

MERCANTILE HOME BANK & TRUST CO.

1119 WALNUT STREET
KANSAS CITY, MISSOURI
S. M. WOODSON
PRESIDENT

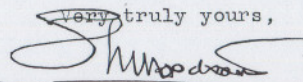
November
Thirteenth
1935

TO WHOM IT MAY CONCERN:

The undersigned has every confidence in the Belsaw Machinery Company, of this city.

They are extensive manufacturers of small portable sawmills, which we understand have been most successful.

We are personally acquainted with Mr. Stanley Field, in charge of the active management of the business, and know him to be a man of honor and integrity.

Very truly yours,


SMW:LM President



HOW TO MAKE LUMBER

A GUIDE BOOK OF EQUIPMENT AND METHODS FOR PROFITABLE SMALL PRODUCTION OF LUMBER PRODUCTS



FIRST BELSAW
STILL IN USE

BELSAW MACHINERY CO., KANSAS CITY, MO. U.S.A.

MODEL 18X36 DUPLEX BELSAW

(Base not included in regular equipment)

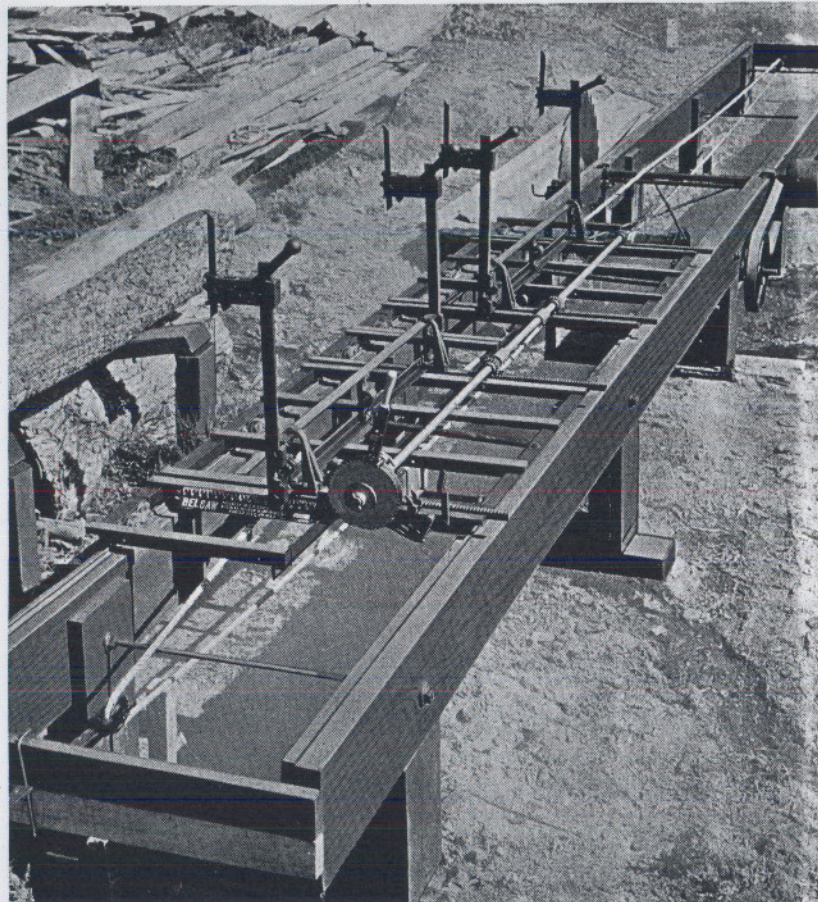


Fig. 1

This photograph shows the valuable "unit system" of the Belsaw, the long log carriage consisting of regular single-unit carriage coupled with Duplex trailer unit.

With an old model of the outfit shown here, a Washington customer reports consistent production rate of five thousand board feet of one-inch lumber per day, from logs averaging 24" diameter, 16 and 18 ft. long.

