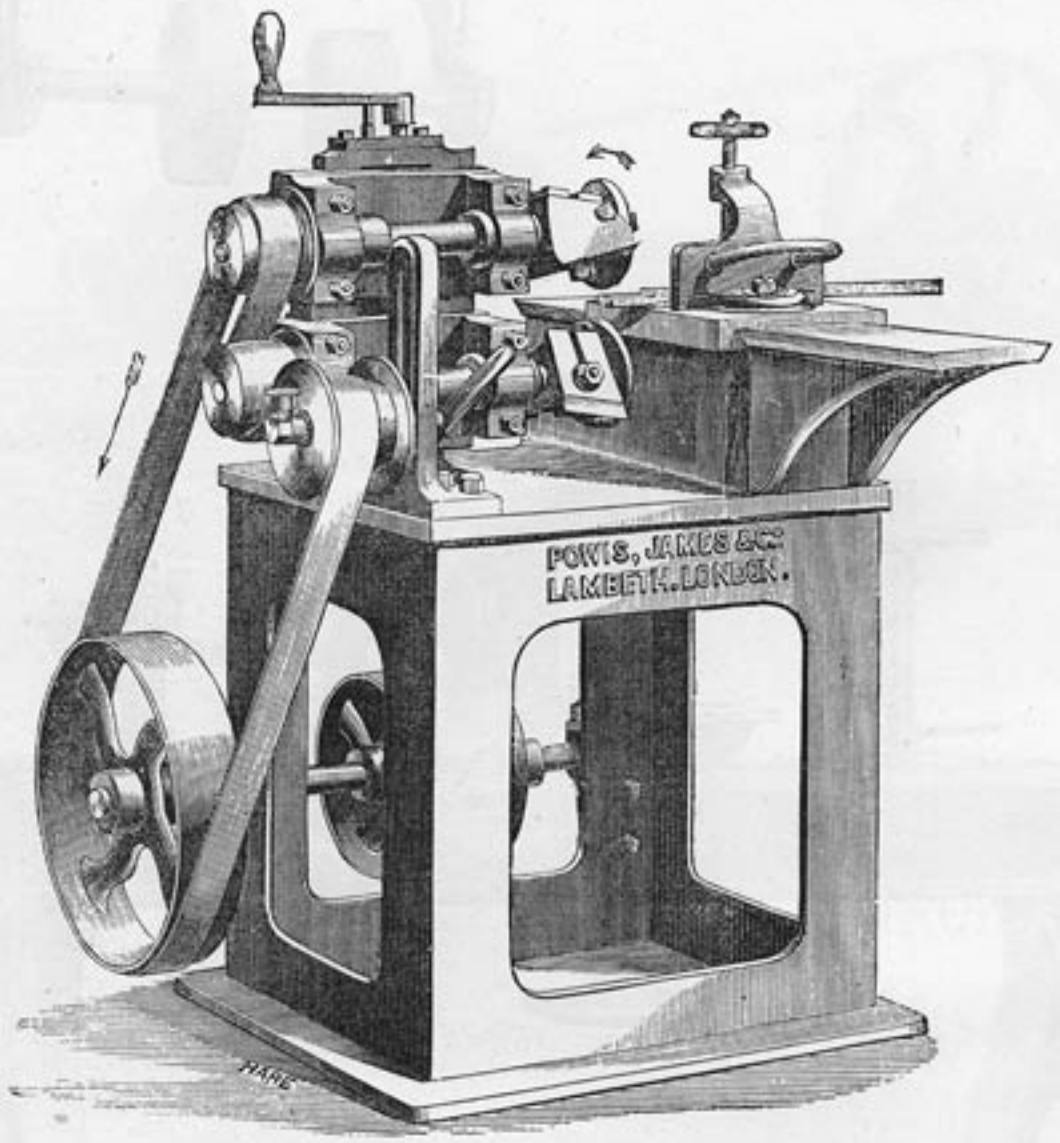
A table is provided, which can be raised or lowered to suit various sized felloes.

Sometimes this Machine is provided with a separate saddle and slide for mortising the stocks. The mortise is cut with a Revolving Bit, and the ends must be then squared out. This has the advantage of saving the special Machine for the purpose described on page 128.

No. 1, Machine for Tanging and Boring, the price includes countershaft, 6 tanging chucks, 6 boring bits and a set of spanners.

No. 2, Machine for Tanging, Boring, and Stock-mortising; the Price includes countershaft, 6 tanging chucks, 6 boring bits, 6 mortising augers, and a set of spanners.

Speed of countershaft, 500. Average power, 2-horse.



IMPROVED SPOKE TENONING MACHINE,

FOR COACH-BUILDERS, WHEELWRIGHTS, &c.

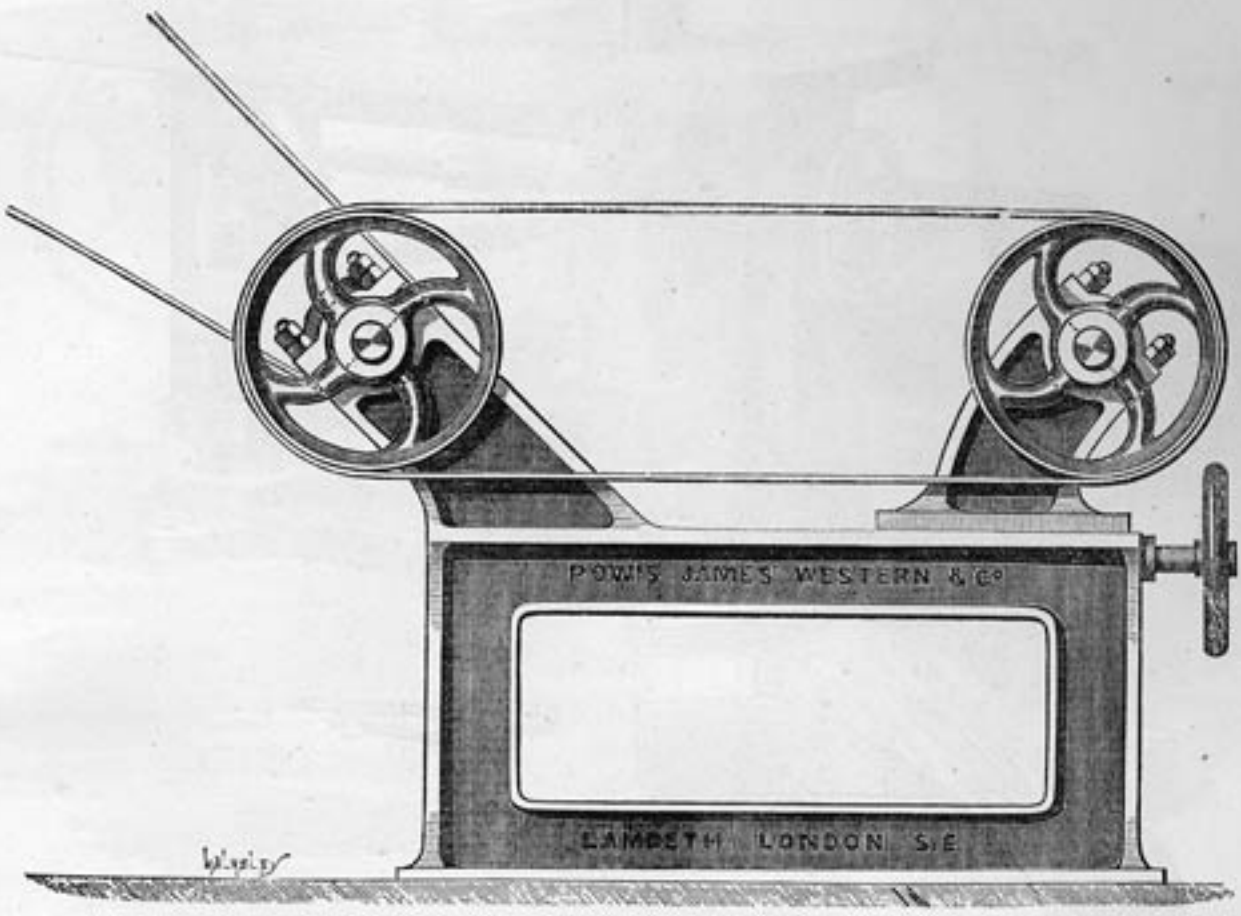
THIS compact and useful Machine supersedes every plan hitherto adopted for cutting Tenons on Spokes, and all other work required in a Wheelwright's or Coach-builder's factory.

It makes the most perfect Tenon and Shoulders that can be produced, is large enough for all general purposes, and the knives being perfectly flat, require no trouble to sharpen and keep in order; the power required to drive is but trifling, it occupies but little space, and has the advantage of being exceedingly moderate in cost.

The piece to be tenoned is simply laid on the travelling bed, tightened with a screw, and sent past the cutters, when, in less time than is taken to explain, the Tenon and Shoulders are formed with a precision much exceeding that of Saw or Disc Tenoning Machines. A lad only is required to put the work through, the Machine being once set. Adjusting screws offer the greatest facility for raising and lowering the cutters, and a gauge rod is provided so as to cut all the Tenons to one length.

The price includes the Countershaft, which is attached to the main Frame, and one set of Cutters and Spanners.

Speed of Countershaft	700.
Average power	1-horse.



IMPROVED SPOKE BUFFING MACHINE.

THIS Machine is used to finish off the work done on the Copying Machines just described. An endless Leather Belt, coated with pounded glass or emery of what degree of fineness may be requisite, runs over two pulleys, while the spoke is worked upon it until it is quite smooth.

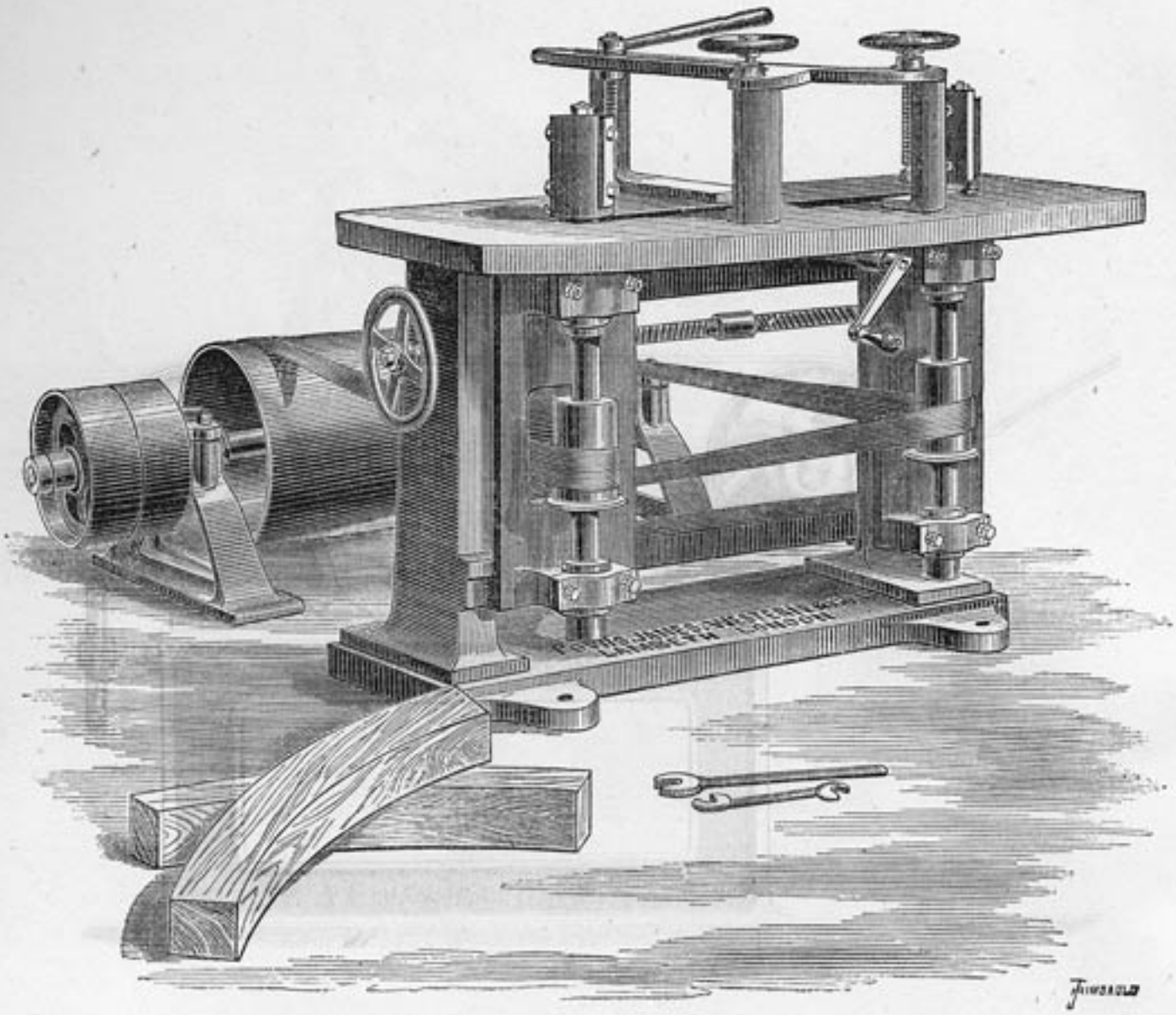
It will be advantageous to have two Belts, one finer than the other, when a very smooth finish is required.

One Standard is fitted in a Slide, and moved with a Screw, for tightening the belt. The Machine merely requires screwing to the floor in any suitable position, and is at once ready for work.

The power required to drive is merely nominal.

One endless Belt is included in the price.

Speed of pulleys. ... ... 250.



IMPROVED FELLOE SHAPING MACHINE.

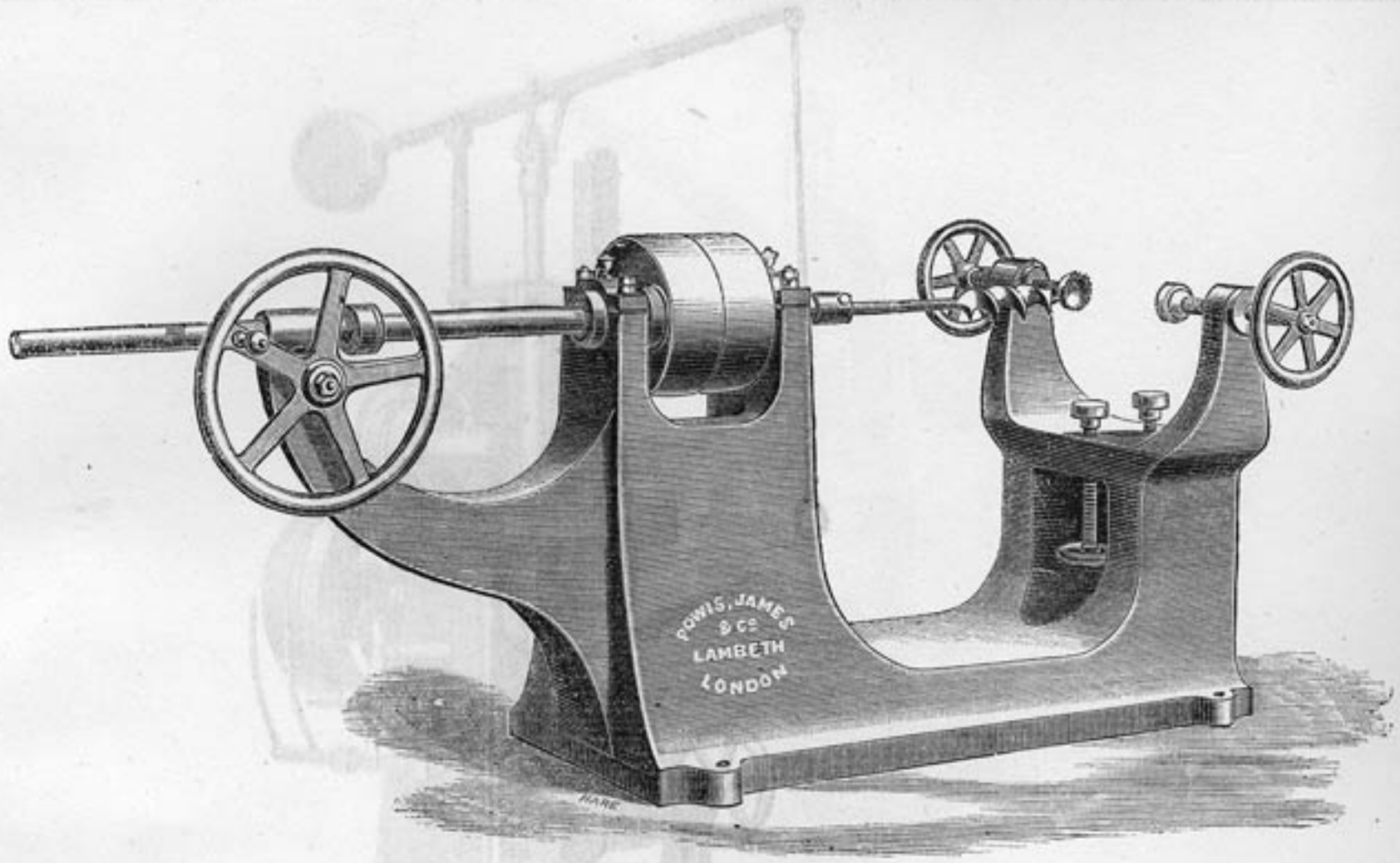
THIS Machine will be found extremely useful in a Wheelwright's shop, as, in addition to planing the wheel felloes, it will do nearly all the shaping and finishing about the shafts and framework or carriages and carts, now generally done by hand. The Felloe, after it has been cut out at a Band Saw Machine, is fixed in the radiating cramp of this Machine, and pushed first against one cutter block which planes the inside, and chamfers the edges of one-half of the Felloe lengthways, and then against the other block which works the other half in the same manner. By means of the two blocks, which revolve in opposite directions, we avoid ever cutting against the grain of the wood, so that the work is perfectly finished, and requires no hand labour. The Machine can be quickly altered to suit wheels of various diameter up to six feet.

The cutter blocks are so made that, if desired, the chamfer on the edge can be stopped opposite each spoke, without using a template.

For Shaping Shafts and Framing, the Radial Cramp is removed, and suitable irons put on the blocks.

The price includes countershaft and two pairs of Planing and Chamfering Irons.

Speed of Countershaft	600.
Average power required	2 horse.

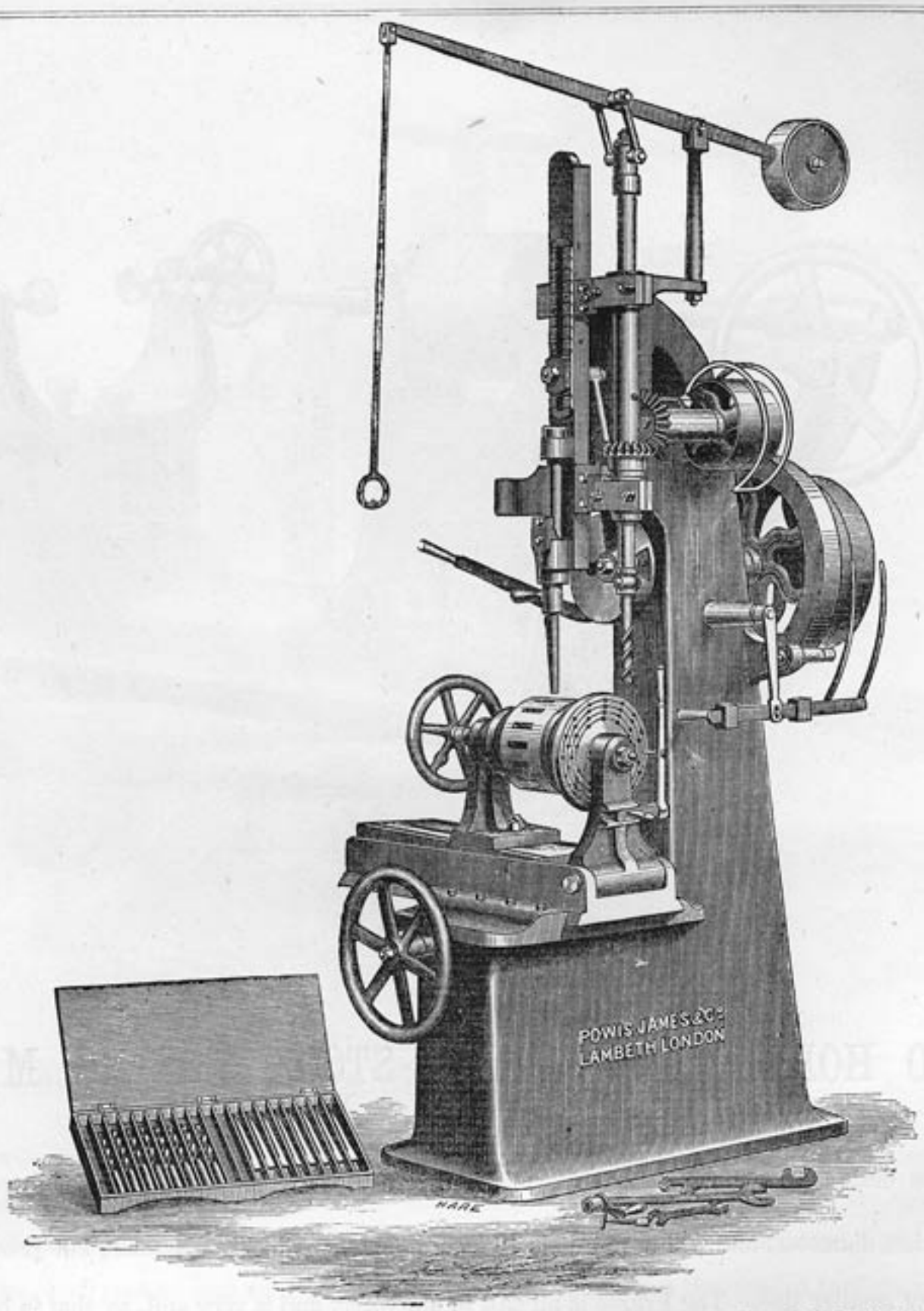


IMPROVED HORIZONTAL WHEEL-STOCK BORING MACHINE.

THIS Machine is designed for Boring the holes in the centre of Wheel-stocks. It is large enough to take in Naves 18 inches diameter, and will bore a hole 18 inches deep by 3 inches diameter, but provision is made for holding Naves of any smaller size. The Frame is all cast in one piece, and is very stiff, so that in boring the largest holes it will not spring. The bit is fed through the Nave by the hand-wheel shown, which works a rack at the back end of the boring spindle.

The Price includes a set of 6 Augers and Spanners.

Speed of Pulleys	450.
Average power required	3-horse.

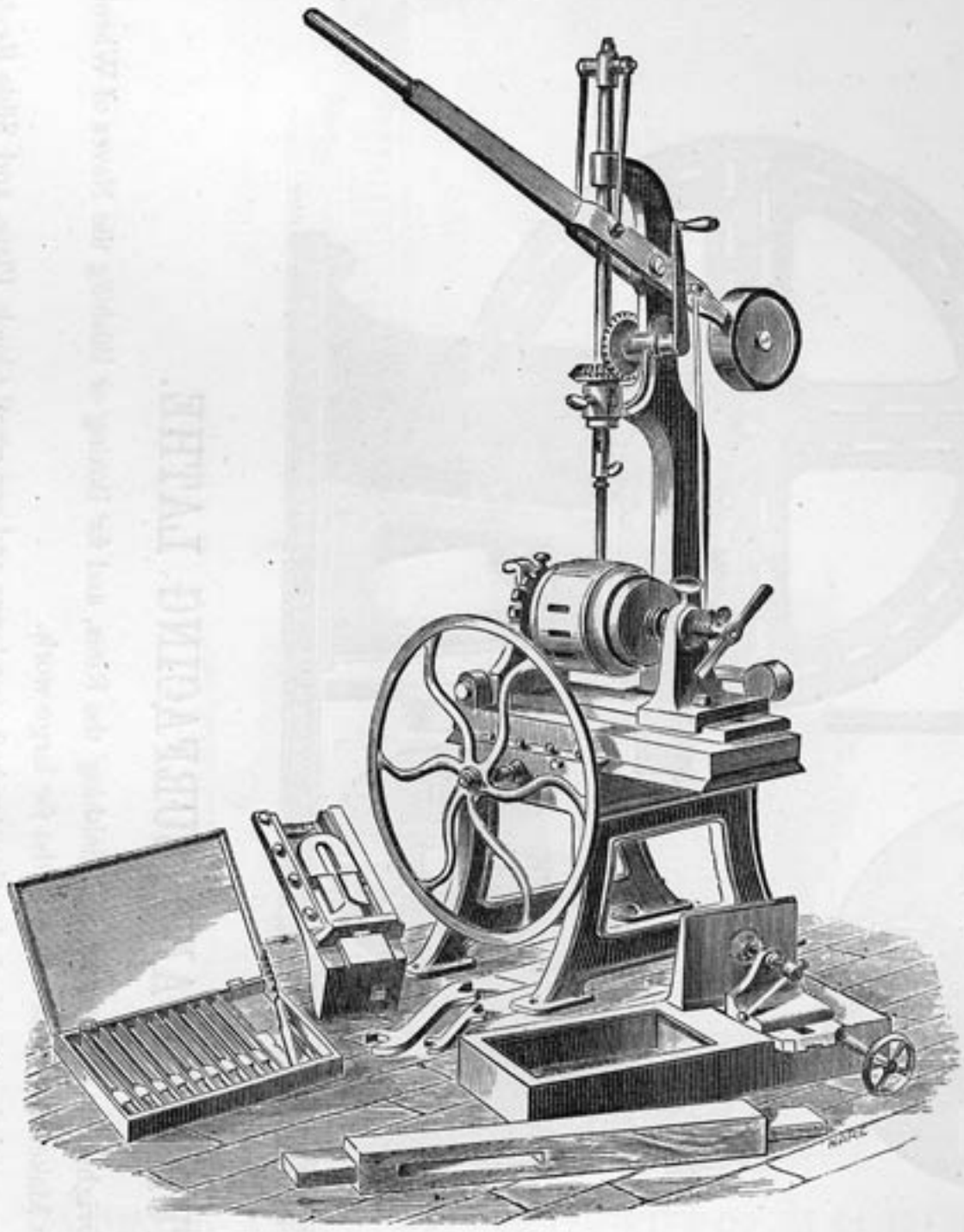


IMPROVED WHEEL-STOCK MORTISING MACHINE.

NO Wheelwright's or Carriage Building Establishment will be complete without one of these Machines; and the saving in time effected, and the accuracy of the work done, is so great that we feel sure they only require to be known to be more extensively employed. The mortises are cut both quicker and cleaner than by the old plan of slotting, and the Stock leaves the Machine ready for driving the spokes. The wheel-stock is held in centres, to one of which is attached a dividing plate, so that it is unnecessary to mark out the mortises. The table which carries the centres has suitable arrangements to cant it, according to the amount of "dish" required in the wheels. The crank-pin is easily adjustable to suit different depths of mortises. Striking gear is attached, both for the boring and the mortising, and with the latter is also combined a break, so as to stop the chisel instantaneously. The Price includes eight best cast steel chisels, eight augers, and a set of spanners and keys.

Size of Stock.	Speed for Mortising.	Speed for Boring.	Average Power required.
16 in. diam. by 16 in. long	120	750	2-horse.

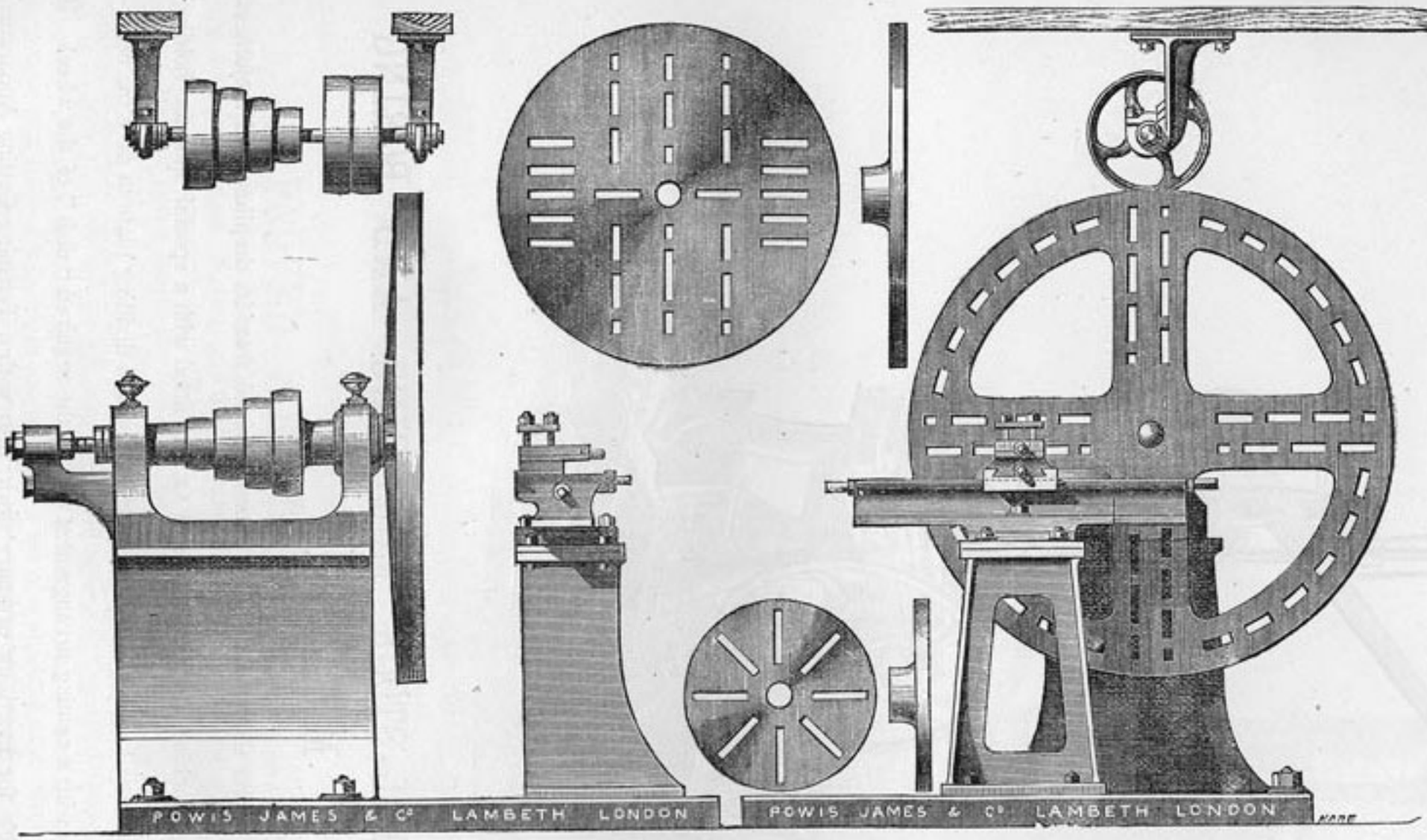
If desired, an extra table can be supplied, so as to make the Machine available for ordinary Mortising and Boring like that described on page 91.



HAND POWER WHEEL-STOCK MORTISING AND BORING MACHINE.

TO Wheelwrights who have no steam power this machine will recommend itself from its simplicity and usefulness.

It is in effect our Hand Mortising Machine described on page 12, but fitted with a special slide for holding wheel naves up to 8 inches diameter and 8 inches long. This slide is provided with a dividing plate to save the necessity of marking out the mortises, and also with a canting arrangement to suit the required "dish" of the wheel. If desired it can be fitted with an extra slide for mortising ordinary work, also with a Tenoning Cutting Apparatus. The price includes a set of 8 best cast steel chisels, eight augers, one core-driver and spanners.



WHEEL TURNING AND SURFACING LATHE.

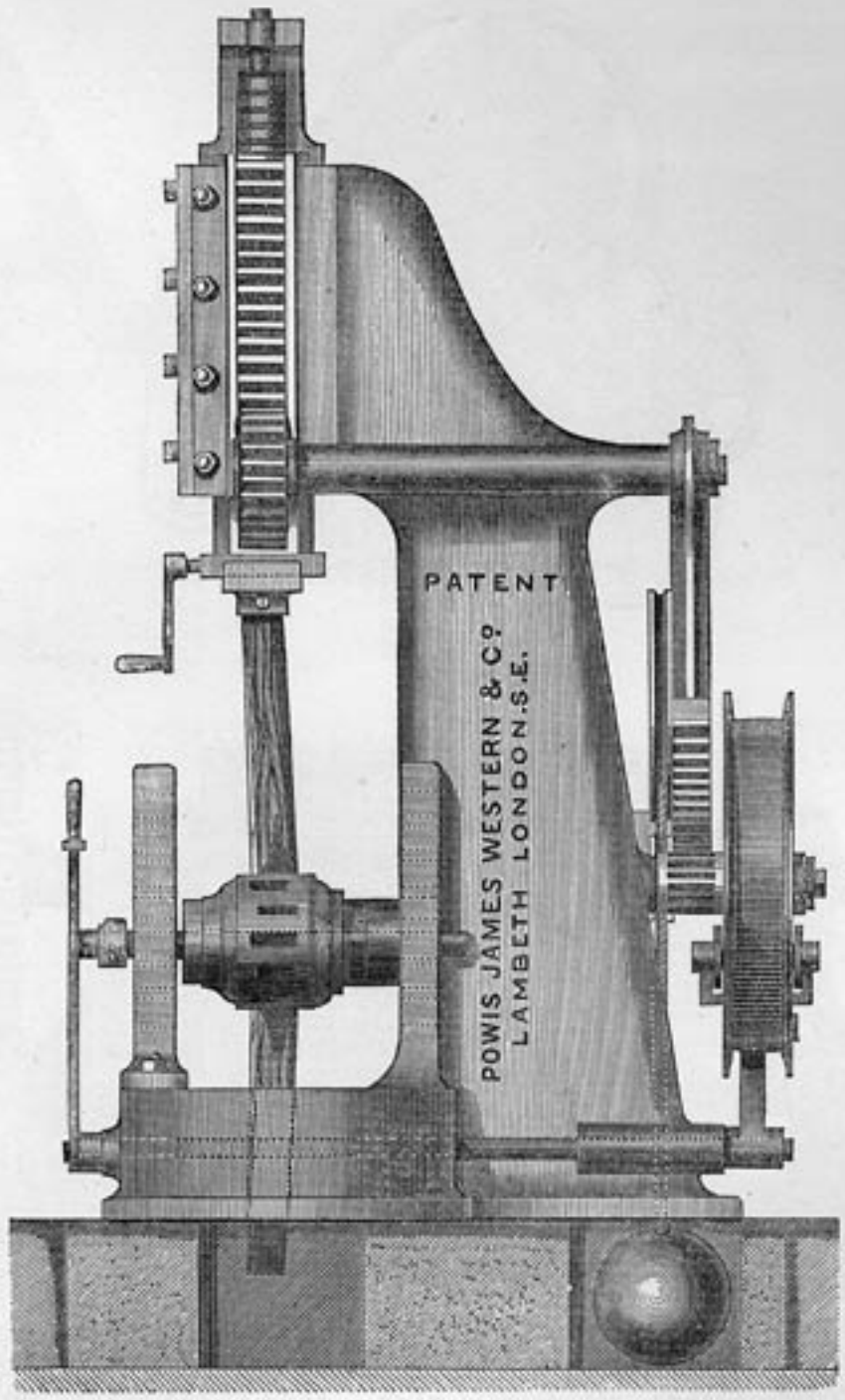
THIS Lathe is intended specially for Wheelwrights, for turning up and finishing the Rims, and for Boxing or Bushing the Naves of Wheels; but is equally well adapted for the Pattern Maker's shop as a face Lathe for large work.

The centre stands 3 ft. 9 in. above the floor; and the price includes Countershaft, one large and one small Chuck Plate, and Slide Rest.

If preferred a Hand Rest can be supplied instead of the latter.

Speed of Countershaft	150.
Average power required	2-horse.

Other sizes quoted for.



PATENT PUTTING TOGETHER MACHINE.

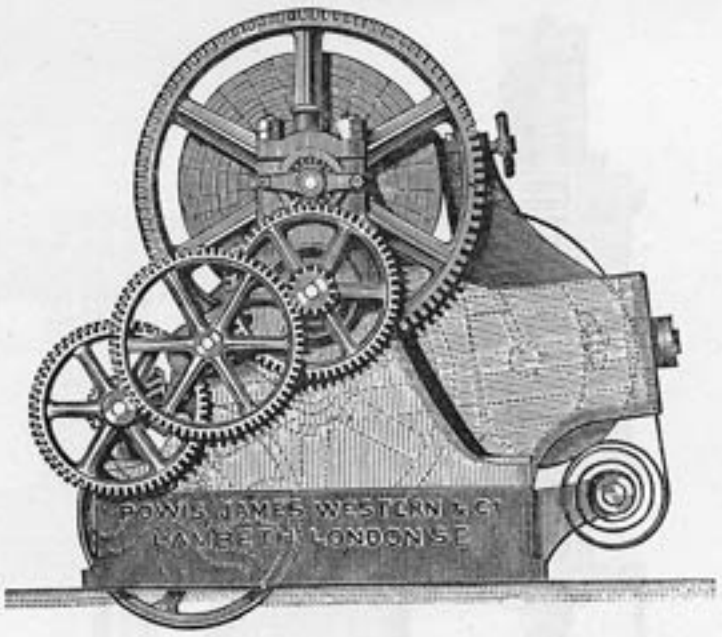
THIS Machine is used first for driving the Spokes into the Nave, and then for putting on the Felloes. A very great saving of time is effected over hand labour, and the finished wheel is found to stand better than when the Spokes are driven by hand. The workman has the most perfect and instantaneous control over the machine, and a very little practise will enable him to know exactly what pressure is required in each case. The machine is made large enough to take in a 6-feet wheel, and provision is made to drive the Spokes at whatever "dish" is required.

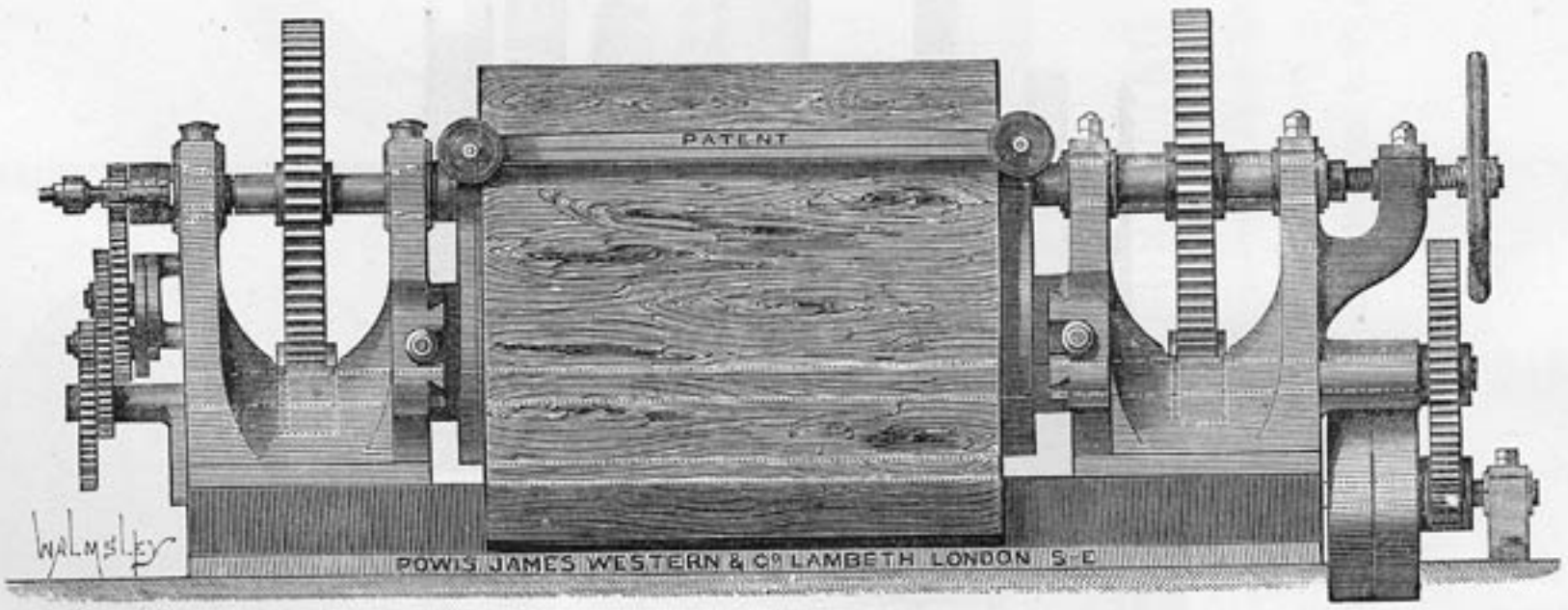
If preferred this Machine can be constructed to work horizontally, but we prefer to make it to work vertically as shown, as it then occupies less floor space.

Speed of driving pulley	40.
Average Power required	1-horse.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.





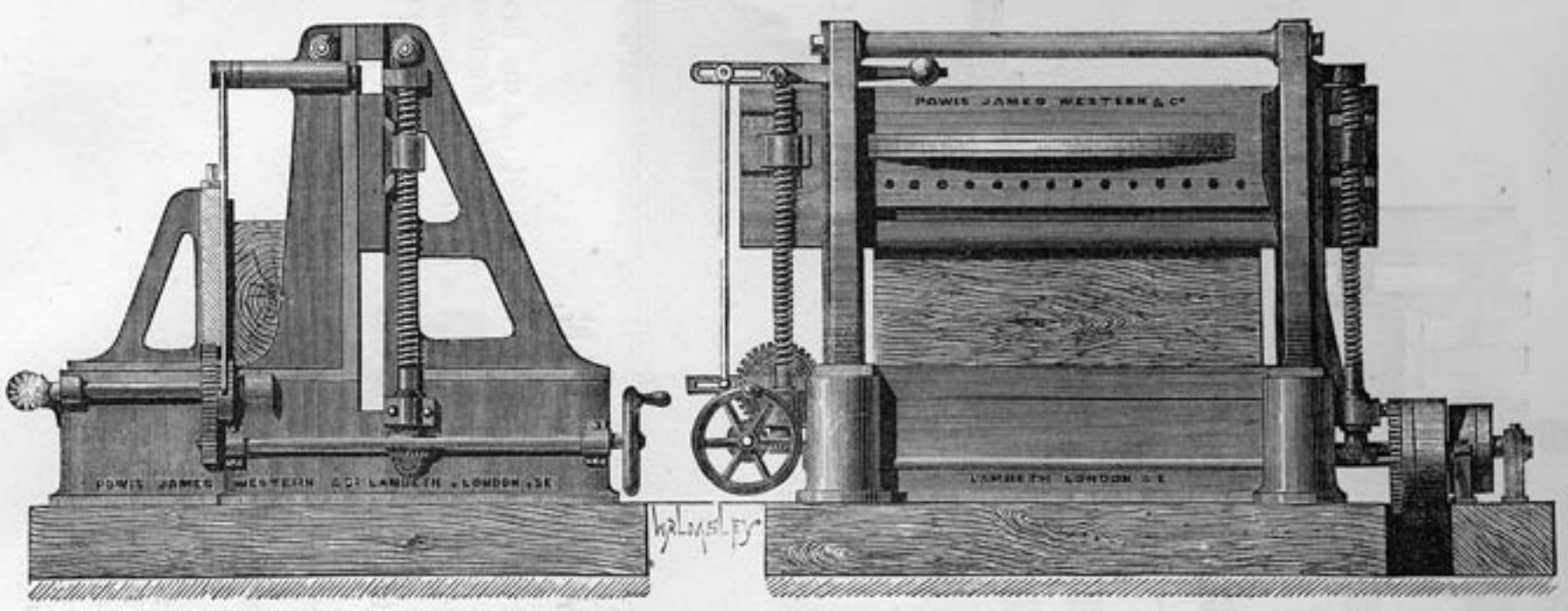
PATENT MACHINE FOR CUTTING VENEERS ROUND THE LOG.

THE advantages of this Machine for Veneer Cutting will be at once apparent to a practical man. Wide Veneers may be obtained from small wood, and the figure will be uniform throughout the width instead of being plain in the centre with a strip of figure on each side, as is frequently the case with Veneers cut on other machines. It is found also that Veneers cut in this manner, *i.e.*, *round* and not across the annular growth rings can be laid more easily and settle into a smoother surface than if otherwise cut. The mode of working is very simple, and is as follows:—The wood is steamed, and then placed between the centres of the Machine and caused to revolve; at the same time the knife is brought up by a self-acting motion, the rate of which can be varied according to the thickness of Veneer required, up to as many as 100 or 130 to the inch.

The Price includes a knife and a set of spanners.

No.	Length of Log.	Diameter of Log.	Speed of Driving Pulleys.	Average Power required.
1	6 ft.	24 in.	400	2-horse.
2	6 „	36 „	400	2 „

Quotations given for other sizes.



PATENT VENEER SLICING MACHINE.

NO Saw Mill Machinery requires greater nicety and care in construction than Machines for cutting and sawing Veneers, as the material to be cut is generally very expensive, and it is of the greatest importance to the proper laying of a Veneer that it should be of exactly even thickness.

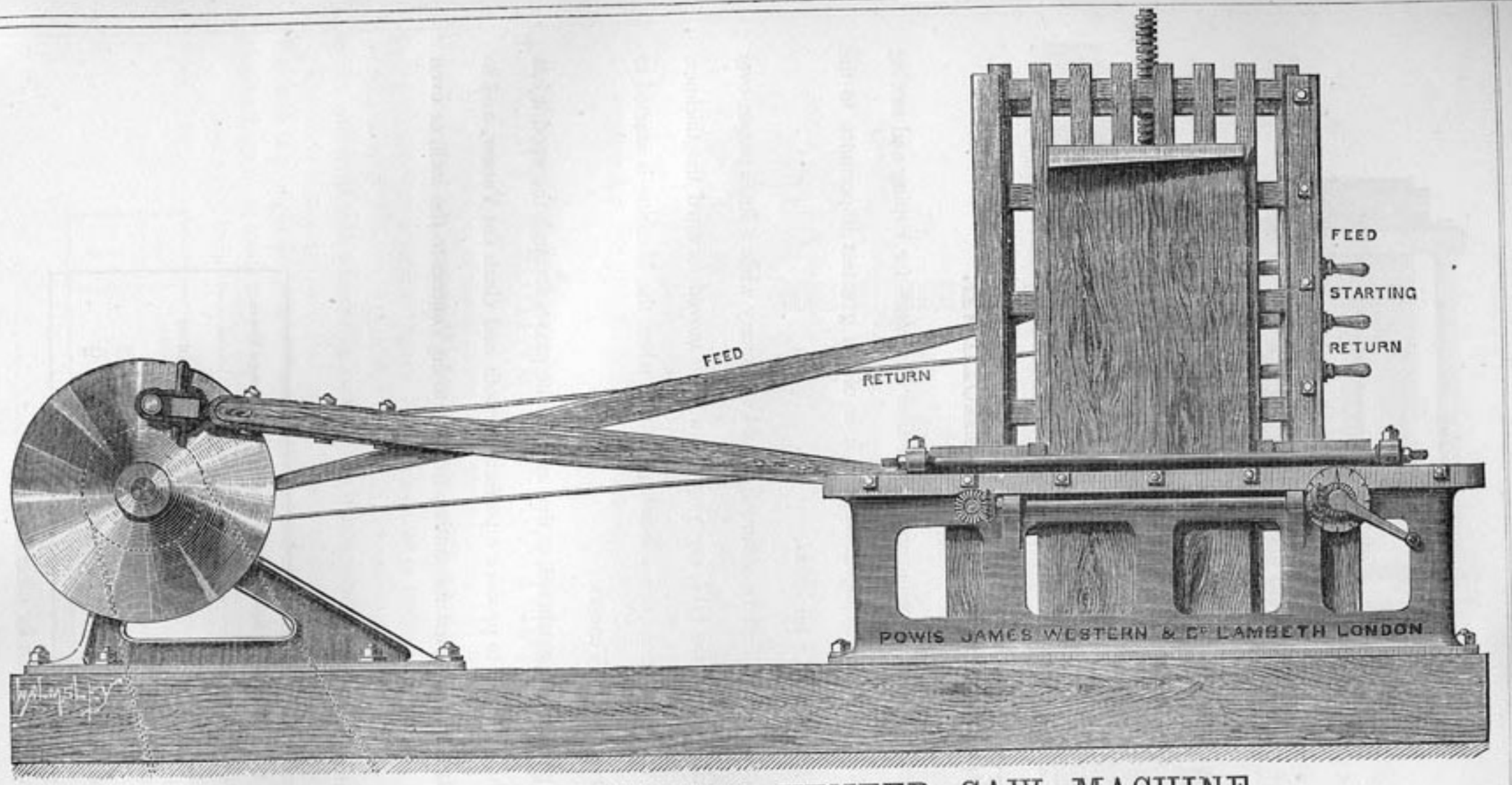
In the Machine here shown the wood, which must first be steamed, is held stationary while a knife passes over one side, taking off a slice. The knife then rises again, the table carrying the wood is moved forward the thickness of a Veneer, and another slice is taken off. All the motions are self-acting, so that when the Machine is started to work the attendant has little else to do than remove the Veneers.

The Frame which carries the knife is peculiarly constructed, so that as the knife passes through the wood it has a sort of sliding motion given to it. The effect of this is to produce a perfectly smooth and clean cut Veneer, and to avoid the danger of breaking out knots. It is well adapted for cutting from 20 to 80 Veneers to the inch, or even more if desired.

The Price includes one Knife and a set of Spanners.

No.	Length of Log.	Width of Log.	Speed of Countershaft.	Average Power.
1	6 feet	24 inches	400	3-horse
2	8 „	36 „	400	4 „
3	10 „	48 „	400	5 „

Quotations given for other sizes.



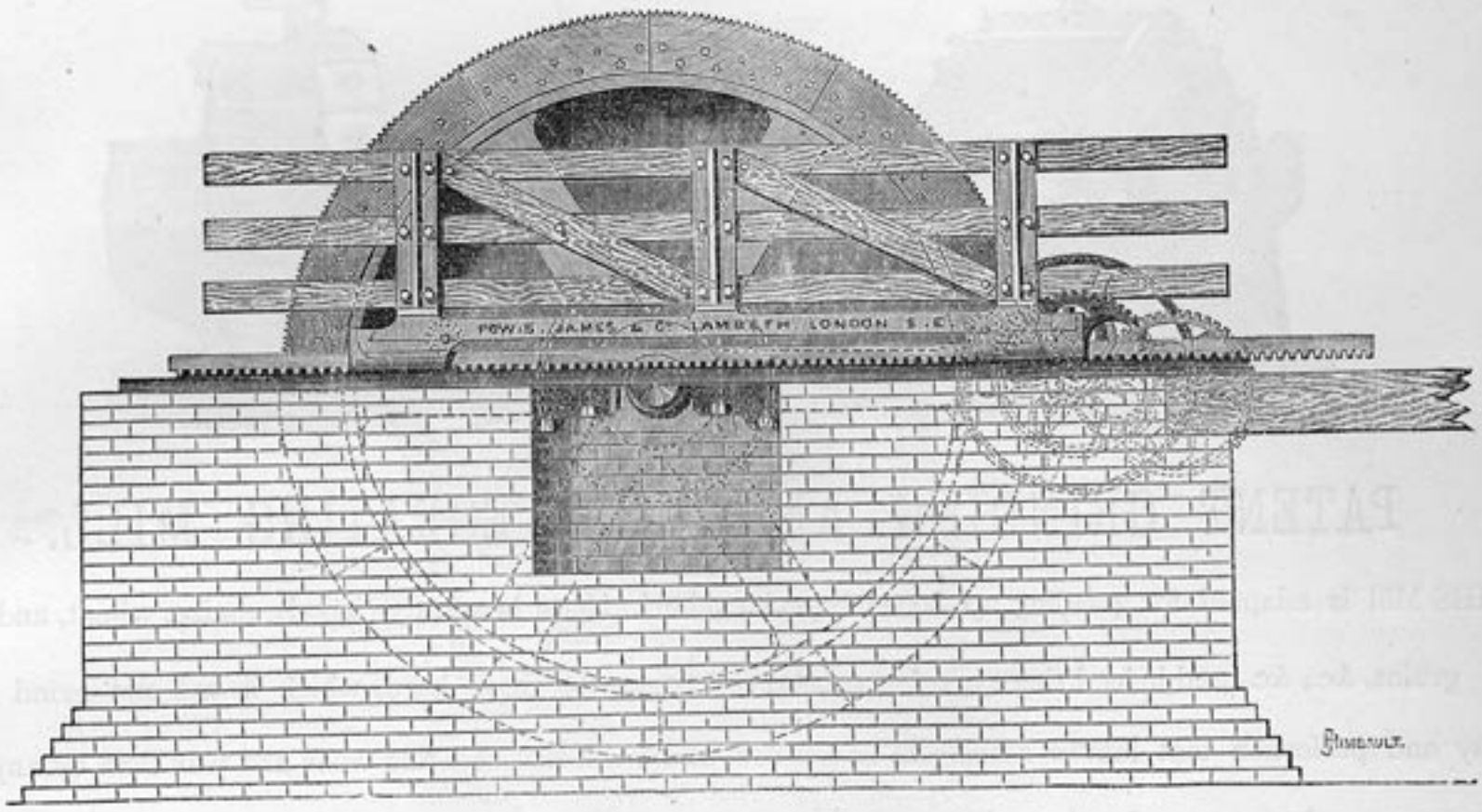
IMPROVED RECIPROCATING VENEER SAW MACHINE.