The boards showing on ground behind saw are 1" thick by 14" wide, and were sawed on this mill, using a 40" saw. Note also the power feed drive from mandrel.

For producing both lumber and shingles, front carriage is equipped with shingle gear as shown in Fig. 9. For maximum shingle production both carriages may be equipped with shingle feature, without affecting lumber sawing.

INTRODUCTION

TIMBER UTILIZATION is most important to the farmer—who is both the largest aggregate owner of timber and the largest consumer of lumber. While he has to pay high prices for products made from other people's trees he seldom receives proportionate returns from his own timber.

THIS BOOK TELLS how the farmer can easily obtain the full value of his trees by making them into *all forms* of lumber products. It describes sawmill and wood-working equipment costing far less than other types and yet far more efficient for its purposes. It describes the operation of this equipment, explaining each stage of production from the standing tree to numerous profitable easily marketed products.

THE FARMER is essentially a *small producer*. This means that ordinary sawmills do not meet his needs. They are built for *volume production* and can not be made to pay except on sizable runs from large trees. But farm woodlots are small, with small trees, and farmers prefer to operate a mill part time. Therefore, they require *maximum utilization at lowest cost*, so a high rate of returns may assure maximum profits whether production is large or small.

THE BELSAW EQUIPMENT described in this book is built especially for profitable small production; its chief advantages over other types may be briefly summarized as follows:

1. Its cost averages less than one fourth that of other types, and is less than the price of a bill of lumber for a small building. In fact, the saving on material for a single building usually more than pays for it. Hundreds of owners report clearing more than its cost within a month.
2. The operating expense is much less than that of other mills. Many operators power with old auto engines, and report fuel cost of less than 75c per thousand board feet sawed, less than \$2.25 on an average day's run of 3M feet of lumber, worth conservatively \$75. And no crew of helpers is needed. A Dakota man with only one arm has run his Belsaw for several years without a single helper.
3. It is an *all-purpose* sawmill. Other mills are limited to coarse-sawed products,—no matter how great the demand for shingles and other profitable fine-sawed products. But the Belsaw not only makes excellent dimension lumber; its shingles are equal to any on the market; it is a high production lath mill, one owner reporting making \$100 worth in one day; and many Belsaw users earn their living from such products as mining timbers, boxes and cases, and numerous other small dimension products.
4. The Belsaw is truly portable. Other mills have separate foundations for trackways and mandrel husk and a pit for the saw. Moving such mills takes time and expense. But the Belsaw is a self-contained unit and is so portable that users often move it to the trees instead of hauling logs to it.

IT IS AN ECONOMIC CRIME to sacrifice your trees. They took many years to produce; don't let them go for less than they are really worth. In the form of cordwood, posts, hewed ties, and other inferior products you are lucky to average as much as \$2 per thousand (M) board feet. If you buy lumber at \$25 you are losing \$23 per M. And farm woodlots usually have hardwoods suitable for products bringing \$100 or more per M, products which can be made on the Belsaw. Therefore, the Belsaw gives you from twelve to *fifty* times higher returns from your trees.

HOW TO MAKE LUMBER

A Guide Book for Small Producers

SEVENTH EDITION

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BOOK 1. SAWED PRODUCTS

Chapter 1. How to Estimate Lumber

BUYING, SELLING, OR UTILIZING LUMBER in any form requires a knowledge of how to estimate the amount of lumber a tree will yield. The necessary supplies are a tape line, a pole, and a "volume table." Wrap tape around tree 5 feet above ground and divide its reading by three; this gives the diameter with allowance for bark and taper. Check sawlog length with pole. Refer to volume table for number of board feet in log of that diameter and length.

A PRINTED VOLUME TABLE will be sent free on request accompanied by stamped return-addressed envelope. This table is based on the International Rule, which is the most accurate. Doyle's Rule, used by most sawmill men, gives much less than actual yield of logs under 20" diameter. Scribner Decimal Rule, used in scaling government forests, gives less than actual content of logs over 20".