THIS is perhaps the best known and most generally used of all Veneer Cutting Machines, and as long experience has pointed out the best form and proportions of the various working parts, we have no hesitation in recommending this as in every respect a first-class Machine, and one that will give unqualified satisfaction. The Saw, which is sharpened to Cut in both directions, is very thin, and is stretched in a swing-frame made as light as possible, consistent with strength, to enable it to be run at a high speed. The arangements for setting up the Frame carrying the Wood are of great nicety, and if the Saw is kept in good order as many as 40 Veneers to the inch can be cut.

The price includes the Countershaft and 3 Saws.

No.	Will Cut Wood.		Speed of Countershaft.	Average Power required.
	Length.	Width.		
1	10 feet.	30 inches.	250	3-horse.
2	,,	36 ,,	225	3 ,,
3	,,	42 ,,	200	4 ,,

The Frame can be made to take greater lengths if desired.

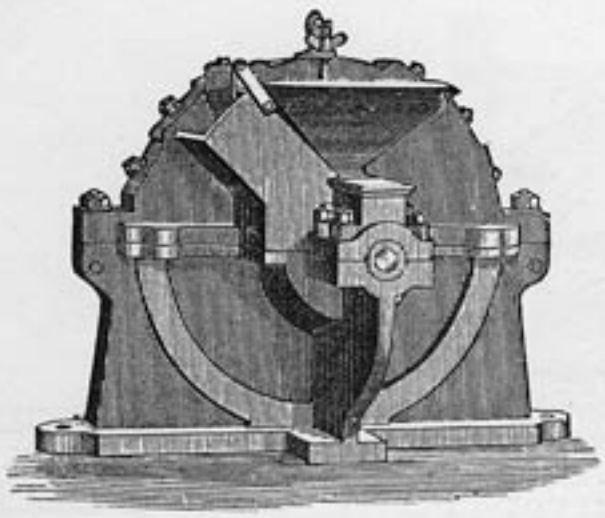


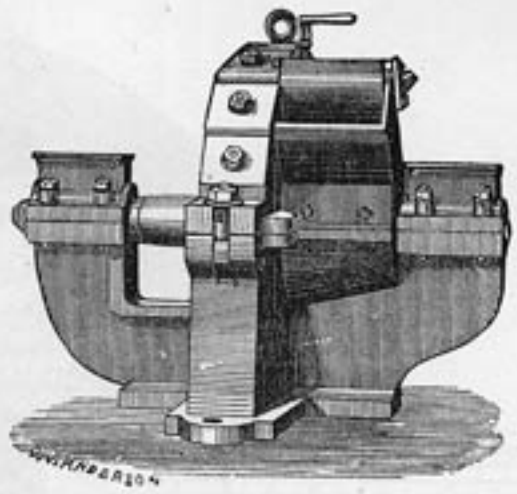
IMPROVED VENEER CIRCULAR SAW MACHINE.

THIS Machine is best adapted for cutting the thicker class of Veneers, such as 6 to 18 to the inch. Great care is taken to balance the Disc perfectly, otherwise the bearings will soon get out of order, and the Saw will no longer cut true. This of course is of vital importance in all Veneer Cutting Machines, on account of the great value of the Wood which is being cut. Buyers, therefore, should be very careful to get Machines of the best possible make, as the saving of a few pounds in the cost may result in a constant loss through spoiling the Veneers. The log to be sawn is carried on a strong carriage 12 feet long, and advances at a rate variable from 8 to 20 feet per minute, while it returns at double the speed. Suitable provision is made for moving the log forward parallel to the face of the Saw after each cut.

The price includes a complete set of Segment Saws.

No.	Diameter of Disc.	No. of Revolutions.	Average Power required.
1	8 feet.	300	4-horse.
2	10 „	250	5 „
3	12 „	210	6 „
4	14 „	170	8 „



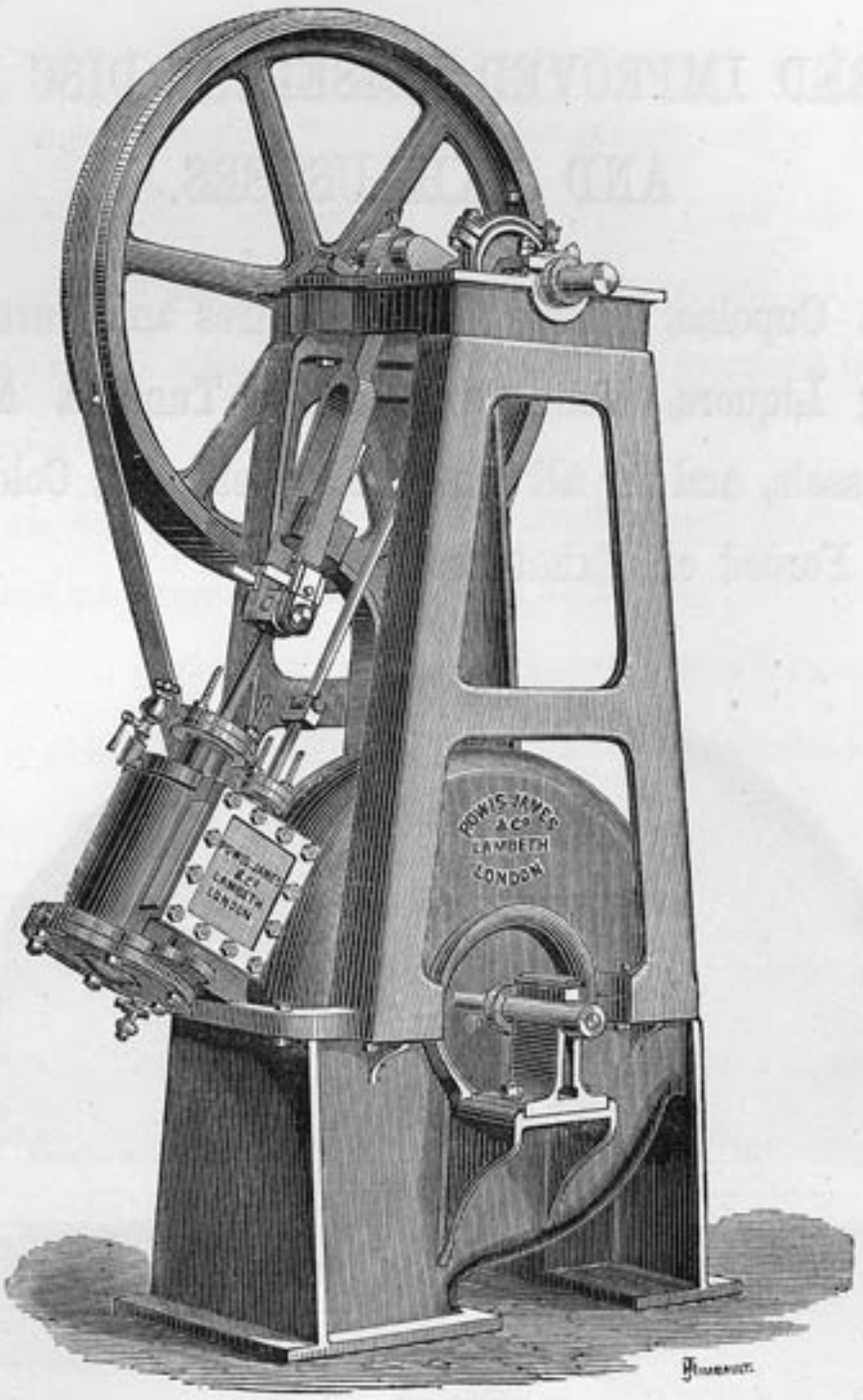


PATENT GRINDING AND DISINTEGRATING MILL.

THIS Mill is adapted for grinding up bones, coprolites, bark, locust beans, dye woods, maize, wheat, and other grains, &c., &c., and indeed there are few substances, no matter how hard, which it will not grind with a rapidity and perfection that leaves nothing to be desired, and with less cost and wear and tear than by any other known process. As compared with the ordinary mill stones the advantages are greatly reduced first cost, a larger production of ground or crushed material, less driving power, and the saving of time necessary to dress the stones. Provision is made for readily reversing the wearing parts, and when quite worn out they can be renewed at a trifling cost. The durability, however, of these Mills is very great, and under the most severe test, such as grinding coprolites, the cost of wear and tear is only nominal.

The principle on which these Mills work is as follows:—For the rubbing and cutting action of a pair of stones there is substituted a succession of blows. Wrought iron beaters, tipped with steel points, revolve at a high speed inside the casing, and by their centrifugal force drive outwards the material to be operated on, and triturate it against blocks of the hardest possible iron set in the circumference of the casing. The degree of fineness is determined by the size of the interstices in the gratings which occupy the lower half circumference, and through which the pulverised material has to escape. One set of these grates is included in the price of the machine, but five different kinds are made, to be used according to the nature of the material and degree of trituration required. The casing is constructed so that the gratings can be changed with only a few minutes' stoppage. Countershafts are supplied if required.

No.	Diameter of Disc.	Revolutions per Minute.	Revolutions of Countershaft per Minute.
1	19 ins.	3500	500
2	28 „	2400	500
3	36 „	1800	500
4	44 „	1400	500



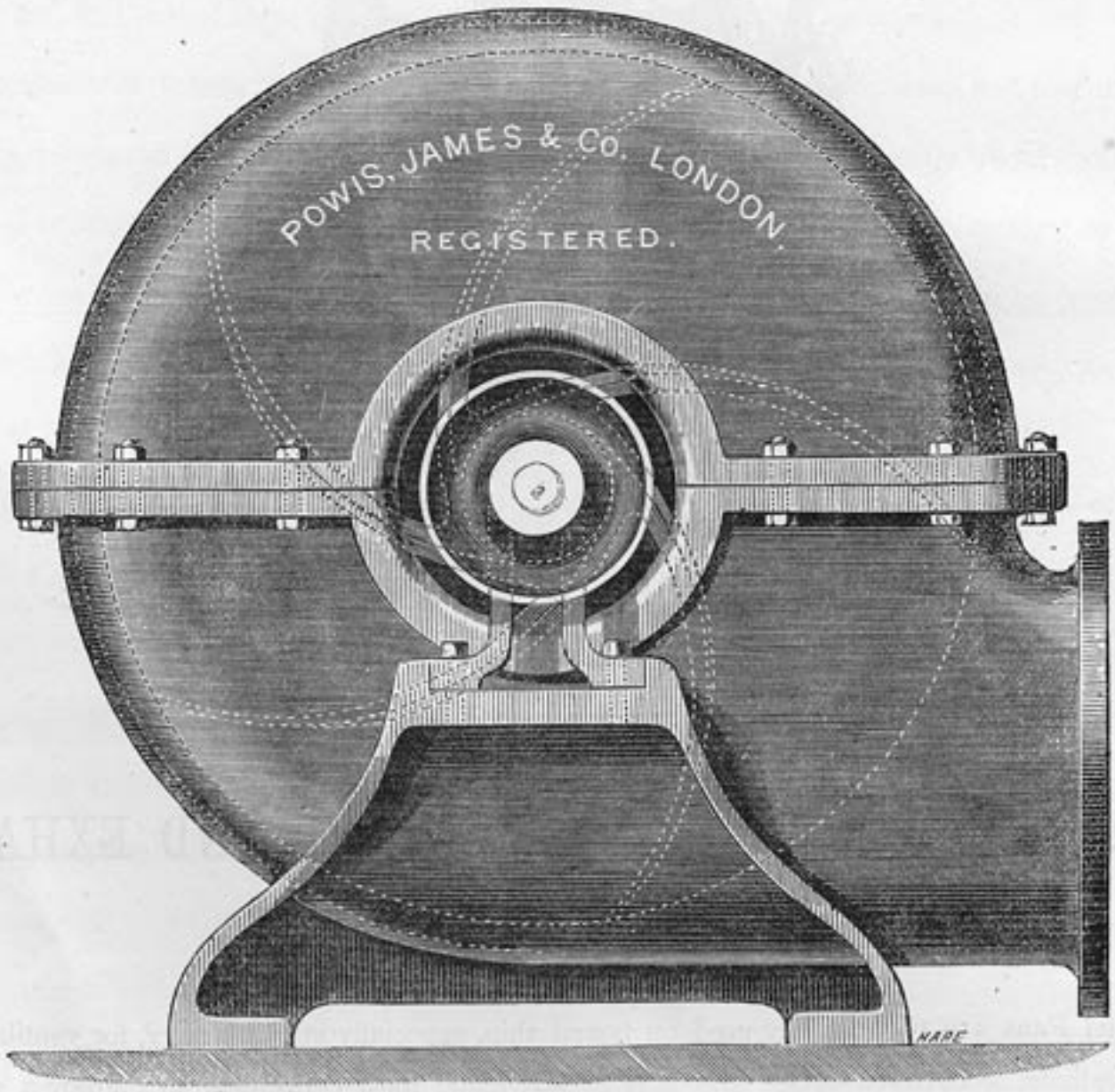
IMPROVED REGISTERED BLOWING FANS AND EXHAUSTERS, COMBINED WITH ENGINES.

OUR Improved Fans are now largely used on board ship, especially in H.M. navy, for ventilating the engine-room, stoke hole, or between decks, and it is usually found most convenient to employ a special engine to drive them, the steam for which is brought from the main boilers. The above drawing shows one of many patterns which we make, each to answer different requirements. This is arranged to occupy very little deck space. It has a 36 inch Impeller, and only covers a space of 4 ft. 2 in. by 3 ft. 2 in. Upon application, stating the position and space that can be given, we will submit the most suitable design and quote prices.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,
VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.

NEW REGISTERED IMPROVED NOISELESS DISC BLOWING FANS AND EXHAUSTERS.

For Melting Iron in Cupolas, Blowing Smiths' Fires and Furnaces, Heating Drying Rooms, Cooling Liquors, Ventilating Mines, Tunnels, Manufactories, Steam and Sailing Vessels, and for all purposes where Hot, Cold, Pure, or Foul Air requires to be Forced or Exhausted.



THESE Fans and Exhausters combine every known mprovement in construction for producing a strong Blast with the smallest amount ot power for driving. Our Fans and Exhausters are largely adopted in preference to any others by the Admiralty, and many eminent Shipbuilding Firms, ior forcing and drawing air for ventilating

purposes. They are rendered much more simple and efficient than any others by having the Outer Casing divided in the Horizontal Section right through the Centre, just above the Discharge Pipe, by which means the upper half of the Casing, which is cast in one piece, may be lifted off in a few minutes, without disturbing either Bearings or Foundation, and accumulations of oil and dust may be easily removed. This joint being planed quite true it is perfectly air tight, without the cement or packing invariably used in ordinary Fans.

Handles are cast on the larger sizes for convenience of lifting. The Impeller is built up of best Charcoal Iron, and in the strongest manner possible.

The Spindles are of Steel, running in carefully prepared Bearings, and made long enough to drive from either side. The Driving Pulleys are turned inside and out. All the working parts are accurately balanced, and the whole turned out in a finished style of workmanship not hitherto bestowed upon Fans, without any increase in price.

The Outlet in Fans up to 30 in. diameter of Impeller is circular, above that size it is square. The pipes for conducting the Blast should in no case be smaller than the Outlet.

The Driving Bands should be equal throughout, and as pliable as possible.

No.	Cwts. of Metal per hour.	Number of Smithy Fires.	Horse Power.	Diameter of Pulley.	Width of Driving Band.	No. of Revolutions per Minute.	Diameter of Discharge Pipe.	Diameter of Impeller.
1	6	4	½	4	1½ in.	2,000 to 2,200	5 in.	13 in.
2	10	6	¾	5	2 „	1,900 „ 2,100	6 „	16 „
3	15	9	1	6	2½ „	1,800 „ 2,000	7 „	19 „
4	22	12	1½	7	2½ „	1,700 „ 1,900	8 „	22 „
5	30	16	2	8	3 „	1,600 „ 1,800	9 „	25 „
6	45	25	3	9	3 „	1,500 „ 1,700	11 „	30 „
7	60	40	4	11	3½ „	1,400 „ 1,600	13 „	36 „
8	90	60	5	13	4½ „	1,200 „ 1,400	15 „	42 „
9	120	90	6	15	5 „	1,000 „ 1,200	18 „	48 „

In the number of Smithy Fires stated, the Tue-irons are calculated at 1¼ in. diameter. Allowance must be made for larger sizes, where it is found advantageous to use Tue-irons 2, 3, or even 4 in. diameter, for very heavy work.

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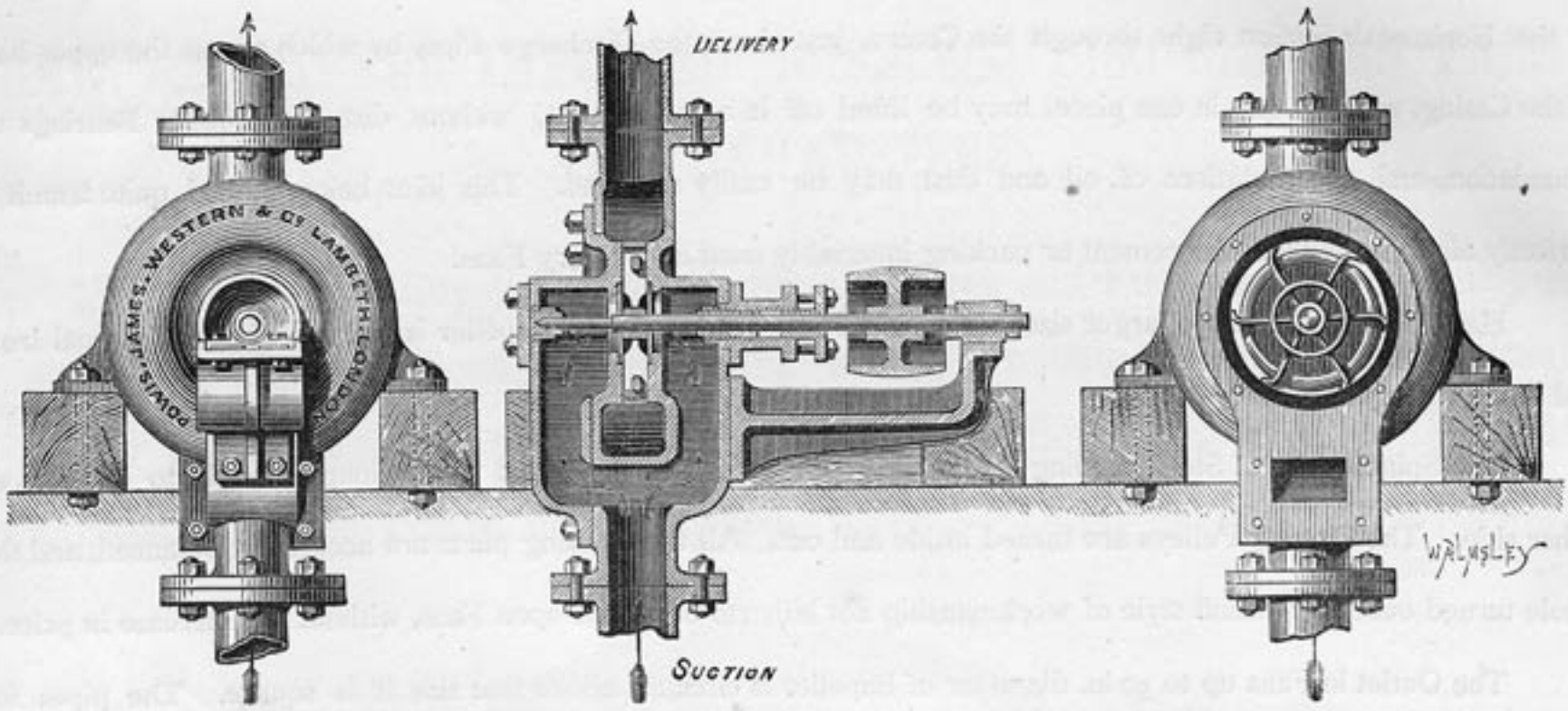


IMPROVED CENTRIFUGAL PUMPS.

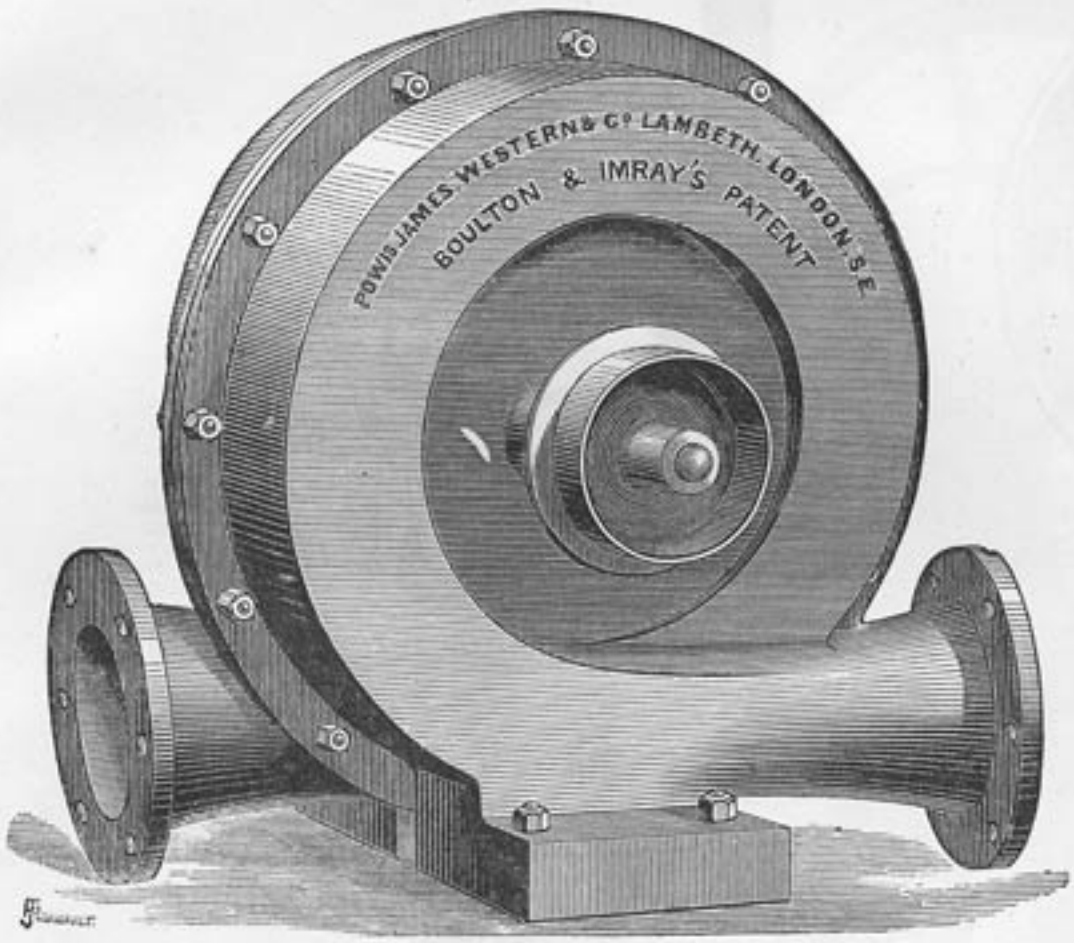
THESE Pumps have now been in use for many years, and their uses and mode of working are so well known that we will here only point out several improvements in their construction, tending to make them more lasting and simple to manage, without increasing the price, which are introduced into the Pumps shown above. As every Pump is liable, even in the best hands, to get out of order, it is desirable to so construct it that it can be repaired with the least possible trouble and cost. All our Pumps are made so that, by removing the door shown in the side view above, the impeller can readily be examined or taken out, and replaced without either moving the Pump off its foundation or disturbing the principal bearings of the spindle. By this means we save time and labour; and when the impeller is replaced there is no danger of the spindle heating on account of the bearings not being true with one another, as frequently happens in Pumps whose casings are divided right through the centre. The impellers are in every case made of gun-metal, and are carried on steel spindles, running in long gun-metal bearings. A bearing is provided outside the pulley to equalise the strain of the belt on the brasses.

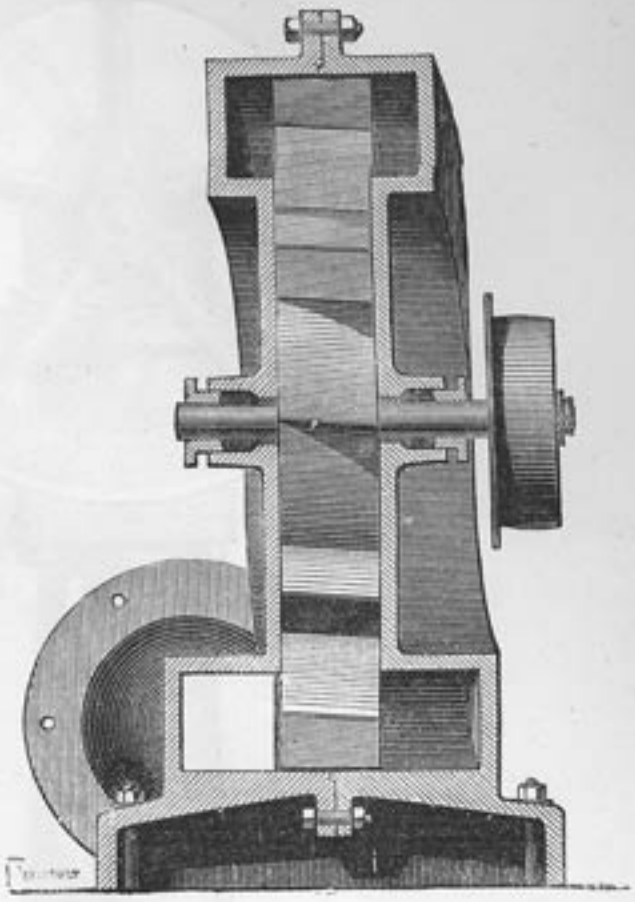
The price includes a Foot Valve and wrought iron Grating, which is nearly always necessary.

For particulars of Bends, Pipes, &c., see Price List.

Size	1	2	3	4	5	6	7	8	9	10
Diameter of Suction and Discharge Pipes ..... inches ..	3	4	5	6	7	8	9	10	12	15
No. of Gallons raised per Minute ...	100	200	350	500	800	1000	1200	1500	2000	3000
Horse power required per 10 feet of Lift	¾	1	2	2¾	4	5	6	7	9	13

Special quotations given for larger sizes.





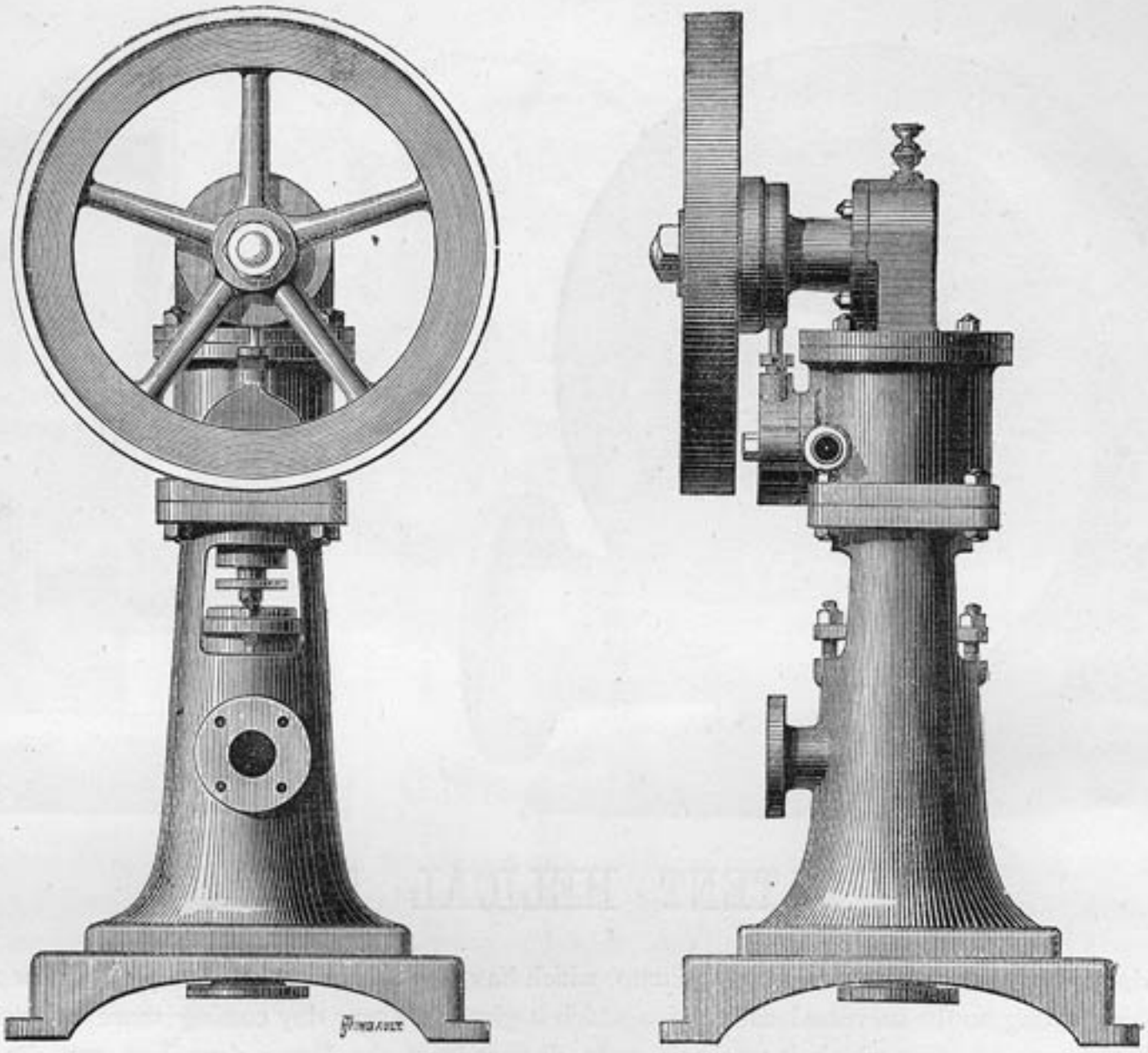
NEW PATENT HELICAL PUMP.

THE drawings above show a form of Rotary Pump, which has now been in successful operation for several years, and which, owing to the universal satisfaction which it gives, is every day coming more into general use. It will be seen that the principle on which it works is quite distinct from the Pump described opposite. The water, instead of entering at the centre and being discharged at the circumference, as is the case in all Centrifugal Pumps, is here drawn in at the circumference, whirled once round inside the casing, and then discharged again also at the circumference, at the same speed at which it entered. A great advantage in this Pump is that the Impeller revolves much slower than usual for any given lift, thus reducing materially the wear of the bearings and liability to derangement. The section of the water passage is uniform throughout, and there being no sudden bends or turns, the loss of power through friction is reduced to a minimum, and all danger of the passage choking up is removed. The Price includes the Foot Valve with Grating.

For particulars of Bends, Pipes, &c., see Price List.

Size	1	2	3	4	5	6	7	8
Diameter of Suction and Discharge Pipes ..... inches ...	4	6	8	10	12	16	20	24
Number of Gallons raised per Minute	160	450	900	1500	2200	4100	6600	9500
Horse power required per 10 feet of Lift	¾	2	4	6	8	15	24	35

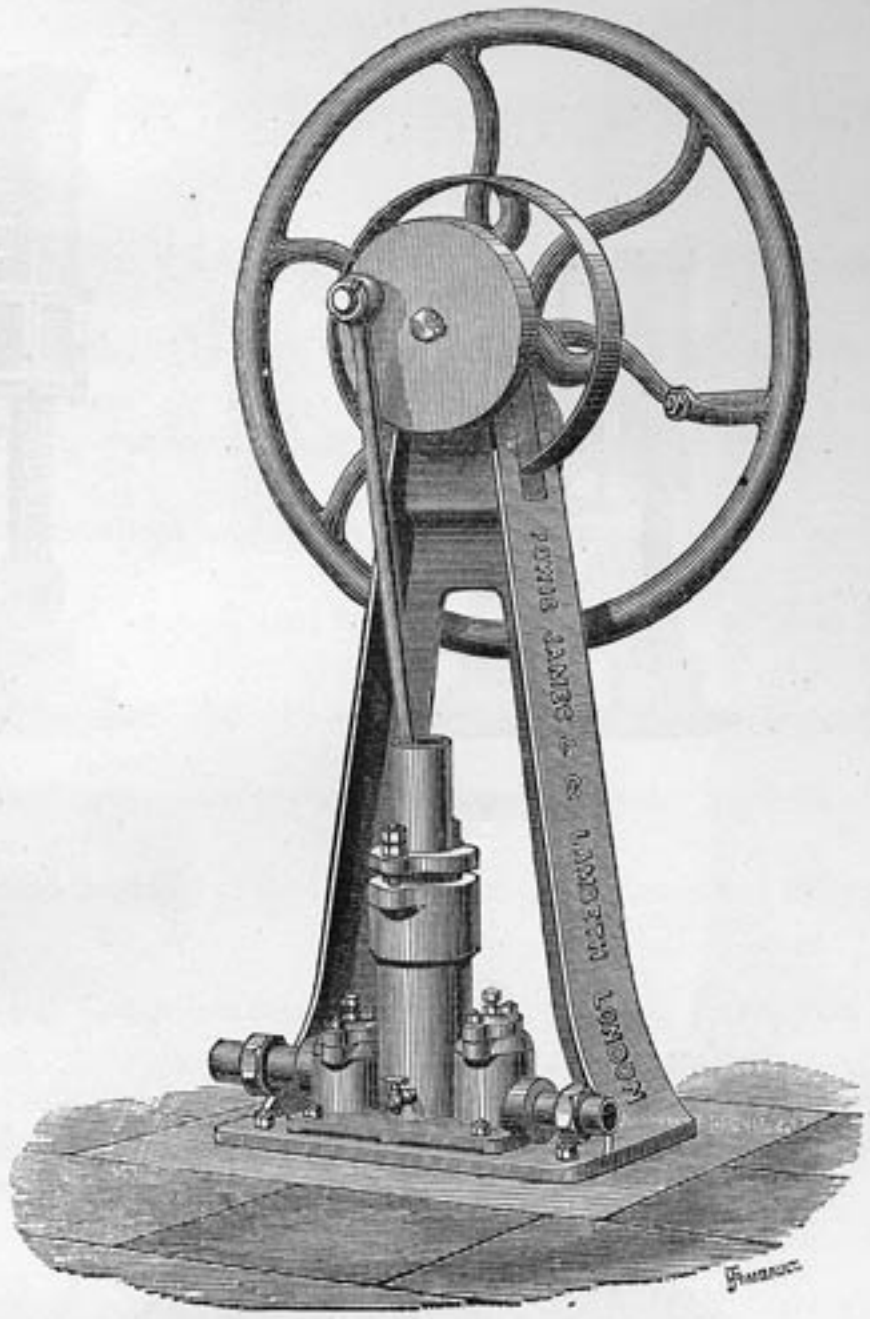
Special quotations given for other sizes.



PATENT "PARAGON" STEAM PUMP.

THESE Pumps are adapted for feeding Steam Boilers, or for use in Breweries, Tanneries, Paper Mills, Soap and Chemical Works, or, in fact, in any place where water has to be drawn or forced. Their construction is so simple that no skill is required to manage them; all the main working parts are inside, and entirely protected from injury, and yet readily accessible for adjustment and repairs. A considerable economy is effected by admitting the steam for only part of the stroke, and letting it expand through the rest. The smaller sizes are made to attach to a wall plate, and the larger as shown above.

Size	1	2	3	4	5	6	7	8
	Single Acting.			Double Acting.				
Diameter of Steam Cylinder	2½	3½	4	4½	5¼	6	8½	8½
Diameter of Pump Plunger	1¼	1⅝	2⅛	1¾	3¼	3⅝	5	6
Gallons delivered per Hour	80	150	250	400	1200	1800	4000	7000



IMPROVED FORCE PUMP,

FOR HAND OR STEAM POWER.

THE above drawing represents a very simple form of Pump, which occupies little room, and will be found very useful in any factory. It may be worked by hand to fill the Boiler, &c., if steam is down, or driven by a belt, if the engine is running. It will draw from a moderate depth 10 to 15 feet, and force any height that is required.

No.	Diameter of Plunger.	Stroke of Pump.	Revolutions per Minute if driven by a Belt.
1	3 in.	8 in.	100
2	4 ,,	10 ,,	100

FIG. 1.

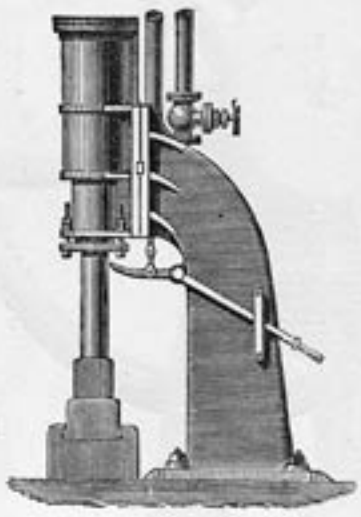


FIG. 2.

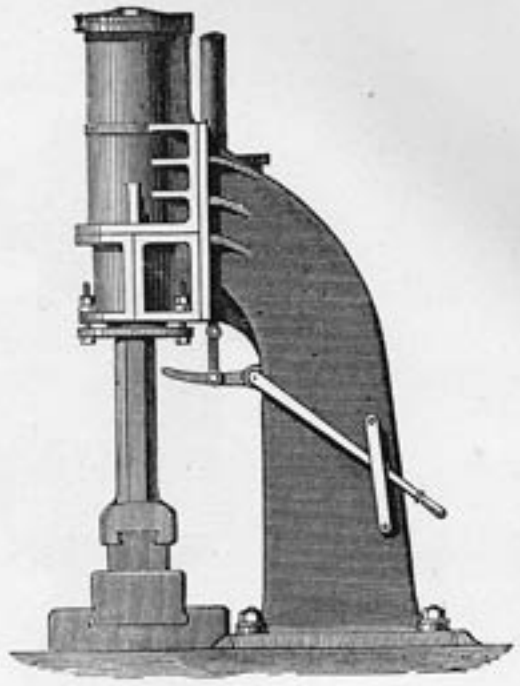


FIG. 3.

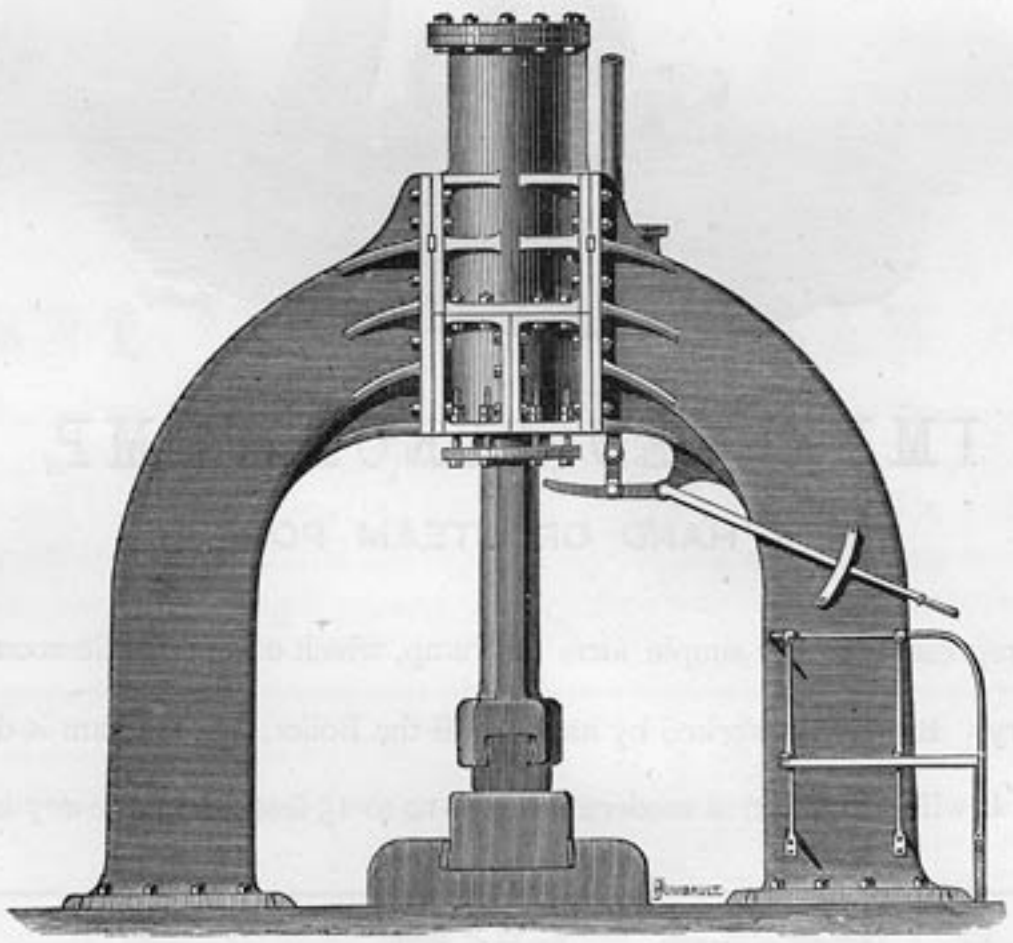


FIG. 4.

IMPROVED DOUBLE-ACTING STEAM HAMMERS.

IMPROVED DOUBLE-ACTING STEAM HAMMERS.

WITHIN the last few years the demand for these Hammers has very largely increased, not only through the increase of trade, but principally because their value as money and labour-saving machines has become more fully recognised. Instead of being confined to large engineers' shops and heavy forges, they are gradually being introduced into every smith's shop where more than a couple of men are kept at work. In addition to the immense saving in labour, there is a great economy effected in the coals used, as with a Steam Hammer more than double the amount of work can be done at one heat than can otherwise be done in two; the work, too, is quite as well finished, and sounder than if hand smithed only. In every sized Hammer the steam is admitted to the top of the piston as well as to the bottom so as to increase the force of the blow, but this is not taken into account in fixing the nominal size.

Builders, Contractors, and Coach-builders will find the 3 cwt. and 5 cwt. sizes well suited to their purposes, while the larger sizes are best adapted for Engineers' shops. The smallest size, $1\frac{1}{2}$ cwt., is an extremely handy tool and will soon repay its cost in any shop.

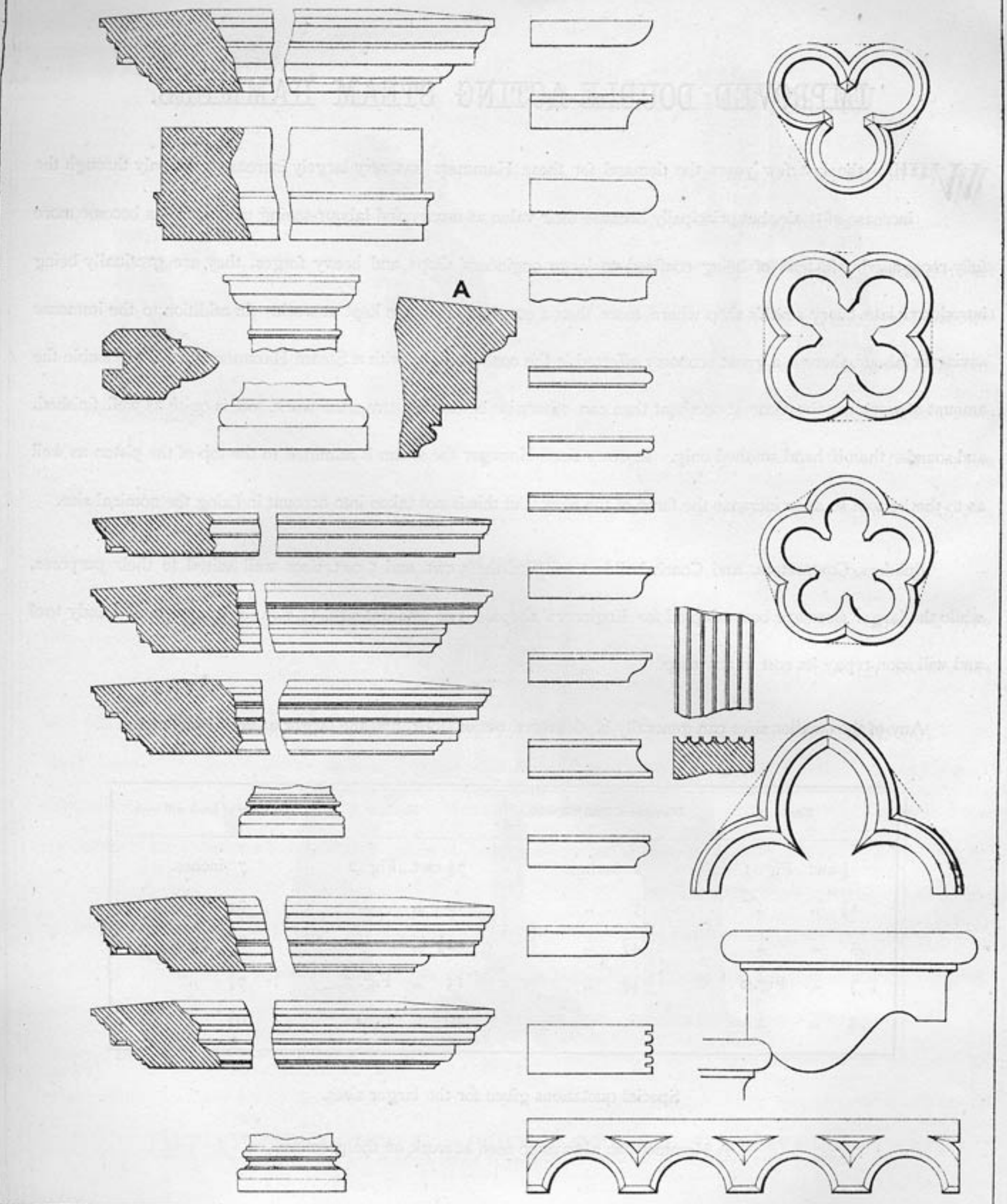
Any of the smaller sizes can generally be delivered out of stock, and the larger at very short notice.

Size.	Diameter of Shaft will work.	Size.	Diameter of Shaft will work.
$\frac{3}{4}$ cwt., Fig. 1	2 inches.	$7\frac{1}{2}$ cwt., Fig. 2	7 inches.
$1\frac{1}{2}$,, ,,	3 ,,	10 ,, ,,	$7\frac{3}{4}$,,
3 ,, ,,	$4\frac{3}{4}$,,	$12\frac{1}{2}$,, ,,	$8\frac{1}{2}$,,
3 ,, Fig. 2	$4\frac{3}{4}$,,	15 ,, Fig. 3	$9\frac{1}{4}$,,
5 ,, ,,	6 ,,	20 ,, ,,	$10\frac{3}{4}$,,

Special quotations given for the larger sizes.

A Hammer can always be seen at work on the premises.

SECTIONS OF MOULDINGS WORKED IN STONE BY PATENT MACHINERY.



NEW PATENT STONE MOULDING, SAWING, AND PLANING MACHINERY.

THE cost of masons' labour in any estimate for building is so great that the introduction of efficient machinery for rapidly sawing, planing, and elaborately moulding those kinds of stone in most general use is a matter of great importance to the Builder and Contractor.

The Patented Inventions we are now considering have proved in every respect a most perfect success, and as machines have now been at work constantly in London for several years, they can no longer be considered experimental. The principle on which the machines and tools are constructed for Sawing, Planing, and Moulding, is quite new, and the saving in time and money by their use is so enormous that it would hardly be credited, if it were not for actual experience. On the opposite page are sections which have been worked by the Patent Moulding Machine. A piece of stone 5 feet long, of such a section as that marked A, can be cut from the rough and finished in an hour. One of the smaller Machines, as on page 151, will do as much work of this kind in a day as would cost £6 or £7 to work by hand, while the larger Machines, on page 149, will earn proportionally more in the same time.

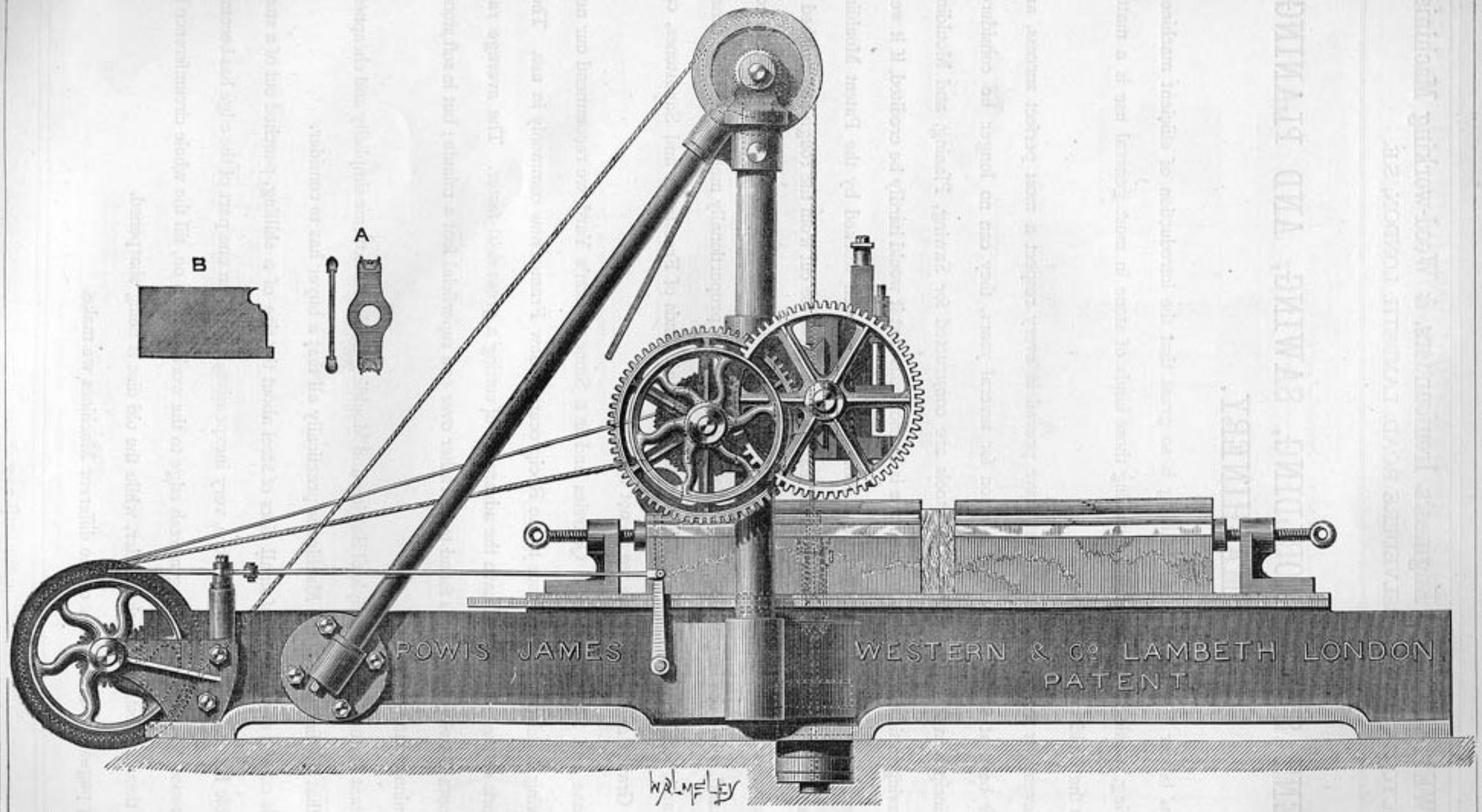
"Bath," "Portland," and "York" stones, Mild Limestones, and all kinds of Freestones and Sandstones, can be worked with ease. Granite and hard Marble we do not work.