Enter the content on a tally sheet, and "blaze" the tree to prevent counting it a second time.

A thousand board feet of lumber is roughly equivalent to 10M shingles or 5M lath. Ties are estimated 1 to a 10" tree, 2 to a 12", 3 to a 14 or 16", and 4 to an 18", times lengths to sawlog.

THE IMPORTANCE OF KNOWING how to estimate timber is well illustrated in the following case from U.S.D.A. Bulletin 1210: An Ohio farmer wanting to clear his woodlot got bids on the stumpage, the highest being \$600. He was about to accept this price when a relative who had run a sawmill told him he would make more by sawing the timber himself. Taking this advice, he obtained \$2,350 worth of lumber and cleared \$1,400 profit above all costs.

Chapter 2. Logging

LOGGING INCLUDES felling tree, bucking it to sawlog lengths, and getting the logs to the mill. This work, as well as value of the stumpage, should always be taken into account as part of the cost of lumber production.

To fell a tree with an axe, chop shallow notch on side away from direction tree is to be thrown, and chop other side lower down and as deep as necessary to fell the tree. Chop deeper in center than at sides to prevent butt splitting or tearing.

FELLING WITH A SAW is preferable as it wastes less of the log, and when a tree is to be made into lumber every foot is valuable. Chop shallow notch with axe on side tree is to fall, then do all the sawing at other side. Drive a pair of Woodchopper's Wedges in cut back of saw to prevent its pinching, and to throw the tree. The chopped notch provides falling hinge and prevents butt damage.

Cross cut saw *must* be kept properly "set," and filed sharp. This is often neglected by a woodsman who wouldn't think of using his axe in dull condition. Refitting is best done with an Excelsior type tool, in which an 8" file is clamped to serve as a jointer, raker gauge, and side file. Also included are a tooth set gauge and a channeling set block. Price, postpaid, 75c.

The logs are usually hauled to mill by attaching Skidding Tongs or Log Chain hitched to tractor or horses. But if there is any grit in the soil the logs should be hauled on a wagon or skids, or they will have to be barked before sawing. Gritty bark will dull a mill saw in one cut.

WHEN ESTIMATING LOGS for a given amount of sawing, they are "scaled" and the contents marked on butt with crayon. This is done with a Log Stick, which is a part of every sawyer's equipment. When stick is placed across center of log its markings show contents according to length.

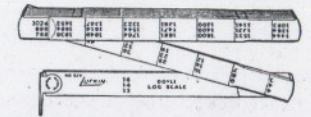


Fig. 2—CONVENIENT FOLDING LOG STICK.

Handling and turning the logs is done with a Cant Hook, another logging necessity. It is advisable to have not less than two.

THUS, LOGGING EQUIPMENT consists of (1) double bit woodsman's axe, (2) two-handed cross-cut saw, (3) Files and set tool for saw, (4) pair of wedges, (5) skidding tongs, (6) log chain, (7) cant hooks, and (8) log stick. We carry all of these items in stock and prices will be given on request.

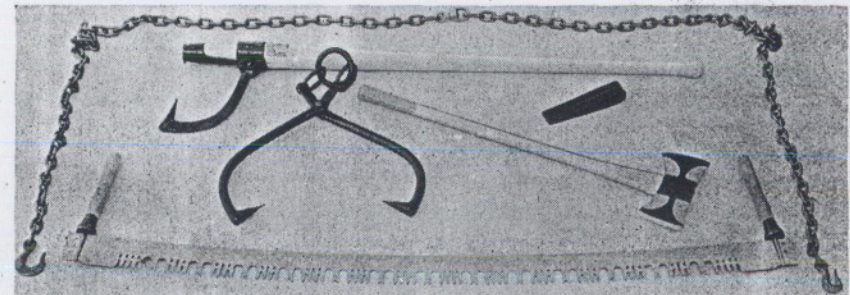


Fig. 3—EQUIPMENT USED IN LOGGING.