For Sawing Stone and Slate, both at the Quarries and in a Stone Mason's Yard, we recommend our new Patented CIRCULAR Sawing Machines in preference to the Reciprocating Saw Frames now commonly in use. They are just as simple to work as these latter, and have the advantage of cutting a great deal faster. The average rate of cutting by the Horizontal Sawing Machine is found to be rather over one superficial foot a minute; but in soft stones as much as two feet a minute can be cut.

The most important feature in this principle of Sawing and Moulding lies in the extreme simplicity and cheapness of the cutting tools, so that the first cost of the Machine is practically all that a buyer has to consider.

The cutting tools consist of a number of small discs of steel about the size of a shilling, punched out of a steel plate, and held in suitable holders. They are therefore, very inexpensive; and when one part of the edge has become dull, the disc is turned round a little way, to bring a fresh edge to the work, and so on, till the whole circumference is blunt. A new one can then be substituted in the holder, while the old disc is being sharpened.

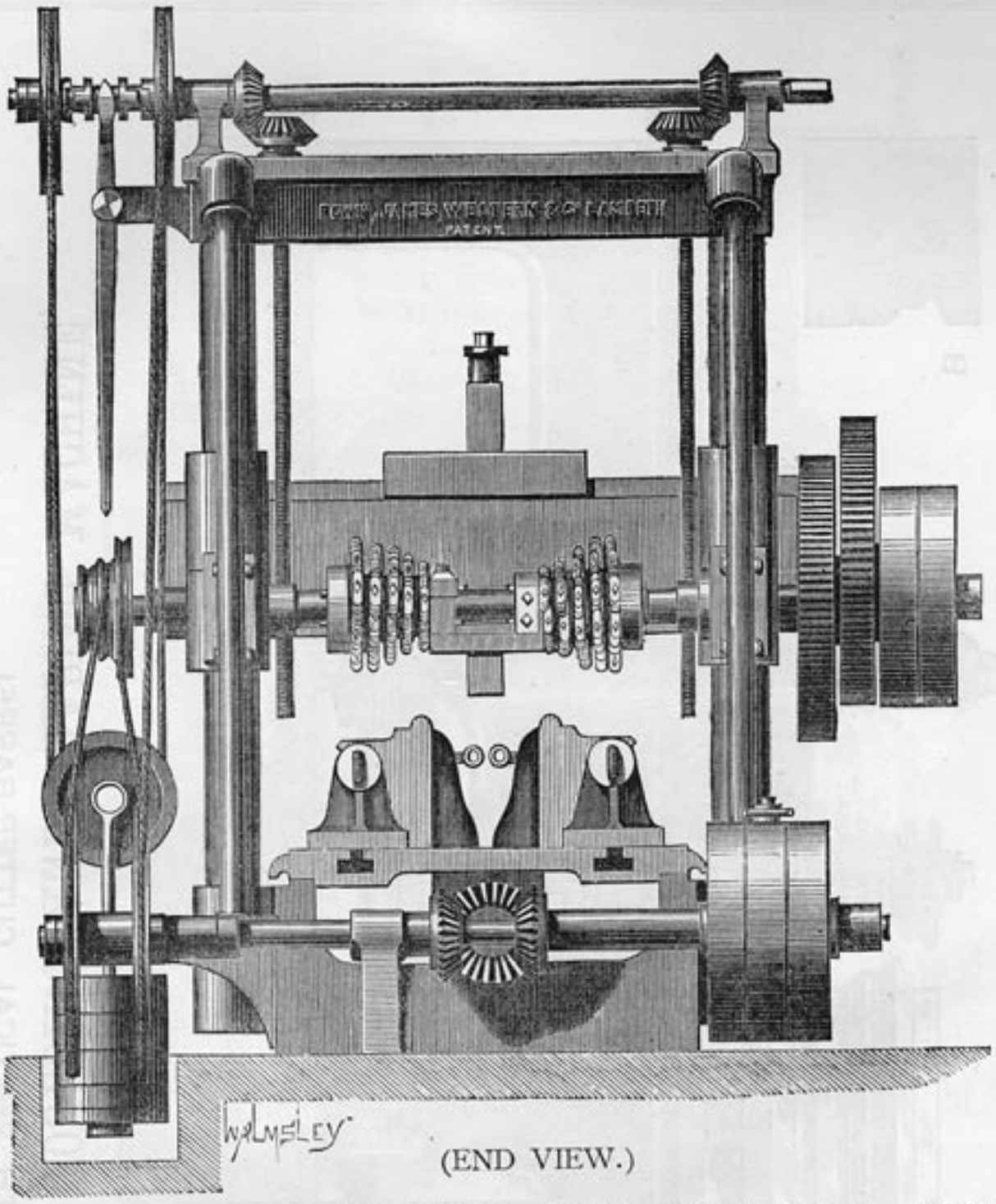
On the following pages are descriptions of the different Machines we make.



PATENT STONE MOULDING AND PLANING MACHINE,

WITH HORIZONTAL CUTTER-BARREL.

(SIDE VIEW.)



(END VIEW.)

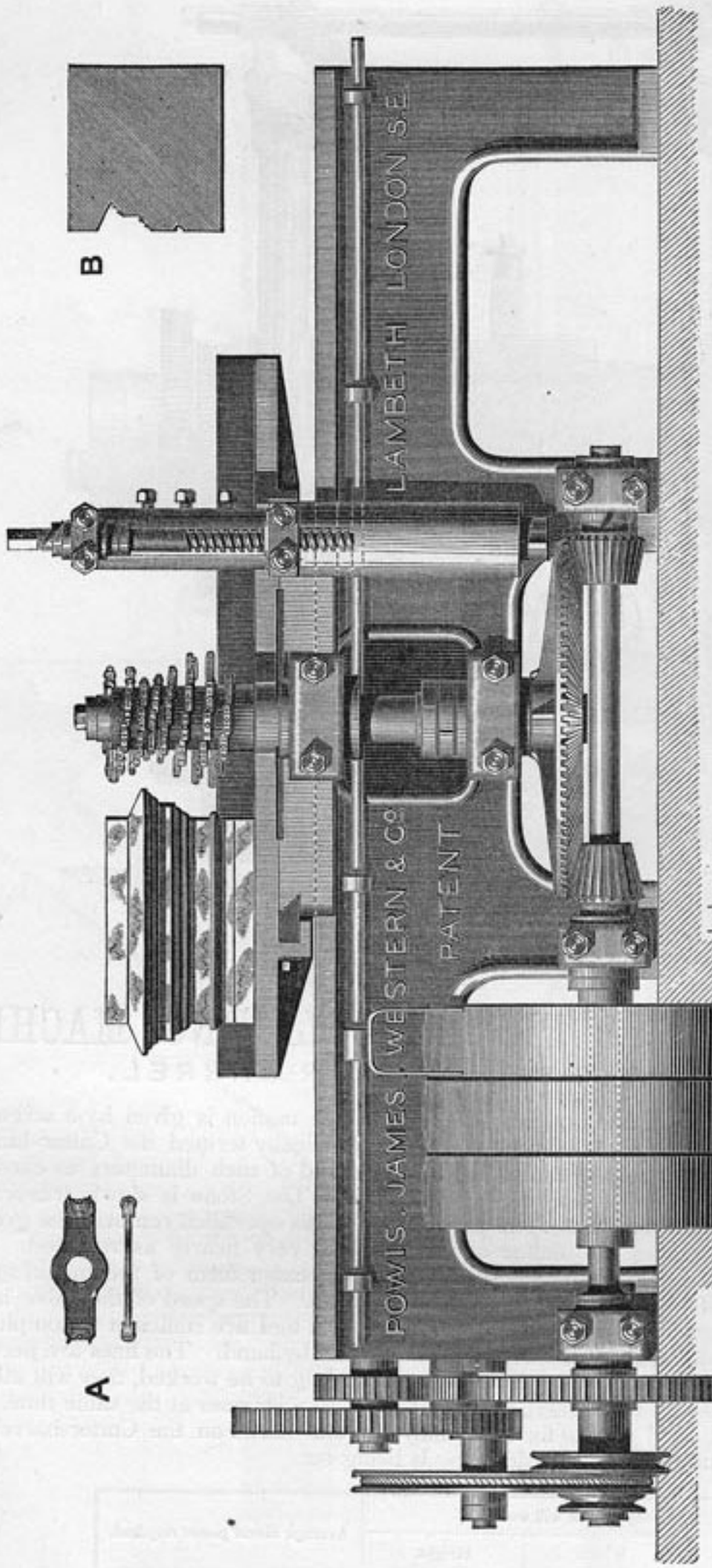
PATENT STONE MOULDING AND PLANING MACHINE,

WITH HORIZONTAL CUTTER-BARREL.

IN this Machine the Stone is carried on a Travelling Table, to which motion is given by a screw, in the same manner as in an Iron Planing Machine. An horizontal shaft, technically termed the Cutter-barrel, is loaded with patent tool-holders, similar to that marked A on drawing opposite, and of such diameters as correspond to the outline of the required moulding. The mode of working is as follows:—The Stone is slowly traversed once only past the Cutter-barrel at the rate of about four inches run per minute. This operation removes the great bulk of the stone which has to be cut away, and leaves the outline of the moulding very nearly as required. To finish, the Cutter-barrel is raised, just to clear the stone, and a steel scraper of the exact form of the moulding, as B, which is held in a tool-box on the other side of the main-bracket, is brought down. The speed of the table is increased to about twelve feet per minute; and generally three or four scrapes with this tool are sufficient to complete the moulding. The work is done not only a great deal faster but much better than by hand. The lines are perfectly straight, and the edges beautifully sharp; and if there are 100 pieces of one moulding to be worked, they will all be absolutely alike in section. Either one large stone can be worked, or two or more smaller ones at the same time.

For some kinds of work it is a good plan to fix two small Circular Saws on the Cutter-barrel for squaring the sides of the block of stone at the same time as the Moulding is being cut.

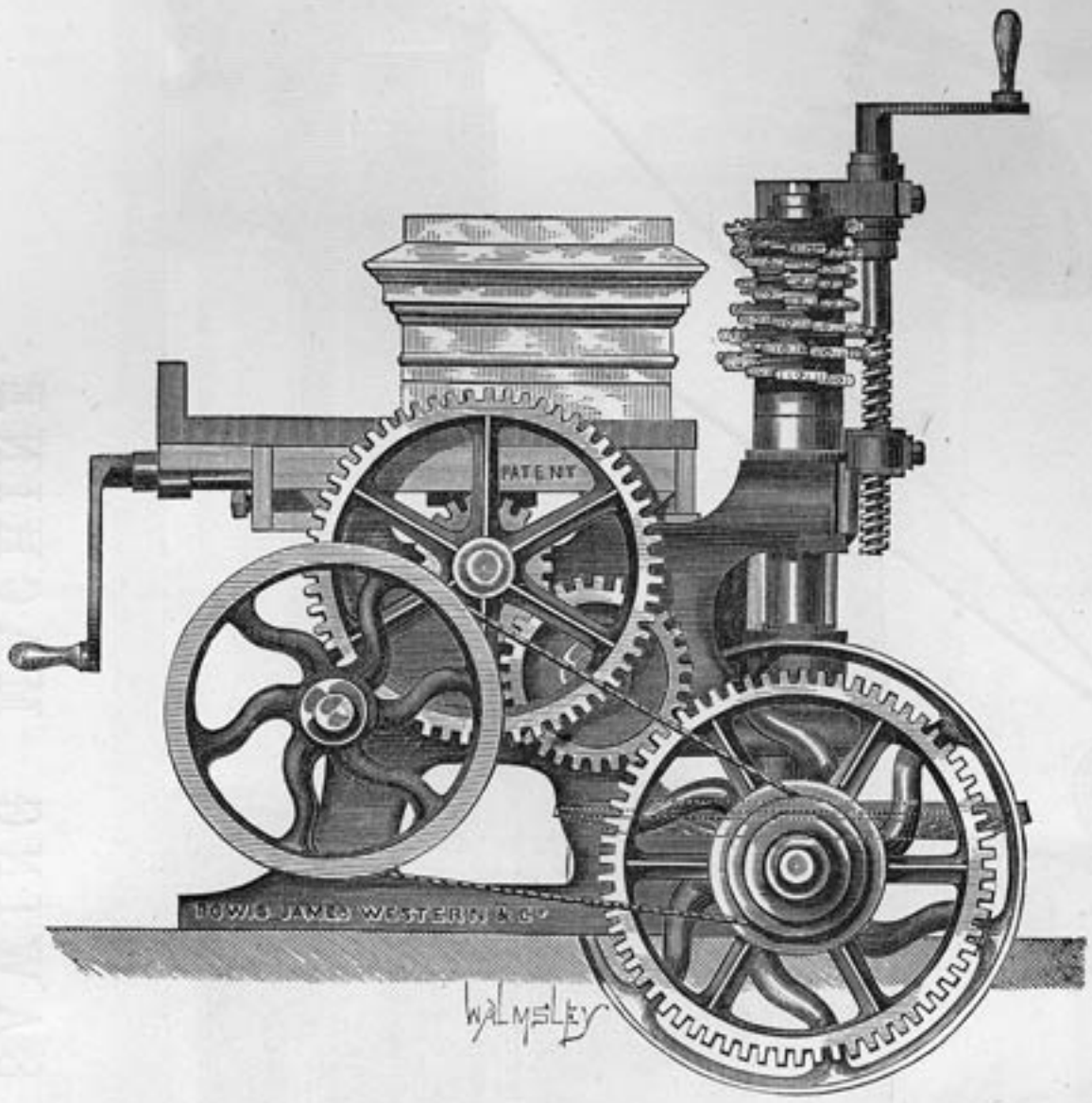
No.	Size of Stone will work.			Average Horse power required.
	Length.	Width.	Height.	
1	9 ft.	4 ft.	3 ft. 8 in.	3-horse.
2	6 „	2 „ 6 in.	2 „ 6 „	2 „



PATENT STONE MOULDING AND SHAPING MACHINE,

WITH VERTICAL CUTTER-BARREL.

(SIDE VIEW.)



(END VIEW.)

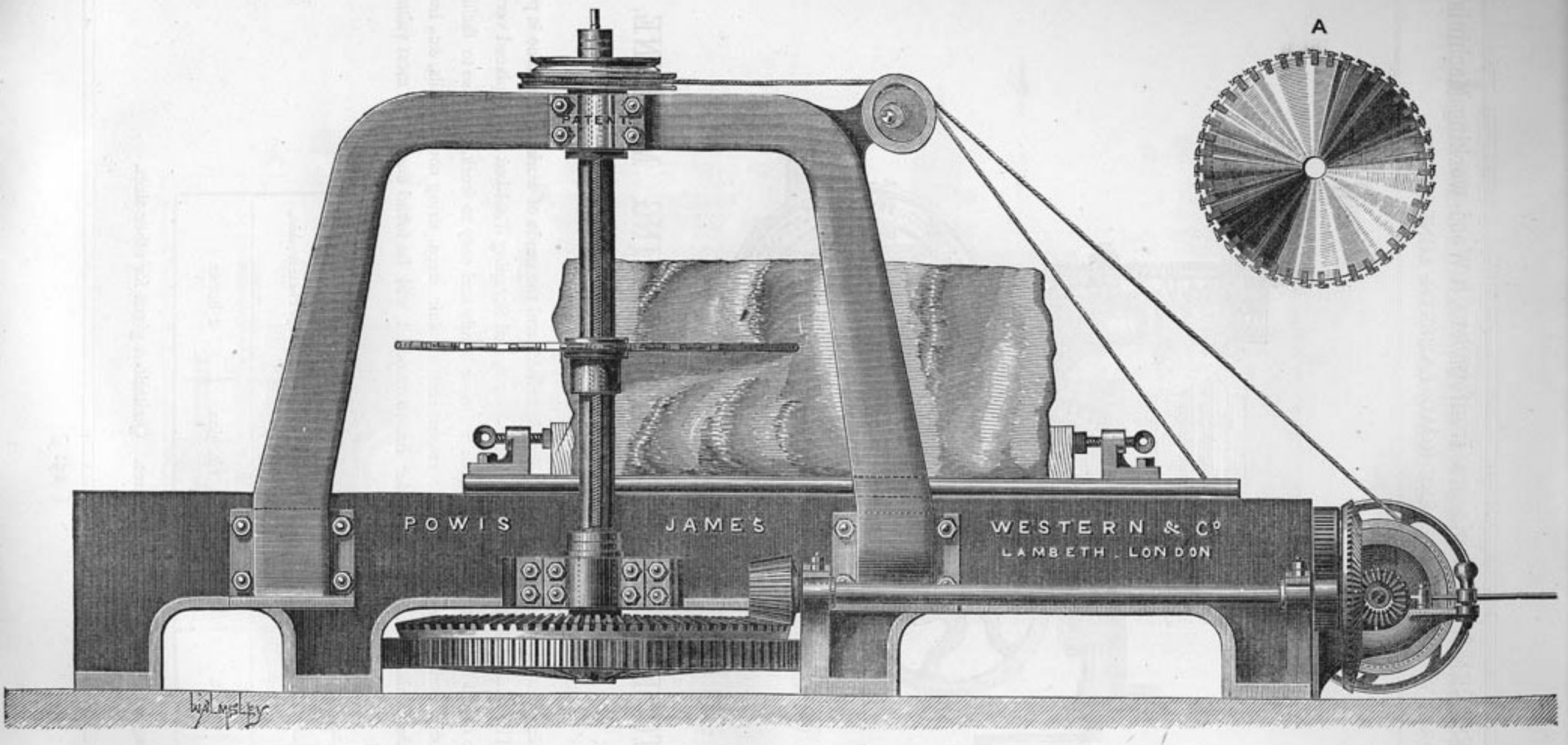
PATENT STONE MOULDING AND PLANING MACHINE,

WITH VERTICAL CUTTER-BARREL.

THIS Machine is for doing just the same work as that last described, and the mode of working the stone is practically the same. The main difference lies in the Cutter-barrel, and Scraping Tool-box being placed vertical instead of horizontal. The object of this is to make the machine more handy and easy to work, and also to facilitate changing the tools. It is only made for working smaller stones, such as stair steps, string courses, sills, &c., but as these constitute three fourths of the work which a builder has to make, it will be found one of the most valuable machines he can have in his place.

Size of Stone will Work,			Average Power required,
Length.	Width.	Height.	
5 ft.	2ft. 3ins.	1ft. 3ins.	2-horse.

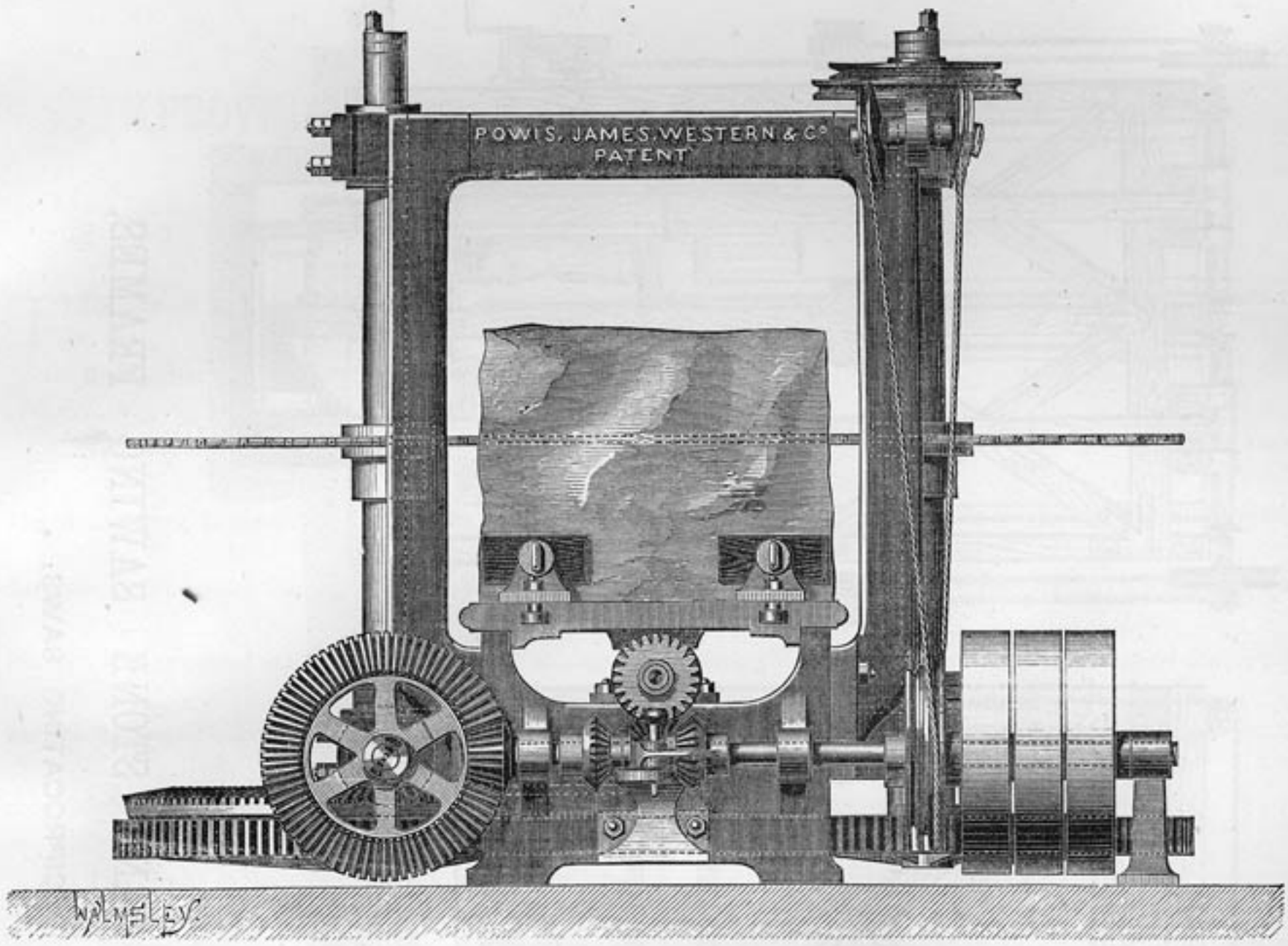
The table can be lengthened to take in longer stones. Quotations given for other sizes.



PATENT STONE SAWING MACHINE,

WITH HORIZONTAL SAWS.

(SIDE VIEW.)



PATENT STONE CIRCULAR SAWING MACHINE,

WITH HORIZONTAL SAWS.

THIS Machine is designed for converting large blocks of stone as they come from the quarry into Slabs, or pieces of any size or shape that is required.

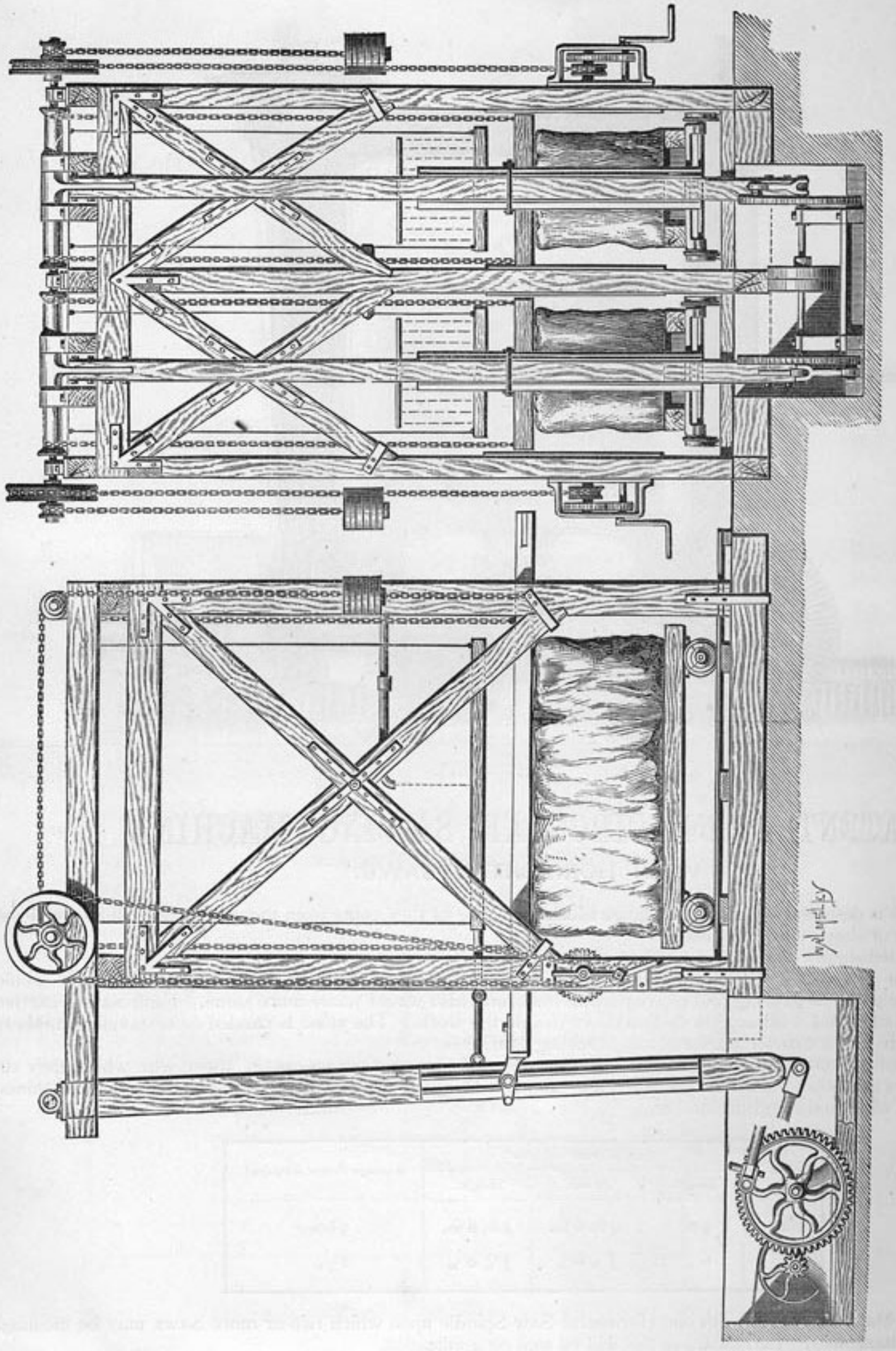
It is also used simply for Squaring up and Facing blocks.

We find it preferable to use two Saws of moderate diameters to one very large one, as the latter would necessitate a more powerful gearing and heavier framework, and also would waste more stone. Each Saw is carried on a Vertical Spindle, and is adjustable up and down to suit the work. The stone is carried on a travelling table to which motion is given in a manner similar to the Moulding Machines.

We especially recommend these Saws to the attention of Quarry Owners, as the speed with which they cut stone far surpasses any other known means of working stone. They are very heavy and powerfully made Machines, and calculated to withstand rough treatment.

No.	Size of Stone will Saw.			Average Power Required.
	Length.	Width.	Height.	
1	9 ft.	4 ft. 6 in.	4 ft. 6 in.	3-horse
2	6 „	3 „ 0 „	3 „ 0 „	2 „

A similar Machine is made with one Horizontal Saw Spindle upon which two or more Saws may be mounted and worked simultaneously. Particulars of this will be sent on application.



IMPROVED MARBLE AND STONE SAWING FRAMES,

WITH RECIPROCATING SAWS.

IMPROVED MARBLE AND STONE SAWING FRAMES,

WITH RECIPROCATING SAWS.

THIS class of machine being now so generally adopted in this country and elsewhere, no further reference to their value is necessary.

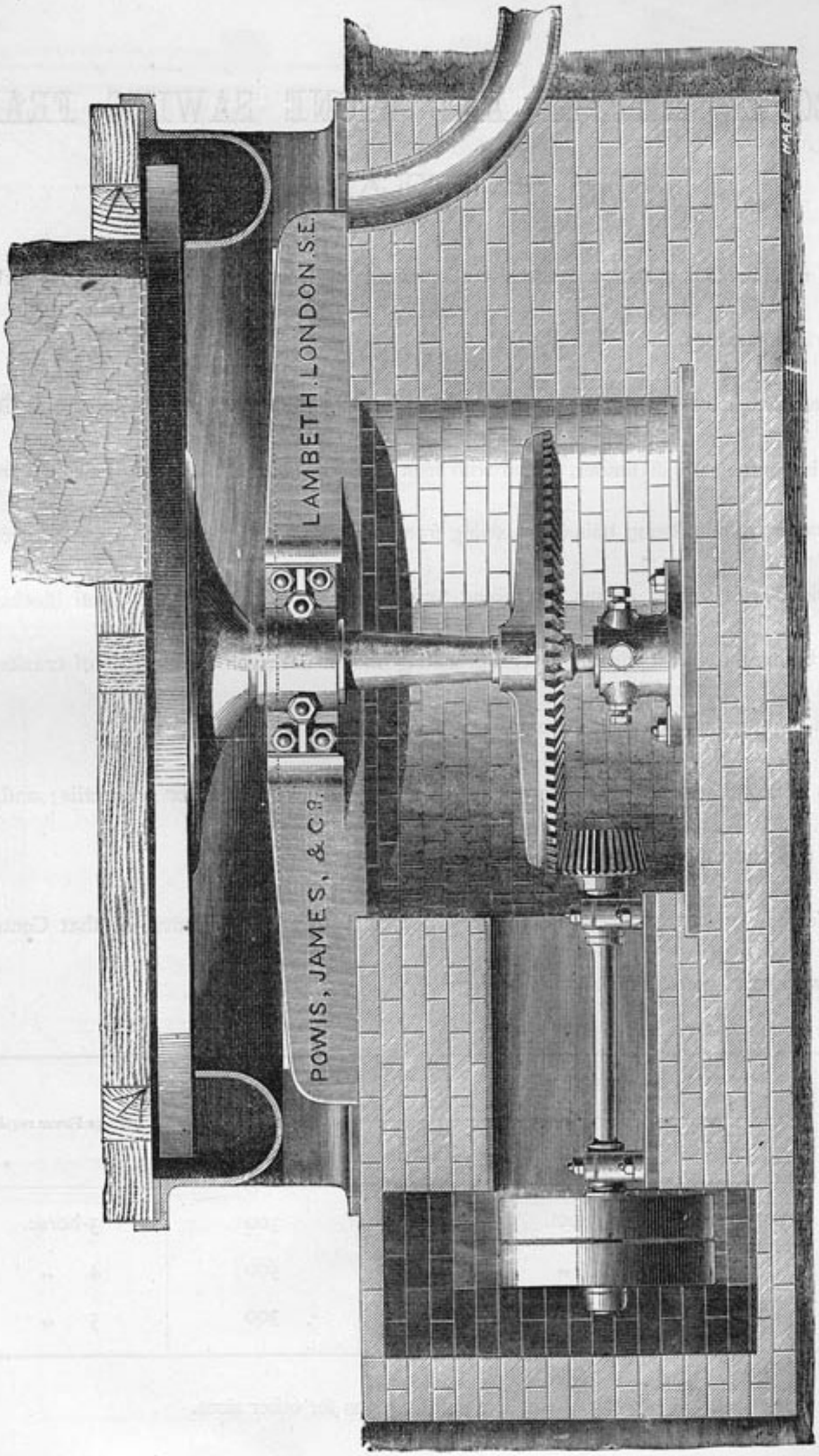
The one we have here represented is designed for permanent use in Marble Works or a Contractor's Yard. The frame-work is constructed of timber, bound with iron at all the joints; the whole being of great strength and durability. The outer framing being united, the swing frame is suspended by rods to cross-shafts, on which it works freely. It is provided with proper means for raising and lowering it to suit different sized blocks, and chains and weights to counterbalance it whilst working. Reciprocating motion is given from a pair of cranks and connecting rods driven from a counter shaft, on which are a pair of fast and loose driving pulleys.

The blocks to be cut are run into the proper position upon trucks moving on tramrails; and an arrangement is also made for a constant supply of sand and water.

When preferred we supply only the iron work necessary for these Frames, so that Contractors can find their own timber work, and erect them to our drawings.

No.	Size of Stones will Cut.			Speed of Pulleys.	Average Power required.
	Length.	Width.	Height.		
1	7 feet.	4 feet.	4 feet.	300	3-horse.
2	8 „	5 „	6 „	300	4 „
3	10 „	7 „	9 „	300	5 „

Special Estimates will be given for other sizes.



IMPROVED MARBLE AND STONE SURFACING OR RUBBING TABLE.

IMPROVED MARBLE, STONE, AND SLATE SURFACING AND RUBBING TABLES.

THE value of Steam Power, in greatly reducing the cost of Surfacing and Polishing Slate, has long been made available in the Slate Districts of North Wales.

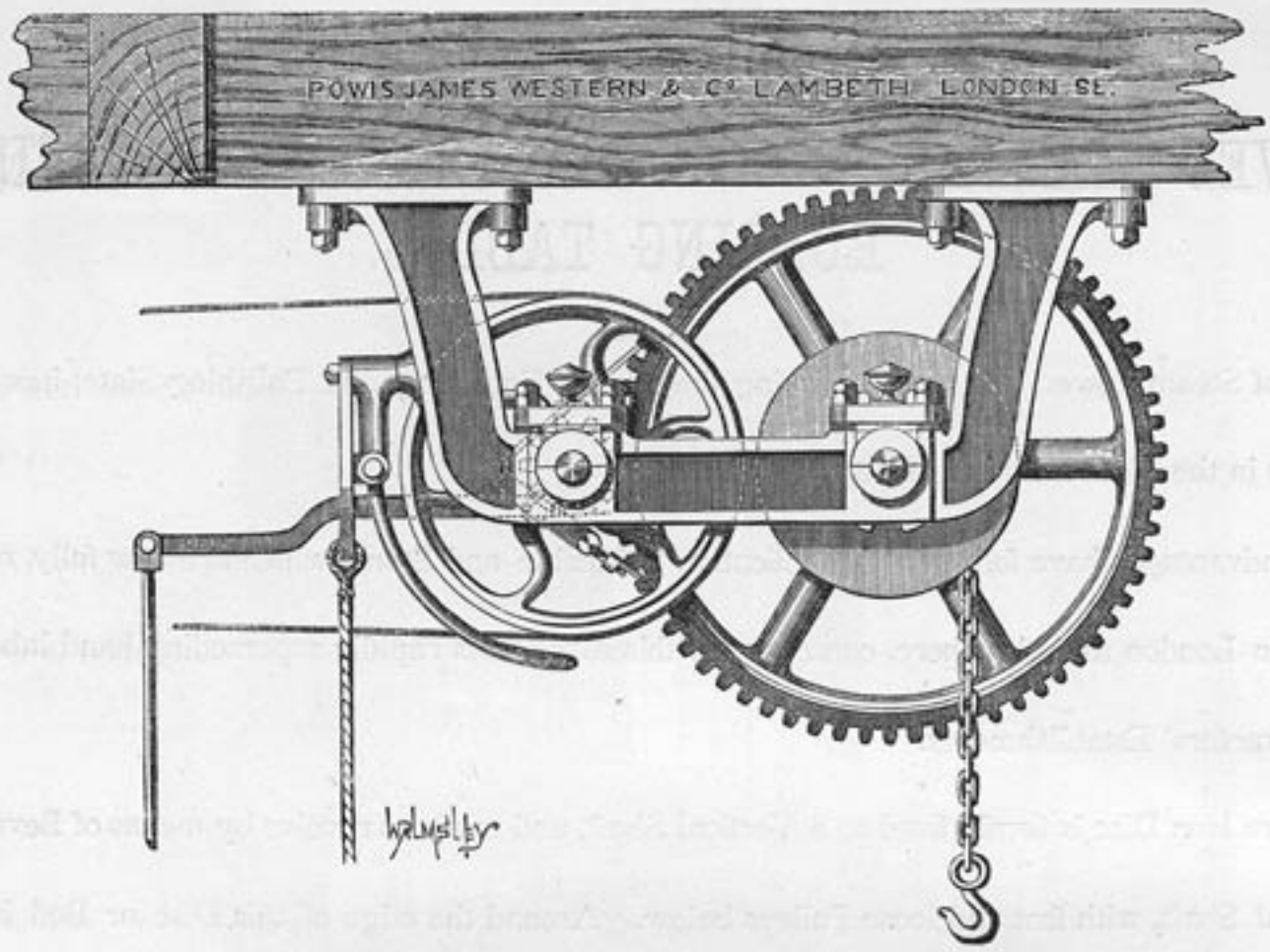
Similar advantages have followed its application to Marble and Stone, which are now fully recognised by the leading Firms in London and elsewhere, consequently this Machine is rapidly superseding hand labour for this class of work in Contractors' Establishments.

A Massive Iron Disc is firmly fixed to a Vertical Shaft, and made to revolve by means of Bevel Gearing, driven from a horizontal Shaft, with fast and loose Pulleys below. Around the edge of this Disc or Bed is a Circular Iron Trough, which serves to catch the waste sand and water used.

For working the Machine, strong Timbers are framed at right angles or otherwise, and fixed just above the Disc or Bed, dividing it into compartments, into each of these a block of Stone or Marble is put, which is kept in place by the timbers while the Bed revolves. A perfectly true and smooth surface is the result in a very short time, at a comparatively trifling cost.

The price does not include the wood-work.

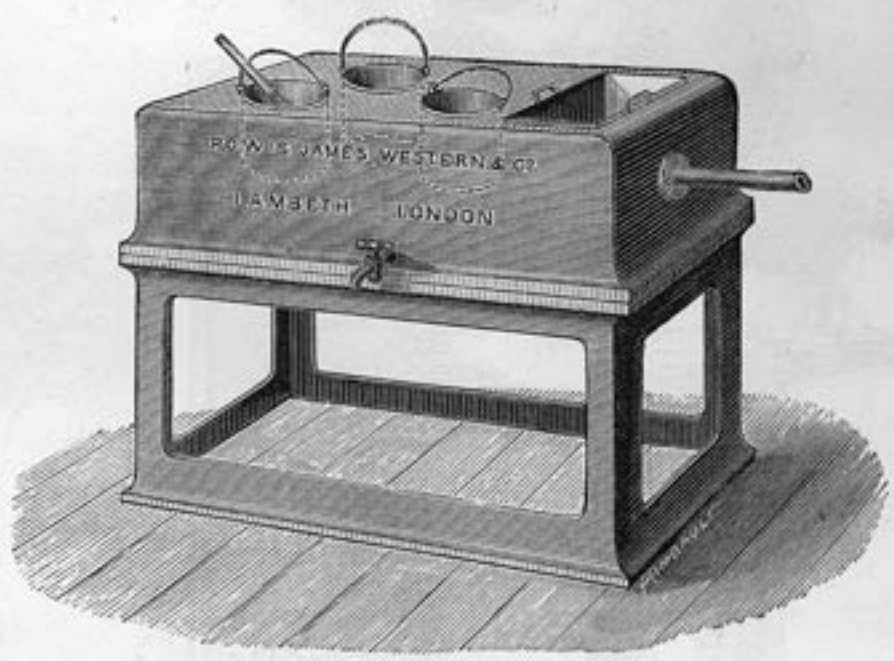
No.	Diameter of Table.	Speed of Pulleys.	Average Power required.
1	8 feet.	60	3-horse.
2	10 „	60	4 „
3	12 „	60	5 „
4	14 „	60	6 „



HAULING APPARATUS.

THIS Apparatus, which is worked by a belt on to a pair of fast and loose pulleys, should be fixed in the roof of a Saw Mill, and will be found very handy for moving heavy logs of timber. If the Mill is on the water's side it will draw the wood out of the water and up the incline to the level of the Mill floor, ready to be rolled on to the table of the Rack Bench, or the carriages of the Timber Frame.

It is fitted with striking off gear and a break, and the price includes 40 feet of chain. Speed of pulleys, 80 revolutions per minute.



IMPROVED STEAM APPARATUS FOR MAKING AND HEATING GLUE.

BY the adoption of this simple method for heating Glue, in lieu of the dangerous custom of burning up the waste of the shop in a fire-place, one very fertile cause of fires is entirely removed, the Glue may always be kept at Boiling point without the loss occasioned by burning around the edges of the Pots, and is quite free from dirt, chips, &c.

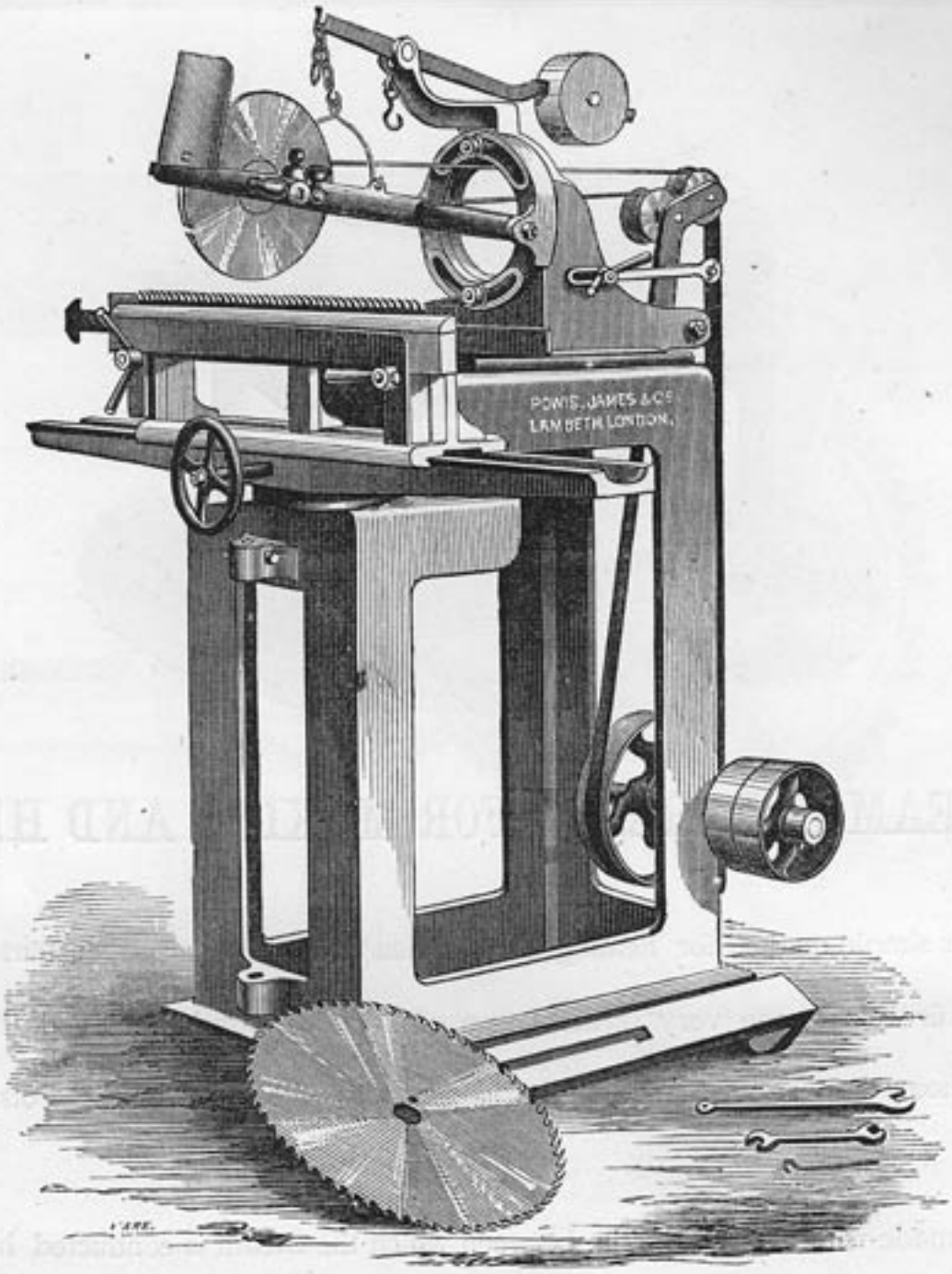
The Apparatus is made with a Double Skin, between which the Steam is conducted by an ordinary gas pipe, so that there is no escape into the shop.

Into the Well at night proper quantities of Glue and cold water are placed (the Cakes need not be broken), very soon after the Steam is turned on in the morning a day's consumption of Glue is ready for use; this is much strengthened by boiling during the time the pots filled up overnight are being emptied.

The three Kettles, 7 inches deep by 7 inches diameter, which we find hold sufficient Glue to keep hot for a long time while in use, and the Well, are of Copper. Each apparatus is provided with a Gun-metal Cock for drawing off the condensed Steam; a hole is drilled and tapped to receive Steam pipe.

Stands, when required, are charged extra.

Larger sizes can be had, where required; but we find that it is preferred to have two or more of the size given above, placed in different parts of the shop.



IMPROVED SAW-SHARPENING MACHINE.

THIS Machine is adapted for Sharpening all kinds of Circular and Frame Saws—used for Sawing either Wood or Stone—by means of an Emery Wheel, and effects an immense saving at a very small outlay. We state confidently that there never has been a more successful Machine introduced, and as soon as its value becomes known every Mill will be provided with one, as it reduces the cost of Sharpening to a mere trifle, and the Temper of the Saws when Sharpened by this Machine is improved and they retain their Cutting Edge a much longer time than they would if Sharpened by Files. It will Gullet, Top, and Bevel the teeth of Saws so perfectly as to effect a total saving in the cost of files. The Emery Wheel is mounted in a Swinging Carriage, which is counterbalanced and can be brought down by hand as required in the Sharpening of Saws. The Carriage can be set at any angle to give the necessary lead to the Saw teeth.

This Machine entirely dispenses with the use of the Fly Press for Gulleting, and allows of the Saws being properly and evenly Gulleted without the defects so commonly caused by the Fly Press.

The framing is cast all in one piece, which gives great stability, and to it is attached the Countershaft necessary to give motion to the Emery Wheel, leaving nothing to be provided to drive the same but a single pulley on any conveniently placed shaft in the Mill, and driving band from such pulley to pulley on Countershaft of Machine.

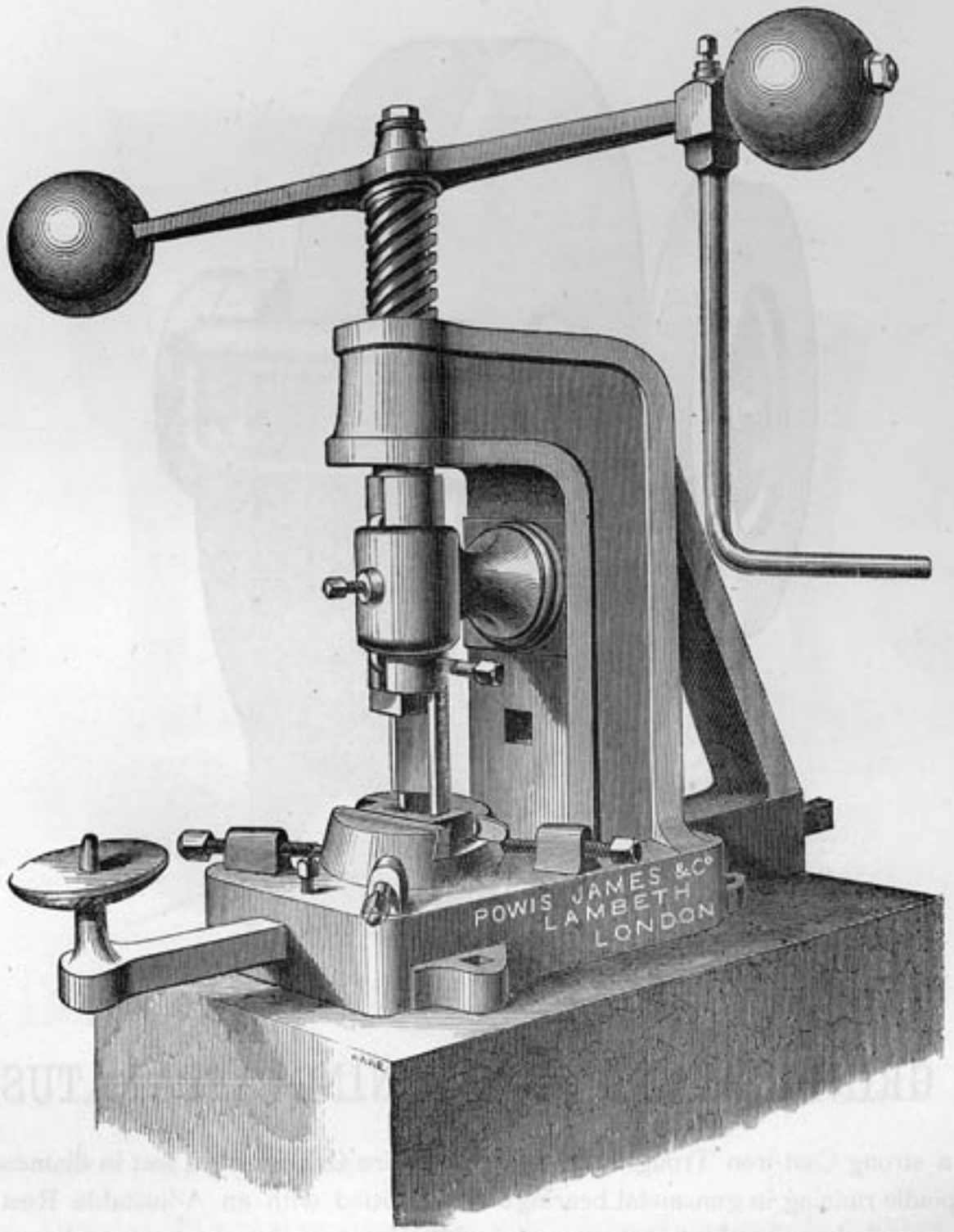
The length of time an Emery Wheel will last, and the smallness of cost in replacing, renders it so trifling an item as not to deserve consideration.

An arrangement, not shown in the drawing, is supplied for regulating the exact depth of Gullet, as well as distance of the top of tooth, so that no irregularities can occur, even where only a lad is employed to sharpen.

The price includes three Emery Wheels, Endless Leather Band, Striking Gear, and Countershaft.

This Machine may always be seen in operation at our Works.

Speed of Countershaft, 360 revolutions per minute. Diameter of Driving Pulley on Countershaft, 8 inches.

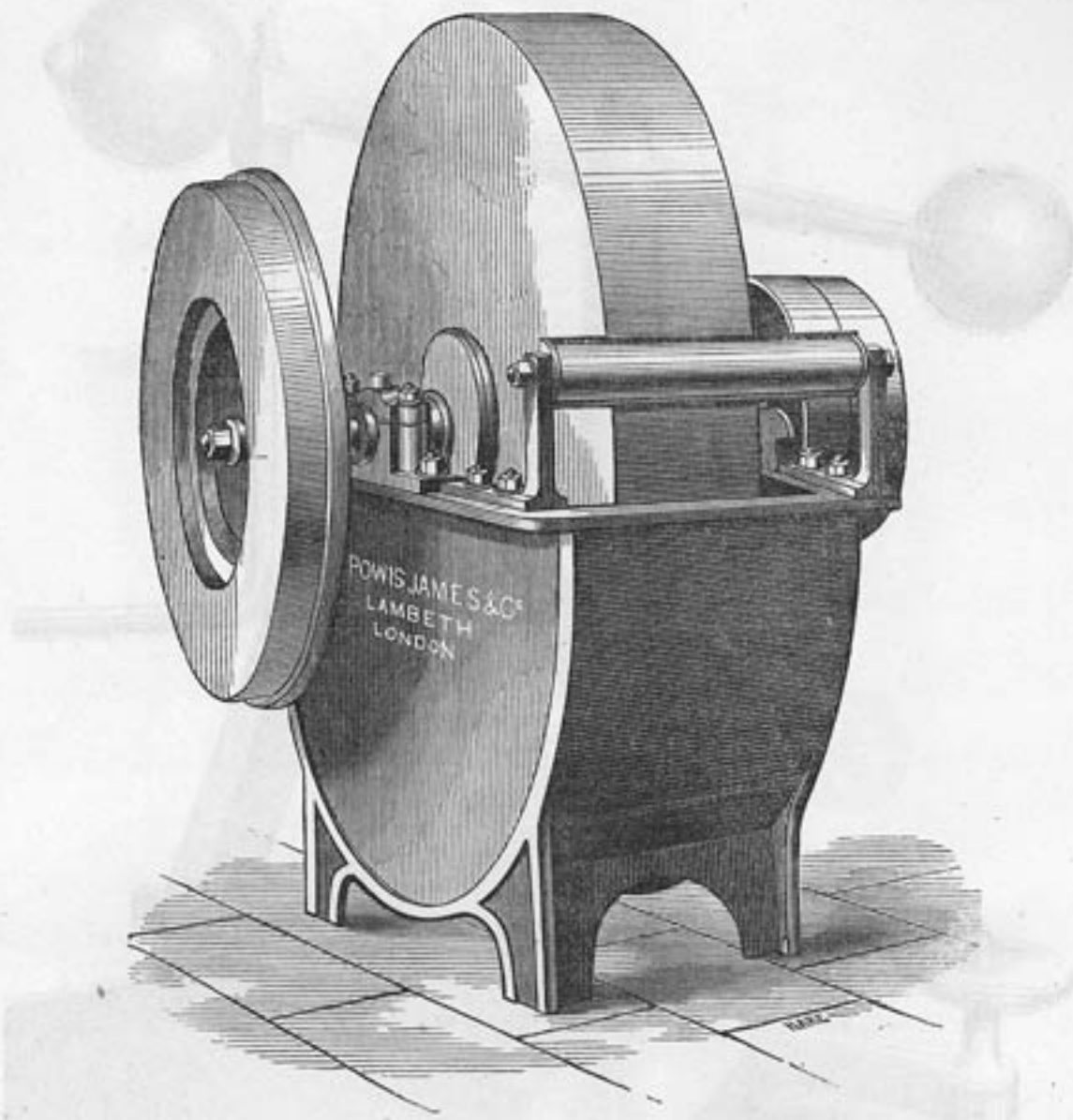


FLY PRESS, FOR PUNCHING AND GULLETING STRAIGHT AND CIRCULAR SAWS.