Chapter 3. Sawmill Power Units

ANY FORM OF POWER may be used for a Belsaw; auto motor, stationary gas or steam engine, tractor, electric motor, waterwheel, etc. The amount of power determines the depth stroke the saw can cut, and the speed of production.

SOME BELSAWS are being powered with as little as six horse power. While such light power is practical for reasonably shallow or softwood cuts, it calls for keeping the saw in the very best condition, sharp, and correctly set so it will run free and cool in its kerf.

Many sawyers believe a balance wheel on mandrel helps engine power. This is true of cross-cutting but much less so of rip sawing. If wheel is used it must have perfect balance, both static and dynamic.

THE ESSENTIAL THING about power is to have sufficient to maintain the correct speed of saw in deepest cut. Size of saw has less to do with amount of power consumed than number of its teeth. A large saw with few teeth takes less power than a small one with more teeth, but the hardness of the wood determines how few teeth is practical. Therefore, the saw should have its number of teeth proportioned to amount of power supply and nature of sawing.

FOR SATISFACTORY RATE of production we advise at least 12 horse power when all the power goes to the saw. With power feed we advise at least 20 h. p., and if there is sawdust remover or other power driven attachments there should be additional power.

There is no objection to oversize engines, but too little power is a source of trouble. Therefore, light engines should always be kept in best condition. Gasoline engines should have carbon scraped, valves ground, and ignition checked regularly.

THE BELSAW OPERATES on less power than any other sawmill, due to the special construction of its mandrel and to the design of power related components.

Auto engines give best results when converted into stationary power plant with the Belsaw Auto Engine Adaptor. This adaptor takes off the crankshaft bearings strain for which they are not intended. It has a heavy shaft with bearing on each side of pulley; one end of shaft fits rear end of engine crankshaft, where front universal originally connected, and other is extended to take extra pulley for powering other equipment.

Pulleys smaller than 10" should be of fiber, to prevent excessive transmission loss from slippage. Larger sizes should be of pressed steel. Large cast iron pulleys are to be avoided, as they are usually enough out of balance to affect the lead of the saw.

Belting should be 6" wide and with perfectly smooth joints, preferably endless. A lumpy joint will "kick" the saw out of lead. The belt should be kept taut, and dressed, especially on small pulleys. We stock 6" by 4-ply special canvas belting, "Alligator" hinge-type lacing, and Cantol belt wax, which is non-injurious and does not cake or glaze.

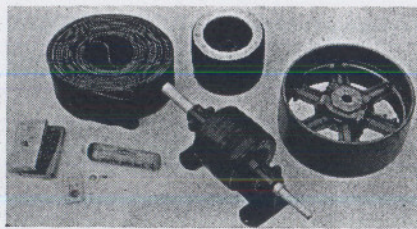


Fig. 4—POWER ACCESSORIES.

Chapter 4. Setting up the Mill

The large photograph on center page shows clearly the units comprising a Belsaw. This picture is of a single carriage outfit, for handling logs up to 10 ft. long, base being 18 ft. Carriage is shown with shingle gearing included.

Fig. 10 also shows single carriage outfit, but with carriage extended with Carriage Lengtheners, for increasing sawing length to 14 ft., base being 30 ft.

The photograph on page 1 is of a double carriage outfit, for logs up to 20 ft. long, base being 36 ft. With Carriage Lengtheners added and base 48 ft. long, sawing length is increased to 24 ft. Increasing number of carriages, and length of base, provides for any greater length desired—so long as diameter of log comes within head-block capacity.

Fig. 10 shows carriage without shingle gear, which may be included or may be added at any time.

THE BASE is made by customer from drawing we furnish. Construction is simple, and cost when home-made is much less than price and freight on factory-made base. Rods and fittings are sold separately for various length bases.

SUPPORTS are each made from a 2x10, 12 ft. long, cut into 7 short pieces and built up as shown. For mills with mechanical feed the cross rods are placed at height indicated, but when carriage is to be fed by hand it is best to use wood diagonal cross bracing, which the sawyer can step over when walking between the beams.