WHEN it is necessary to pare down saws which have been broken, or to cut new teeth, this will be found the best Punching Machine for the purpose.

A socket is attached to the lower end of screw to receive the punches; a small table is also added, having a pin in the centre to receive a Circular Saw, this is attached to a sliding bar, so as to suit Saws of various diameters, and ensure every tooth being at the same distance from the centre.

The Price includes two Punches and two Dies to suit.



GRINDING AND SHARPENING APPARATUS.

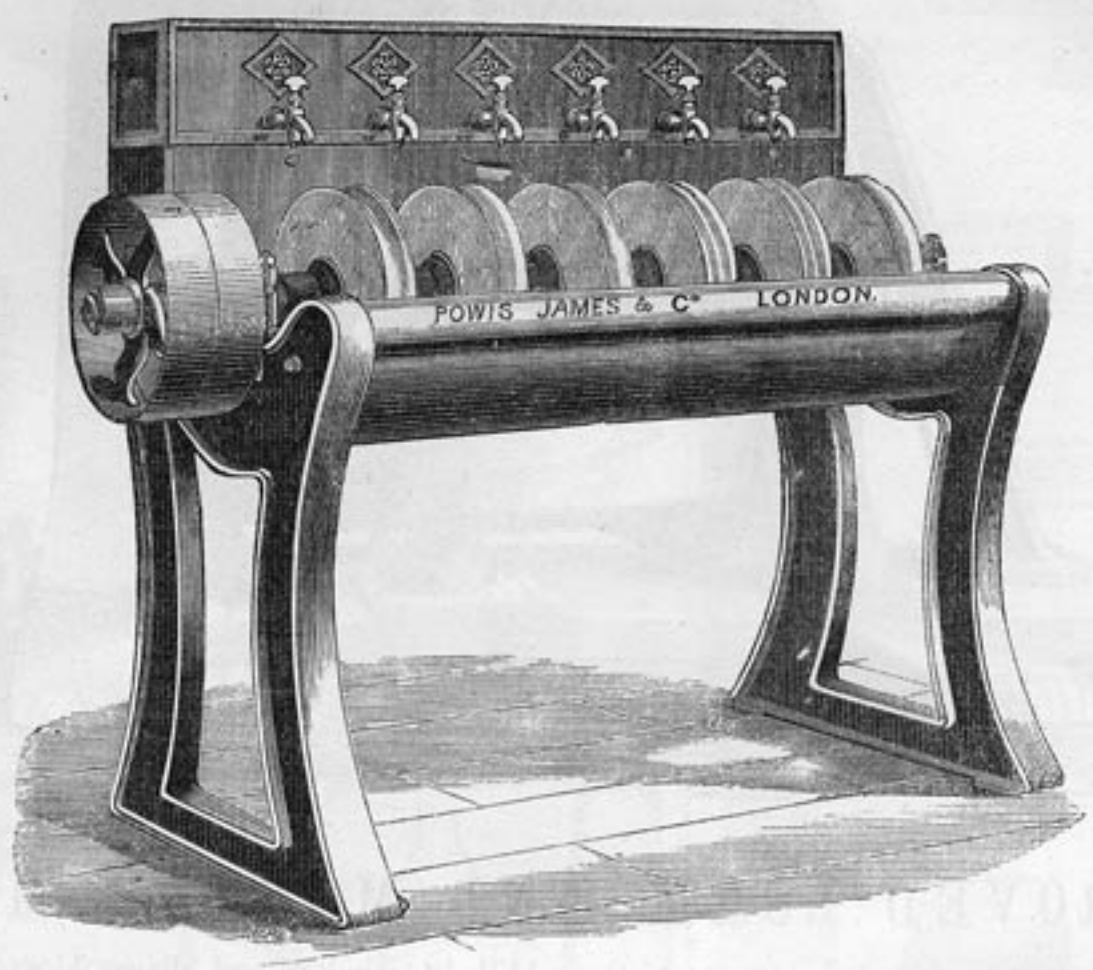
THIS consists of a strong Cast-iron Trough and best Yorkshire Grindstone, 4 feet in diameter by 7½ inches thick, mounted on spindle running in gun-metal bearings. It is fitted with an Adjustable Rest for Plane Irons, &c. On the front of the Spindle is a Cast-iron Disc, mounted with Water of Ayr Stone for Sharpening the Tools after having been ground, or when they may be dull, but not require grinding; this also has an Adjustable Rest for the Irons, although not shown in the drawing. On the back end of Spindle, is a fast and a loose Pulley for Driving.

For the Water of Ayr Stone, it will be found preferable to let the water drip from a Small Pipe as required, rather than have a Trough, as the water in the latter would become charged with grit, and prevent a fine edge being set.

Nothing more than this is required for ordinary Plane and Adze Irons to be kept in perfect order, except a Hand Slip, by which the workman can save taking the Irons out of the Machines when only slightly dull.

This Machine will be found at once, simple, complete, and inexpensive. The Grindstone and Trough may be had without the Water of Ayr Disc.

Speed required.	Average Power.
120 Rev.	10-horse.



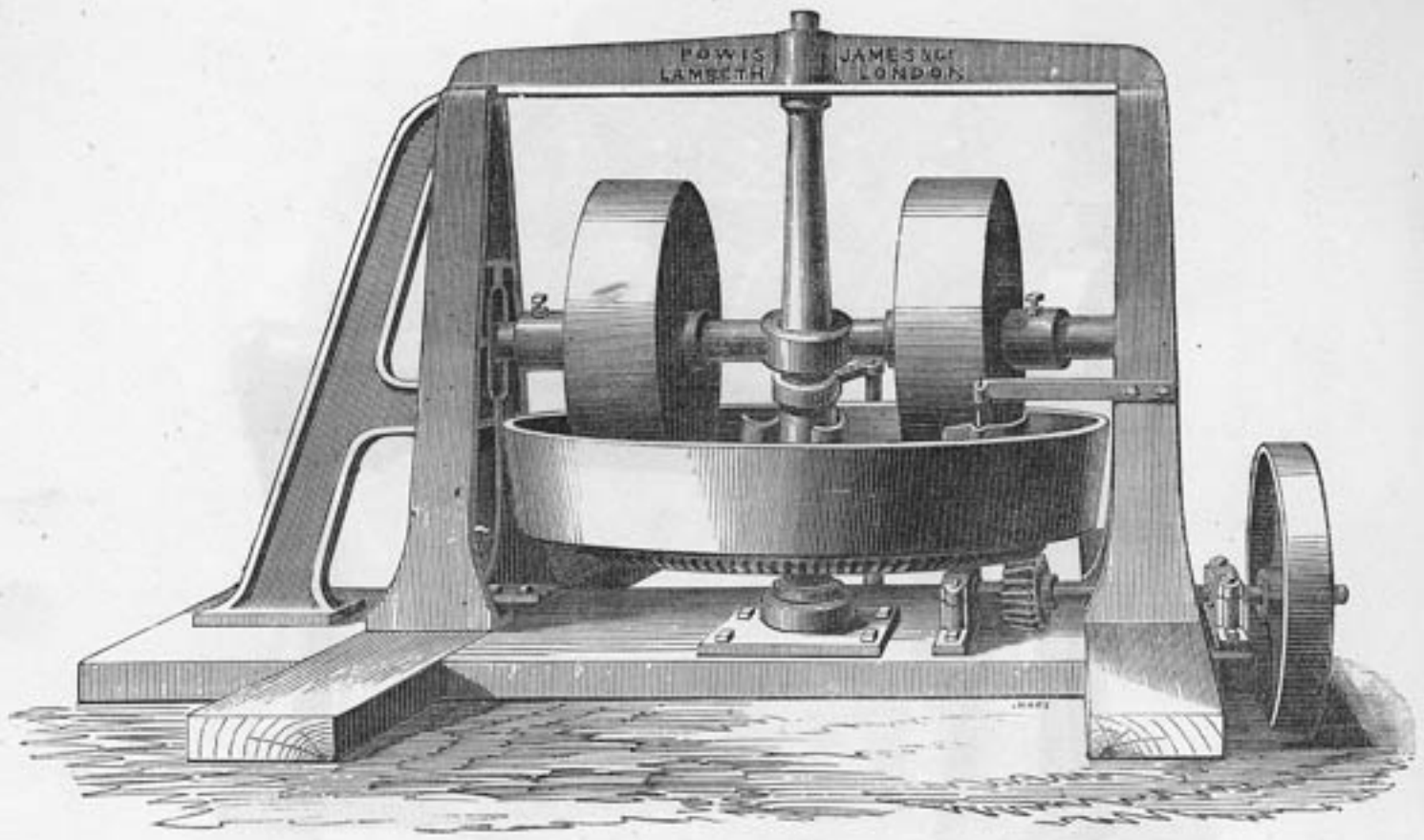
IMPROVED MOULDING IRON GRINDER.

THE saving of time effected by this useful Tool, and its smallness of cost should induce its adoption by every one working any kind of Moulding by machinery.

It consists of a Trough and Cistern, on Standards, with 6 Brass Taps, and six assorted Stones on Spindle, with fast and loose Pulleys and Plummer Blocks.

For use the Stones are turned on the edges to the various shapes required for Grinding the Moulding Irons to a keen edge; the trouble of softening and rehardening necessary when sharpened by files is entirely saved.

Speed.	Average Power required.
200 Rev.	Nominal.



IMPROVED LOAM AND MORTAR MILL.

TO those who have not tested the advantages of these Mills in Grinding and Mixing Mortar, we may say that in addition to the very superior quality of the Mortar made by this means and to the great saving in labour, nearly, and in some cases quite, one half the Lime is saved, and a better Mortar is the result.

The object of a Mortar Mill is to thoroughly pulverise all hard substances, such as Burnt Ballast, Brick Rubbish, and even in some cases Flint Stones are Ground to give extra strength and hardness to the Mortar; the most perfect amalgamation of all the materials takes place at the same time, producing the results stated above. It is necessary to have sufficient weight as well as great hardness in the Rollers.

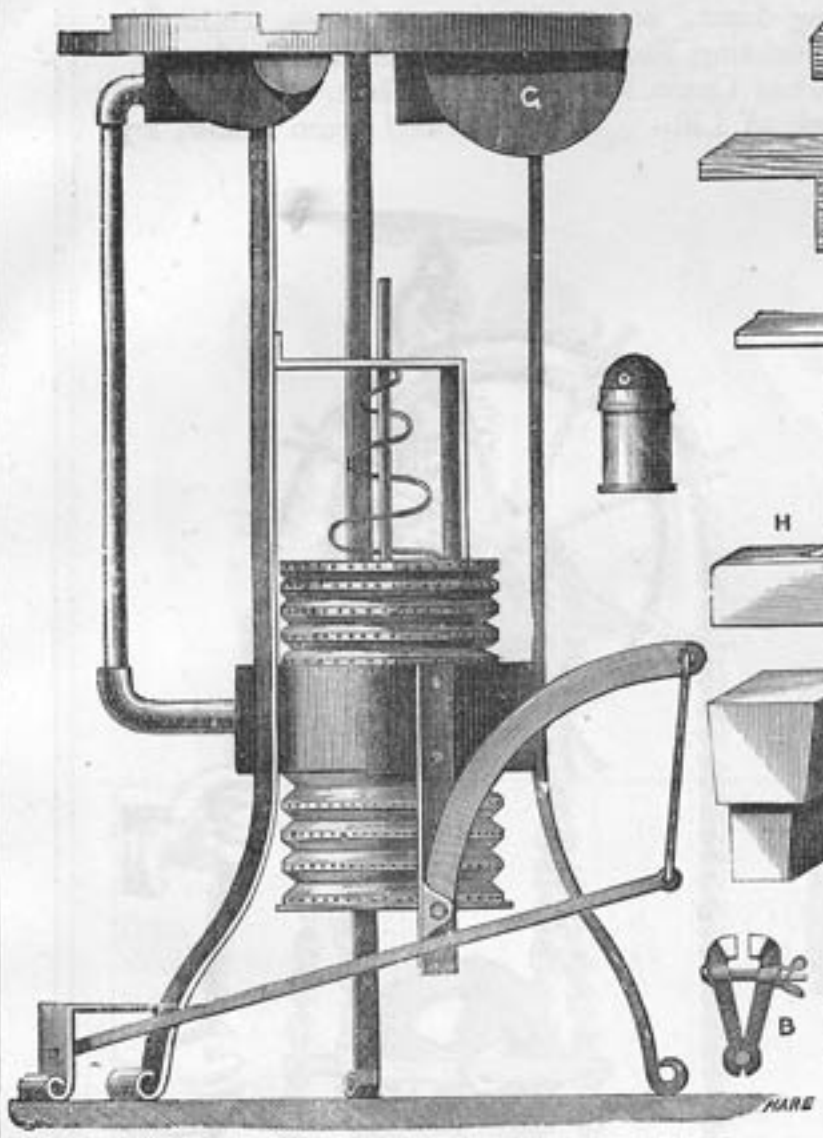
Our Mills are made very heavy, which means that they will last for a long time. The Seven-foot Mill weighs over five tons.

In the Mill shown above these results are attained, and the Pan has a thick false bottom fitted in segments, which may be replaced when worn out at a small cost.

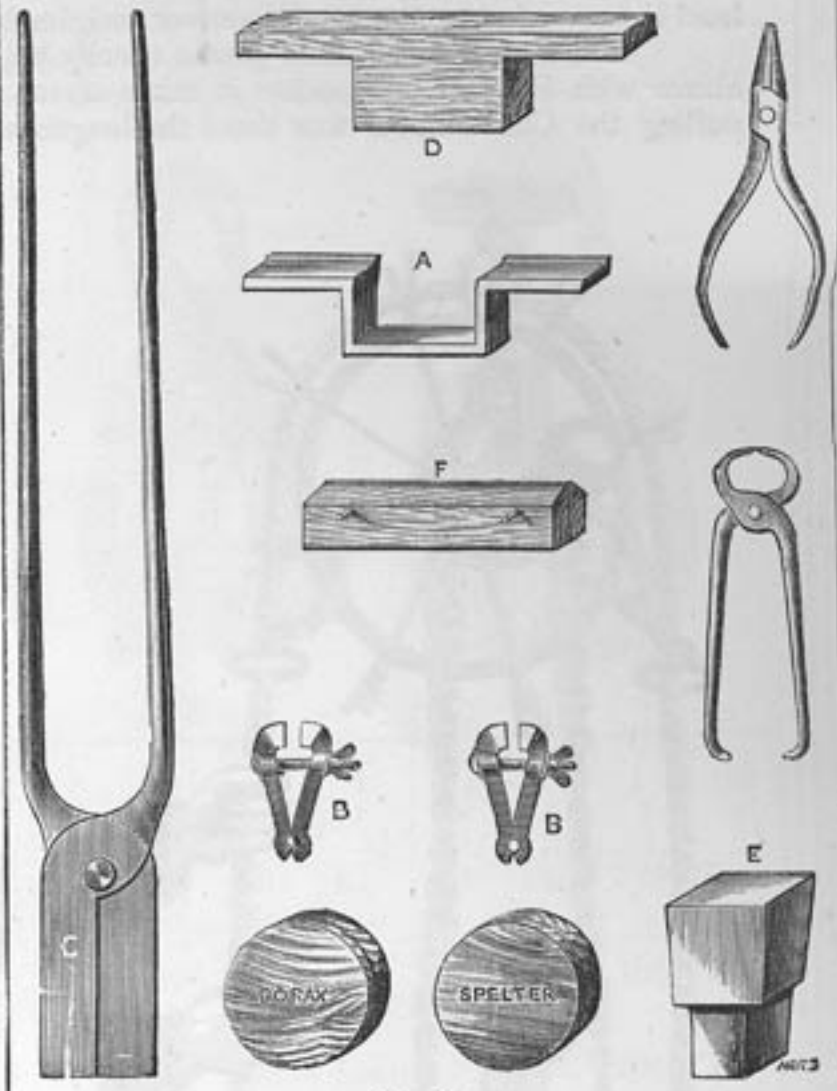
The principle of construction is that most generally approved, having the Pan to drive from the bottom, but may be made to drive from above if required; or the Pan may be made stationary and the Rollers to revolve on a strong Cross Shaft attached to a Vertical Shaft, driven by gearing beneath the Pan.

A strong Wooden Platform is sufficient for fixing, and the Mill may readily be taken to pieces and removed when required, or the whole may be rendered portable by having Wheels placed underneath the Platform; and in some cases a small Vertical Engine is added for driving the Mill direct. The smaller sizes may be made to drive with Horse Gear; but Steam Engines are much more effectual and economical.

Diameter of Pans for Horse Gear	..	..	4 feet, 5 feet, and 6 feet.
Diameter of Pans for Steam Power	..	..	5 feet, 6 feet, 7 feet, 8 feet, 9 feet, and 10 feet.



No. 1.



No. 2.

APPARATUS FOR BRAZING BAND SAWS.

WHEN the accident of a Band Saw Breaking does occur, much more inconvenience is generally occasioned than would be necessary if either of the following simple but complete appliances were at hand. They enable the workman, after very little experience, to Braze his Saws in the most perfect manner, with the loss of only a few minutes each Saw, when several are done at the same heat.

This appliance should, therefore, be found in every establishment where Band Saw Machines are used, its small cost removing any objection that may otherwise exist for its adoption.

The apparatus shown above, marked No. 1, is designed for use where no Forge fire is available.

For cases where there is a Forge fire at hand, the apparatus, marked No. 2, is recommended.

The price includes the complete set of Tools shown, with one Box each of Spelter and Borax.

Full instructions for use are sent with each apparatus.

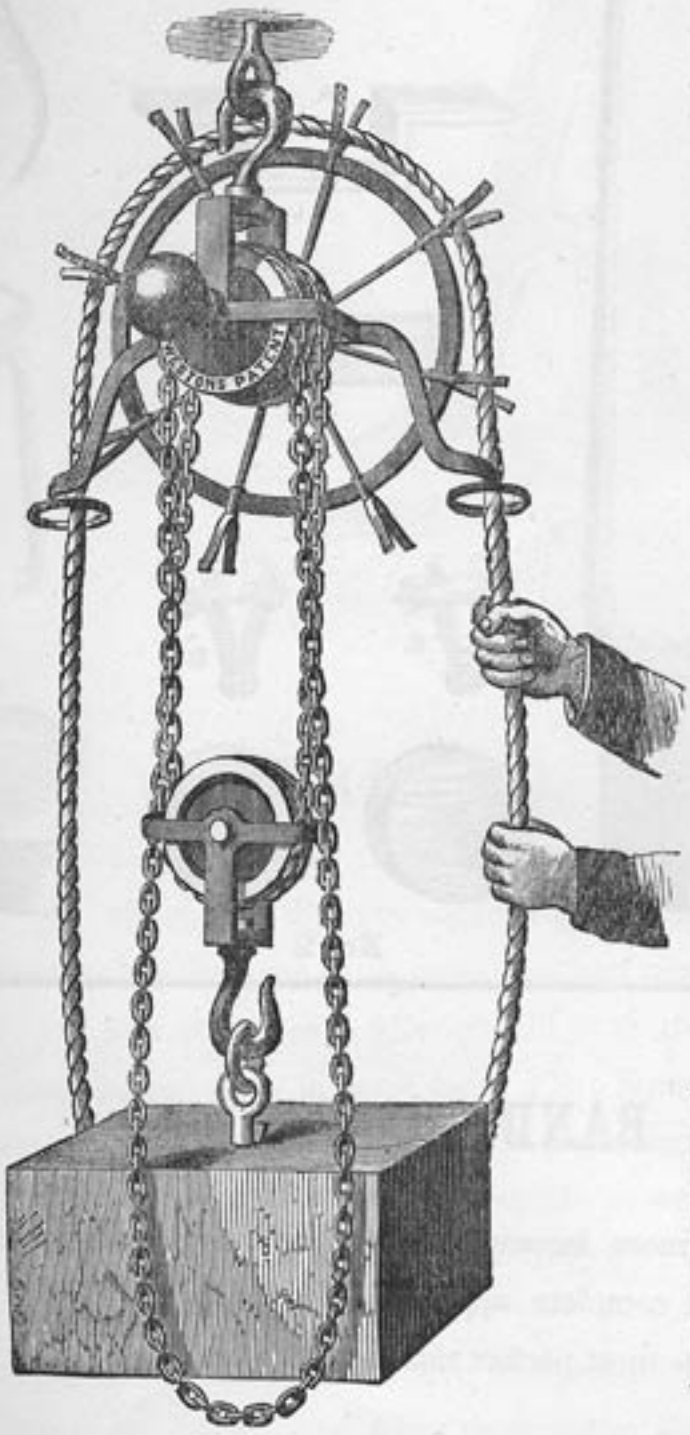
POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.

WESTON'S PATENT DIFFERENTIAL PULLEY BLOCKS.

THE peculiar merit attached to these Pulleys is, that while they are more powerful than ordinary Pulley Blocks, they also possess the novel and invaluable quality of not "running down," under any circumstances, whilst the load is suspended by them. Wherever weights have to be lifted, this Hoisting Tackle will be found invaluable.

In ordering either kind please specify height of Lift, or state what Chain is required. When worked from above with Ratchet or Spocket it takes about three times the length of Lift. When worked from below, by pulling the Chain, about four times the length of Lift is required.



PULLEY WITH SPOCKET WHEEL

Tested to	Price of Blocks per Set.	Bright B. B. Chain per Foot.
2 tons.	80/	10d.
3 ,,	115/	1/1
4 ,,	140/	1/3

Superior Rope, made specially for these Pulley Blocks, Extra.

THIS IS WORKED BY PULLING AT THE CHAINS.

Tested to	Price of Blocks per Set.	Bright B. B. Chain per Foot.
5 cwt.	20/	6d.
10 ,,	30/	6d.
12 ,,	30/	7d.
20 ,,	40/	9d.
30 ,,	55/	10d.
40 ,,	65/	10d.

PULLEY WITH RATCHET.

BY WHICH ONE MAN CAN LIFT THE WEIGHT SPECIFIED.

Tested to	Price of Blocks per Set.	Bright B. B. Chain per Foot.
1 ton	53/	9d.
1½ ,,	65/	10d.
2 ,,	72/6	10d.
3 ,,	107/6	1/1

PULLEY WITH TANGYE'S PATENT GEAR.

Tested to	Price of Blocks per Set.	Bright B. B. Chain per Foot.
4 tons	140/	1/3
5 ,,	200/	1/6
6 ,,	240/	2/4
8 ,,	320/	3/0
10 ,,	400/	3/6

Superior Rope, made specially for these Blocks, Extra.

NOTE.—In sending Blocks for Repairs, or in ordering Parts to repair same, it is necessary to give the number stamped on the Side Strap of Top Frame.

WROUGHT IRON PULLEY BLOCKS,

LONDON PATTERN.

IN this arrangement of Block, each Plate forms a support for the Centre Shaft, besides protecting the Pulley from damage. The Eye, as shown in No. 4, is supplied with the smallest Block of each pair ordered. The measurements are given as at A in No. 1, but the diameter of the Pulley at the bottom of the Groove is one diameter of rope less than at A. The actual width of the Grooves is from $\frac{1}{16}$ to $\frac{1}{8}$ more than List, so that the 16 × 3¼ is really 16 × 3⅜, and so on, to allow for new Rope being larger. They have Turned Shafts, Bright Pulleys, and are bored.

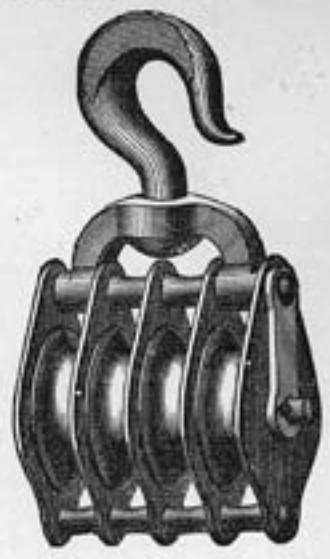
SNATCH
№ 1.


№ 2.


№ 3


№ 4


№ 5.


№ 6.

Diameter of Sheave ...	ins. 2½	ins. 3½	ins. 4	ins. 4¾	ins. 5	ins. 6	ins. 7	ins. 8	ins. 9	ins. 10	ins. 11	ins. 12½	ins. 14	ins. 15	ins. 16
Width of Groove	× ⅜	× ½	×	× ¾	× ⅞	× 1	× 1¼	× 1½	× 1¾	× 2	× 2¼	× 2½	× 2¾	× 3	× 3¼
Price of Snatch Block ...	6/	6/	7/	8/6	11/6	13/6	16/6	21/6	32/	60/	80/	110/	140/	170/	210/
Weight of ditto ... lbs.	1½	3¾	6¼	9¾		16	23	38	48	69	102				
Price of 1 Sheave Block } Pattern No. 2 or 3	4/	4/6	5/9	7/6	10/	11/6	14/	19/	30/	52/6	72/	98/	110/	130/	164/
Weight of ditto ... lbs.	1¼	3⅜	4½	8½	14	15	21	35	44	60					
Price of 2 Sheave Block	5/6	7/	8/6	11/	15/6	17/	24/6	35/6	50/	98/	124/	144/	170/	203/	242/
Weight of ditto ... lbs.	2	5½	9¼	14½	20	26	38	60	79	114					
Price of 3 Sheave Block	7/	8/6	10/6	14/	19/6	21/6	30/6	48/6	70/	127/	157/	190/	222/6	262/	310/
Weight of ditto ... lbs.	3	7¼	11	19	28	36	49	80	107	150					
Price of 4 Sheave Block	8/6	10/	12/6	18/6	25/6	28/6	46/	63/	92/6	157/	190/	222/6	280/	3 52/	400/
Weight of ditto ... lbs.	4	7½	12	24	36	48	67	109	140	192					
Brass Sheave Blocks } per Sheave extra	9d.	1/6	2/	3/	4/6	6/3	7/9	11/6	15/3	21/6					
Blocks will take Chain } diameter ...				3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞

The 10 in. × 2 in. Pulley Blocks and above are made with Rings instead of Hooks.
All parts of these Pulley Blocks being interchangable, duplicate parts can be had by ordering.

Note.—The weights specified above are not guaranteed, but are merely given as near as possible as a guide to purchasers.

GIN BLOCKS OR RUBBISH PULLEYS.

Diameter of Pulley	3½	4¾	6	7	8	9	10 inches
Width of Groove	½	¾	1	1¼	1	1	1 inch
Weight	3¼	6	11	15½	12	14	17 lbs.
Price ... ... each	5/9	6/3	7/	7/9	8/6	9/3	10/
Diameter of Pulley	11	12	14	16	18	20	22 inches
Width of Groove	1	1	1¼	1½	1½	1½	1½ ,,
Weight	19½	23	34	44	50	60	67 lbs.
Price ... ... each	11/	12/	13/	16/6	21/	24/	27/6

The actual width of Groove is from one-sixteenth to one-eighth more than List, to allow for new Rope being larger.

WARRANTED BEST CAST STEEL, MACHINE GROUND CIRCULAR AND GROOVING SAWS.

Diameter—ins.	—	—	14	16	18	20	22	24	26	28	30	32	34
Each	—	—	20/	24/	30/	36/	42/	48/	56/	66/	76/	88/	104/
Diameter—ins.	36	38	40	42	44	46	48	50	52	54	56	58	60
Each	120/	145/	160/	180/	215/	240/	270/	380/	420/	480/	570/	620/	080/
Diameter—ins.	62	64	66	68	70	72	74	76	78	80	82	84	
Each	700/	860/	980/	1100/	1250/	1400/	1600/	1820/	2100/	2220/	2340/	2460/	

DISCOUNT PER CENT.

Ground Off or Swaged Circular Saws as per list above, net.

GROOVING SAWS.

12 inches Diameter.

Thickness—ins.	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Each	20/	24/	28/	32/	36/	40/	44/	47/	50/	55/	60/	65/

Price of other sizes on application.

When ordering Circular Saws, please state—

Diameter of holes for Spindle and Pin.

Distance from centre to centre of holes.

Shape of Tooth and space between.

Thickness per Birmingham Wire Gauge.

BEST CAST STEEL MILL SAW WEBS FOR CUTTING TIMBER AND DEALS.

15TH GAUGE.			15TH GAUGE.			15TH GAUGE, FULL.			14TH GAUGE.			14TH GAUGE.		
Length.	Width.	Per Doz.	Length.	Width.	Per Doz.	Length.	Width.	Per Doz.	Length.	Width.	Per Doz.	Length.	Width.	Per Doz.
3 ft.	3 in.	78/	3 ft. 6 in.	3½ in.	102/	4 ft.	4 in.	132/	4 ft. 6 in.	4 in.	144/	5 ft.	4½ in.	192/
,,	3½ ,,	87/	,,	4 ,,	114/	,,	4½ ,,	138/	,,	4½ ,,	150/	,,	5 ,,	204/
,,	4 ,,	96/	,,	4½ ,,	120/	,,	5 ,,	144/	,,	5 ,,	156/	,,	5½ ,,	213/
,,	4½ ,,	102/	,,	5 ,,	126/	,,	5½ ,,	157/	,,	5½ ,,	180/	,,	6 ,,	222/
,,	5 ,,	108/	,,	5½ ,,	134/	,,	6 ,,	169/	,,	6 ,,	190/	,,	6½ ,,	234/

14TH GAUGE.			14TH GAUGE, FULL.			13TH GAUGE.			13TH GAUGE.		
Length.	Width.	Per Doz.	Length.	Width.	Per Doz.	Length.	Width.	Per Doz.	Length.	Width.	Per Doz.
5 ft. 6 in.	5 in.	228/	6 ft.	5 in.	240/	6 ft. 6 in.	5 in.	284/	7 ft.	5 in.	290/
,,	5½ ,,	237/	,,	5½ ,,	252/	,,	5½ ,,	292/	,,	5½ ,,	298/
,,	6 ,,	246/	,,	6 ,,	264/	,,	6 ,,	300/	,,	6 ,,	322/
,,	6½ ,,	258/	,,	6½ ,,	276/	,,	6½ ,,	309/	,,	6½ ,,	332/
,,	7 ,,	264/	,,	7 ,,	288/	,,	7 ,,	318/	,,	7 ,,	342/
,,	7½ ,,	270/	,,	7½ ,,	300/	,,	7½ ,,	336/	,,	7½ ,,	354/
,,	8 ,,	276/	,,	8 ,,	312/	,,	8 ,,	354/	,,	8 ,,	372/

SAWS FITTED WITH TOP AND BOTTOM BUCKLES AND STEEL KEYS TO SUIT OUR TIMBER AND DEAL FRAMES.

Deal Frames.		Timber Frames.	
No. 1. 11 inch	12/ each.	No. 1. 12 inch	13/ each.
,, 2. 14 ,, ...	16/ ,,	,, 2. 18 ,, ...	21/ ,,
,, 3. 18 ,, ...	21/ ,,	,, 3. 24 ,, ...	27/ ,,
,, 4. 24 ,, ...	27/ ,,	,, 4. 30 ,, ...	32/ ,,
		,, 5. 36 ,, ...	37/ ,,
		,, 6. 42 ,, ...	42/ ,,
		,, 7. 48 ,, ...	48/ ,,

PRICE LIST OF

THE BEST FRENCH BAND SAW BLADES.

THE superiority of French Band Saw Blades to any others has long been known. As Patentees of Improved Band Saw Machines we have always been careful to send out and recommend no others: this has necessitated our importing these Blades in large quantities, and has enabled us to make specially favourable terms with the Manufacturers, by which we can guarantee every Saw not only to be made of best Steel, but tempered to our own Standard.

	LENGTH IN FEET.																	
WIDTH IN INCHES.	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
$\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{5}{16}$	7/3	7/9	8/3	9/	9/9	10/6	11/3	12/	12/6	13/	13/6	14/	14/9	15/6	16/3	17/	17/9	18/6
$\frac{3}{8}$	7/9	8/3	9/	9/9	10/6	11/3	12/	12/6	13/	13/6	14/3	15/	15/9	16/6	17/3	18/	18/9	19/6
$\frac{1}{2}$	8/6	9/	9/9	10/6	11/3	12/	12/9	13/3	14/	14/6	15/3	16/	16/9	17/6	18/3	19/	19/9	20/6
$\frac{5}{8}$	9/	9/9	10/6	11/3	12/	12/9	13/6	14/3	15/2	15/9	16/3	17/	17/9	18/6	19/3	20/	20/9	21/6
$\frac{3}{4}$	9/9	10/6	11/3	12/	12/9	13/6	14/3	15/	15/9	16/6	17/3	18/	18/9	19/6	20/3	21/	21/9	22/6
$\frac{7}{8}$	10/6	11/3	12/	12/9	13/6	14/3	15/	15/9	16/6	17/3	18/	19/	19/9	20/6	21/3	22/	23/	24/
1	11/3	12/	12/9	13/6	14/3	15/	15/9	16/6	17/3	18/	19/	20/	21/	22/	23/	24	25/	26/
$1\frac{1}{4}$	12/6	13/6	14/6	15/6	16/6	17/6	18/6	19/6	20/6	21/6	22/6	23/6	24/6	25/6	26/6	27/6	28/6	29/6
$1\frac{1}{2}$	14/9	15/9	16/9	18/	19/3	20/6	21/6	22/6	23/9	25/	26/	27/	28/3	29/6	30/9	32/	33/3	34/6

2 inches wide, 1/6 per foot; $2\frac{1}{2}$ inches wide, 1/$10\frac{1}{2}$ per foot; 3 inches wide, 2/3 per foot; 4 inches wide, 3/ per foot; 5 inches wide, 3/9 per foot; 6 inches wide, 4/6 per foot. Any length up to 50 feet.

Set, Sharpened, and Joined, ready for Work.

Knife-edge Blades for Cloth, Paper, &c.

BEST FRENCH BAND SAW BLADES FOR SAWING IRON AND OTHER METALS.

BRAZED AND SHARPENED READY FOR WORK.

Width in Inches.	Length in Feet.															
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
⅜	26/3	28/	29/9	31/6	33/3	35/	36/9	38/6	40/3	42/	43/9	45/6	47/3	49/	50/9	52/6
¾	30/	32/	34/	36/	38/	40/	42/	44/	46/	48/	50/	52/	54/	56/	58/	60/
⅞	33/9	36/	38/3	40/6	42/9	45/	47/3	49/6	51/9	54/	56/3	58/6	60/9	63/	65/3	67/6

PRICE LIST OF BEST REFINED CAST STEEL SAW FILES.

Inches.	Mill Saw and Cut Single.		Topping and Cut Single.			3 Square Taper.	Gulleting.
	With one or two square edges.	With two round edges.	Left at point and safe edges.	With one round or square edges.	With two round edges.	2nd cut single.	2nd cut single.
	Per Dozen. £ s. d.	Per Dozen. £ s. d.	Per Dozen. £ s. d.	Per Dozen. £ s. d.	Per Dozen. £ s. d.	Per Dozen. £ s. d.	Per Dozen. £ s. d.
1 to 3½	.....	.....	.....	.....	.....	0 4 0	0 4 9
4	0 5 6	0 6 0	0 5 6	0 6 0	0 7 6	0 4 6	0 5 3
5	0 6 9	0 7 6	0 6 9	0 7 6	0 8 9	0 5 6	0 6 6
6	0 8 3	0 8 9	0 8 3	0 8 9	0 10 9	0 7 6	0 8 6
7	0 9 9	0 10 9	0 9 9	0 10 9	0 12 9	0 9 6	0 10 6
8	0 12 0	0 12 9	0 12 0	0 12 9	0 15 3	0 12 0	0 13 6
9	0 13 6	0 15 3	0 13 6	0 15 3	0 18 6	0 15 6	0 16 0
10	0 17 0	0 18 6	0 17 0	0 18 6	1 2 0	0 19 6	1 0 0
11	1 0 0	1 2 0	1 0 0	1 2 0	1 5 6	1 4 0	1 5 0
12	1 4 0	1 5 6	1 4 0	1 5 6	1 10 0	1 9 0	1 10 0
13	1 7 0	1 10 0	1 7 0	1 10 0	1 16 0	1 14 0	1 16 0
14	1 13 0	1 16 0	1 13 0	1 16 0	2 3 0	2 0 0	2 3 0

Discount per Cent.

A LARGE STOCK ALWAYS ON HAND.

PRICE LIST OF
BEST STRETCHED LEATHER BELTING.

SINGLE BAND.			DOUBLE BAND.		
	s.	d.		s.	d.
1-inch, per foot ...	0	4½	3-inch, per foot...	2	10
1½ " " ..	0	7	4 " " ...	3	10
2 " " ...	0	9	5 " " ...	4	8
2½ " " ...	1	1	6 " " ...	5	7
3 " " ...	1	4	7 " " ...	6	9
4 " " ...	1	11			
5-inch, per foot ...	2	5	8-inch, per foot...	8	0
6 " " ...	3	0	9 " " ...	9	2
7 " " ...	3	7	10 " " ...	10	4
8 " " ...	4	3	11 " " ...	11	6
9 " " ...	4	10	12 " " ...	12	8
10 " " ...	5	5			

FOR working in damp or exposed situations, such as driving Mortar Mills, Stone Saws, or Brick-making Machinery; Bands may be Waterproofed at a cost of about 5 per cent.

For driving Fast-running Machinery, such as Moulding, Tenoning, Grooving Machines, &c., it is of great consequence that the Driving Belts should be perfectly even in thickness throughout their entire length; and great care should be taken to make the joints as thin as possible. Every time that a joint passes over a pulley, it, as it were, strikes it a blow; the result being, that the Bearings wear out much sooner than if the Belt is perfectly even from end to end. To overcome this difficulty, we strongly recommend the following.

PATENT BELT FASTENERS.

WE have carefully tested these Fasteners with all other methods of joining Leather or Rubber Beltings and unhesitatingly recommend these as superior in every respect, and much cheaper in cost. They are not only stronger than Lacing but have the advantage of Joining a Belt perfectly Flat, so that it will run evenly over Pulleys, not causing half the amount of Wear and Friction produced by Lacing—this alone would recommend them if the cost were double.

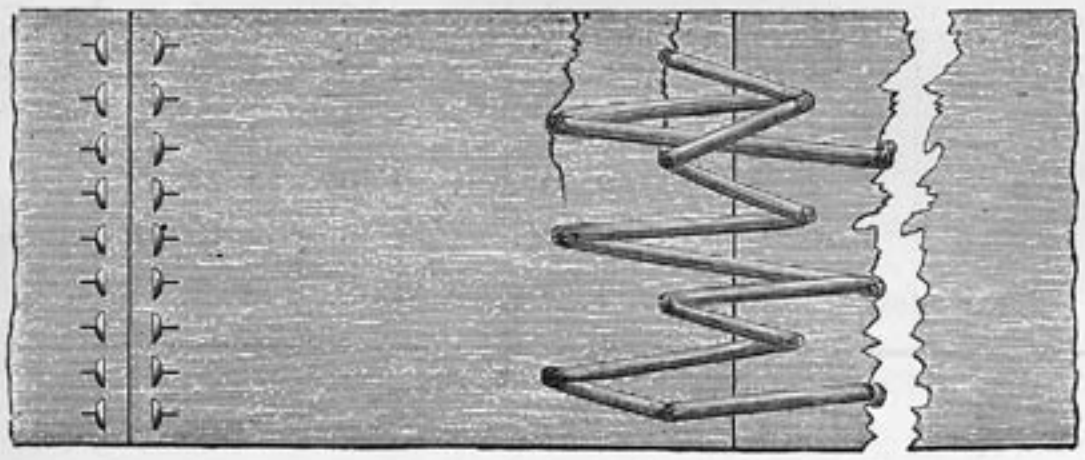
Not one-third of the time is occupied to Join a Belt by this means as by any other, and when the Belt has worn out, the Fasteners may be saved and used again.

The Drawing exhibits a piece of Belt tested in a Belt Stretcher, with the effect produced—the end Joined by the Patent Fasteners remains sound, while at the Laced end the Belt has completely broken across.

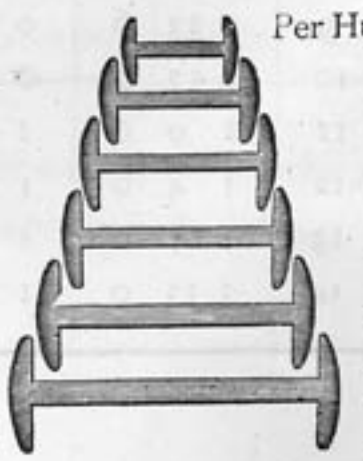
No. 0, the largest size, is best suited for Rubber or Double Leather Belts.

Nos. 1 and 2 for average Single Belts. The other sizes for lighter Belts.

PRICE PER HUNDRED, PACKED IN BOXES WITH PRINTED INSTRUCTIONS FOR USE.



No. 5.	Per Hundred	3/0
" 4.	"	3/9
" 3.	"	4/0
" 2.	"	6/0
" 1.	"	8/0
" 0.	"	10/0
" 00.	"	12/0



Cutters for Rubber Belts ... 6/0. Cutters for Leather Belts ... 4/0. Awls ... 0/10.

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,
VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.

PRICE LIST OF EMERY WHEELS, BORING AND MORTISING AUGERS AND CHISELS.

EMERY WHEELS.

12 inch diameter, with 1-inch hole for Spindle.

Thickness.	Price Square Edge.	Price Bevelled Edge.	Thickness.	Price Square Edge.	Price Bevelled Edge.
$\frac{3}{16}$ in.	4/6	...	$\frac{5}{8}$ in.	12/6	17/
$\frac{1}{4}$,,	5/6	7/6	$\frac{3}{4}$,,	15/	...
$\frac{3}{8}$,,	7/6	10/	$\frac{7}{8}$,,	17/6	...
$\frac{1}{2}$,,	10/	14/	1 ,,	20/	...

PATENT AMERICAN SCREW AUGERS,

WITH SHANKS TURNED TO GAUGE OF OUR MORTISING MACHINES.

Up to $\frac{1}{2}$ in.	$\frac{5}{8}$ to 1 in.	$1\frac{1}{8}$ to $1\frac{1}{2}$ in.	$1\frac{5}{8}$ to 2 in.	$2\frac{1}{8}$ to $2\frac{1}{2}$ in.	$2\frac{5}{8}$ to 3 in.
4/	5/	7/6	10/	16/	23/ each.

IMPROVED MORTISING AUGERS,

WITH TURNED SHANKS.

$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
6/	7/	8/	9/	10/	11/	12/	13/	15/	18/	21/	25/

BEST CAST STEEL MORTISE CHISELS.

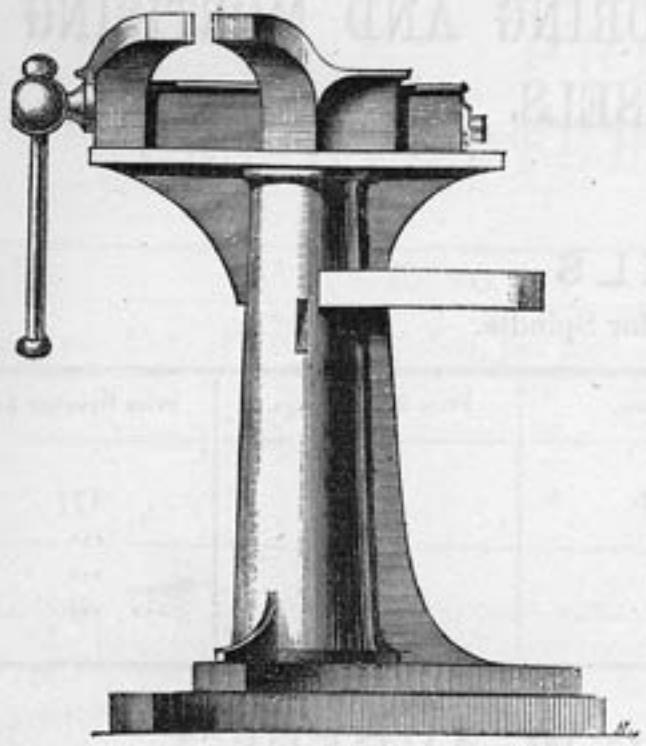
WITH TURNED SHANKS.

Up to $\frac{1}{2}$ inch.	$\frac{9}{16}$ in. to 1 in.	$1\frac{1}{8}$ in. to $1\frac{1}{2}$ in.	$1\frac{5}{8}$ in. to 2 in.	$2\frac{1}{8}$ in. to 3 in.
5/	6/	8/	10/	14/ each.

Best Cast Steel Moulding Irons, 2s. per inch of width.
Tonguing and Grooving Irons, 12s. per pair.
Lip Irons for Planing Disc, 30s. per set of three, with backs.
,, ,, 20s. ,, without backs.
Plane and Adze Irons 1s. 4d. per inch run, backs 1s.
Grindstones, best Barnsley, 4 feet × $7\frac{1}{2}$ inches, ... each 55s.
Best Bilston Stones, for Moulding Iron Grinder, 14 inch × $2\frac{1}{2}$ inch ... ... ,, 4s.
,, ,, 14 inch × 2 inch and under ,, 5s.
Best selected Water of Ayr Stone, in Segments 1/4 per lb., whole 2s. per lb.
Best Selected Water of Ayr Stone, in Segments mounted on Iron Plate, Stone turned up true. Plate turned, bored, and keyway cut, and Steel key fitted. 25 in. diameter £10
Do. do. if solid Ring of Water of Ayr Stone ... £12

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,

VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.



PORTABLE VICES,

WITH PARALLEL JAWS.

Fitted in the best manner with Steel Jaws, Planed Surfaces, &c., and Table for Tools.

Height about 3 feet.

5 in.	6 in.	7 in. Jaws.
120/	150/	180/ each.

PRICE LIST OF SUPERIOR WROUGHT IRON BRIGHT TURNED MILL SHAFTING, PER FOOT RUN.

Inches in Diameter.	1½	1¾	2	2¼	2½	2¾	3	3½	4
Price.	3/6	4/6	5/6	6/6	7/6	8/9	10/-	14/-	18/-

BRIGHT BOX COUPLINGS.

Up to 3 inch, 50/- per pair.

BEST BRIGHT FLANGED COUPLINGS,

With Bolts, Nuts, and Steel Keys fitted, up to 2 inch, 60/-; 3 inch, 80/-; 4 inch, 100/- per pair.

BRIGHT LOOSE COLLARS AND SET SCREWS.

Each up to 2½ inch, 7/6; 3½ inch, 10/; 4 inch, 15/ each.

PLUMMER BLOCKS WITH BEST GUN METAL BEARINGS,

20/- per inch up to 4 inches, above that size special prices.

BOURDON'S PRINCIPLE STEAM GAUGES.

In Polished Brass Cases, 4 inch, 35/-; 5 inch, 45/-; 7 inch, 60/-; Syphons extra, 1/6 each.

POLISHED BRASS SKYLIGHT NEEDLE LUBRICATORS.

	0	1	2	3	4	5	6	7	8
Inches in Diameter.	½	⅝	¾	⅞	1	1¼	1½	1¾	2
Price.	1/6	1/9	2/-	2/3	2/6	3/-	3/6	4/-	5/-

POWIS, JAMES, WESTERN & CO., Engineers, Ironfounders, & Wood-working Machinists,
VICTORIA WORKS, BELVEDERE ROAD, LAMBETH, LONDON, S.E.

PRICE LIST OF DRIVING PULLEYS,

CAST FROM IRON PATTERNS TURNED INSIDE AND OUTSIDE.

Diameter.	Width in Inches.				
	6	8	10	12	14
inches	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
8	0 18 0	1 4 0	1 9 0	1 12 0	...
9	0 19 6	1 5 6	1 10 4	1 13 4	...
10	1 1 0	1 7 0	1 11 8	1 14 8	...
11	1 2 6	1 8 6	1 13 0	1 16 0	...
12	1 4 0	1 10 0	1 14 6	1 17 6	...
14	1 7 9	1 14 8	2 0 0	2 3 6	...
16	1 11 6	1 19 4	2 5 6	2 9 6	...
18	1 15 3	2 4 0	2 11 0	2 15 9	...
20	1 19 0	2 8 8	2 16 6	3 1 9	...
22	2 2 9	2 13 4	3 2 0	3 7 9	...
24	2 6 6	2 18 0	3 7 6	3 14 0	...
26	2 11 2	3 3 4	3 13 9	4 1 8	...
28	2 15 10	3 8 8	4 0 0	4 9 4	...
30	3 0 6	3 14 0	4 6 3	4 17 0	...
32	3 5 2	3 19 4	4 12 6	5 4 8	...
34	3 9 10	4 4 8	4 18 9	5 12 4	...
36	3 14 6	4 10 0	5 5 0	6 0 0	...
38	4 0 0	4 16 0	5 11 8	6 6 8	...
40	4 5 9	5 2 0	5 18 4	6 13 4	...
42	4 11 6	5 7 6	6 5 0	7 0 0	...
48	...	...	7 10 0	8 10 0	10 0 0
54	...	...	8 10 0	9 10 0	11 0 0
60	...	...	10 0 0	11 10 0	13 0 0
66	...	...	13 0 0	14 0 0	15 10 0
72	11 0 0	...	...	16 0 0	18 0 0
78	...	...	...	18 0 0	20 0 0
84	...	...	...	22 0 0	25 0 0

Bored, Turned Flat or Round on Face, Balanced, Keyway Cut and Steel Key Fitted.

EXTRA FOR PULLEYS IN HALVES.

Up to 24 inches diameter, 10/ each; up to 36 inches, 14/ each; up to 48 inches, 22/ each; up to 60 inches, 30/ each; Above, 50/ each.

LIST OF ADDITIONAL MACHINES

NOT DESCRIBED IN THIS CATALOGUE, PARTICULARS OF WHICH WILL BE SENT ON APPLICATION.

Band Saw Machine, with Self-acting Canting Table.

Band Saw Machine, for cutting Bent timbers for Ship-building.

Cranes, Hand Power.

Deal Frames, Coupled.

Deal Frames, Equilibrium.

Felloe Planing and Thicknessing Machine.

Grooving Machine, for Furniture Makers.

Hydraulic Wheel Press, for Wagon Builders.

Lathes, to turn Taper.

Lathes, for Trenails.

Lath Rending Machine.

Match and Pill Box Making Machine.

Moulding Machine, for Wave Mouldings.

Planing and Trying-up Machine, 36 in. wide.

Saw Benches, Large Pendulum Cross-cut.

Saw Benches, Overhead Pendulum Cross-cut.

Saw Frame, for Hard Wood Samples.

Saw Frame, for Ivory Cutting.

Splint Cutting Machine.

Scale Board Machine.

Sleeper Adzing and Boring Machines.

Sole Plate Machine.

Tenoning Machine, Double Ended, for Single and Double Tenons.

Tenoning Machines, for Double Tenons and Cross-cutting-combined.

Trenail Turning Lathe.

Trenail Boring Machine.

Felloe Planing and Thicknessing Machine.

Tire Bending Machine.

Tire Plate and Water Tank.

Wheel Stock Turning Lathe.

Turning Lathe, for Stone Columns.

Slate Sawing Machine.

Slate Planing Machine.

Slate Guillotine.

Ships' Blocks Making Machinery.

Cask Making Machinery.

Wood Pulp Making Machinery.

ENGINEERS' MACHINE TOOLS.

Lathes, Slide and Screw-cutting.

Face Lathes.

Wheel Lathes.

Planing Machines.

Shaping Machines.

Slotting Machines.

Screwing Machines.

Drilling Machines.

Boring Machines.