BEAMS are made of 2x10's spliced together and capped with 2x4 for trackway and for stiffening. If intended to move mill from place to place the splices should be joined with bolts, so base may be divided into sections. The base must be strong and rigid.

THE MANDREL fits into notches provided in beams and the TRACKS are placed just over the mandrel bearings. The diagonally placed brace rods shown are required for holding mandrel section of base rigid, so power pull on belt pulley can not shift mandrel out of lead.

LEAD ADJUSTERS are yoke devices straddling mandrel bearing lug, with set screws. Mandrel bearings have slotted bolt holes for shifting when adjusting saw lead, which is the function of the lead adjusters.

SAW GUIDE, which is also part of mandrel assembly, is bolted to beam at front of saw, with wood pegs straddling it. Its function is to throw saw back into lead when thrown off by knot, etc. Set guide high. Never use to lead the saw, which is done with lead adjusters only.

SAW LEAD refers to alignment of saw with guide track. The saw is usually hung with its front edge about 1/32 inch closer than rear edge to center of guide track, as a trial lead. Then if it veers either way while sawing, the adjustment is changed as required.

Chapter 5. Operation of the Mill

BEFORE STARTING SAWING, set 2x4 uprights before and behind saw, with top nailed to base beam and bottom setting out at ground, and with boards across over lower part of saw. This guard prevents saw hurling slivers, and throws falling cuts away from the saw.

Also, provide log skids level with carriage bed. Ends toward mill should leave space of a foot or so, for passageway, and this gap should be bridged over with blocks when rolling log on carriage. Large logs are extremely heavy, and the Belsaw is a light mill; therefore, this provision is necessary for prevention of shocks that might cause damage. Both the saw guard and log skids are clearly shown in drawing of base.

ROLL LOG on carriage with any overhang same at each end. When turning log after it is on carriage always roll top out while sliding bottom in. This will eliminate any danger of damaging headblock. Advance headblock by moving Set Lever back and forth until log is in proper position for sawing off first slab, then set the Top Dogs.

BELSAW TOP DOGS are of special rapid and efficient design. By turning ball lever to where it "clicks" the head is loosened on post and may be moved to bring spike against log. Then, turning lever both locks head on post and sinks spike into log. The dogs are adjustable to four positions, of which two are shown in the photographs. That in Fig. 9 shows short point down, and out from post; that in Fig. 10 shows spike set in close to post, with long point down.

With the log set and dogged, feed carriage to saw and remove first slab. Then gig the carriage back and turn the log to rest on this sawed surface. Now, either of two methods may be used in sawing the lumber.

SOME SAWYERS "SQUARE" the log, by slabbing second and third sides, placing fourth unslabbed side towards headblock so there will be no waste on final cut. This method is efficient if the boards are to be exact multiples of the size to which the log is squared.

OTHERS "FLITCH" the log. This consists of sawing it into thick cuts without further slabbing. For example, if 2x4's are to be sawed the flitch would be 4" thick. Then when several flitches are laid flatwise each cut will give as many finish edged boards as there are flitches. This method is preferable for narrow width boards.

Thickness of board is regulated by the "Set Works," the gearing actuated by the set lever. The Belsaw set works is graduated to exact eighths of an inch and has two types of set gauges.

For very coarse or occasional cuts the Rule Gauge is used, to which an indicator points from headblock.

For several cuts of same thickness the Automatic Gauge is used, which consists of a stop block on segment beside set lever, to control its stroke.

When the headblock is advanced all the way forward it is receded by moving set lever all the way back and pressing it against throw-out cams which release the pawls and permit spring to pull headblock back.

From this description of operation it will be seen that running a Belsaw is a very simple matter and requires no mechanical knowledge or experience. Use and care of the saw is covered in Chapter 7.

Chapter 6. Sawmill Units

THE ESSENTIAL UNITS of a sawmill are Base, Mandrel, Carriage, and Saw, without any one of which a sawmill can not function. Accessory units common to sawmills are Mechanical Feed, and Mechanical Sawdust Remover. These will be described in this chapter, together with detailed information about Mandrel. Saws will be treated separately in the following chapter.

RIP SAW MANDREL requirements are much more exacting than for cross-cutting. A rip saw revolving at high speed requires a mandrel of absolute accuracy and perfect balance. The slightest defect will prevent the saw following true line, or "lead."

Belsaw mandrels are uniformly perfect. The shaft of the Standard grade is special alloy steel and will resist strains that would spring a much larger diameter mandrel of ordinary shafting. The Special and Junior mandrels are of finest genuine cold rolled steel shafting. The fixed collar is shrunk on the shafting which is then centered in a lathe and the bearing journals, saw stud, and faces of collar machined perfectly true. Keyway is provided for belt pulley, and left hand threads cut for collar nut. Bearings are yoked on Standard mandrel. All types include same lead adjusters, and Standard and Special include heavy saw guide, adjustable with saw running. Junior saw guide adjusts with saw not running.

MECHANICAL FEEDS are furnished in three types: Power-Save, Duo-Speed, and Vari-Speed. Many Belsaws are operating without any mechanical feed, the sawyer pushing the carriage by hand. This was a feature of the original Belsaw, the carriage being placed at convenient height. But as models were developed for sawing long logs and for high scale commercial production, the three types of mechanical feed were developed—to meet all requirements.

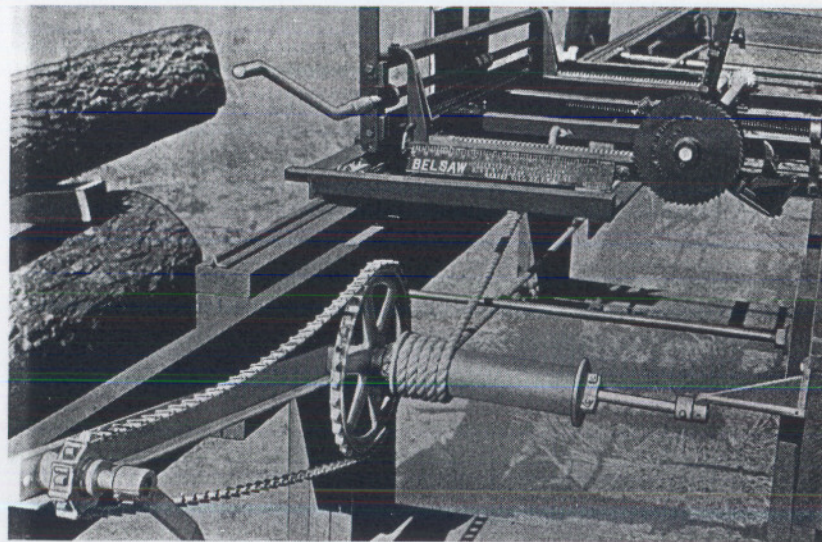


Fig. 5—"POWER-SAVE" TYPE MANUAL MECHANICAL FEED.

POWER SAVE TYPE mechanical feed possesses every advantage over pushing carriage by hand. The sawyer remains in one position and the hand crank is adjustable to the most comfortable level. Special gearing provides for feeding even heaviest logs at correct and uniform speed with minimum effort, and hand crank may be changed to end of drum shaft for faster gig-back. This type feed should be used whenever the engine power is lighter than 20 h.p., also on long outfits when hand feed would otherwise be used. It is regular equipment on 10-foot Standard and Special Models.

DUO - SPEED TYPE

is an economical fixed speed power feed. The rate of feed is determined by size of drive pulley belted to mandrel. It has a single control lever which is moved one direction to tighten the belt to drive drum for feeding, and the other to engage the friction wheels for giggering back. The rate is automatically variable to the extent that mandrel revolves somewhat more slowly when saw is in thick cut, thus slowing the rate and preventing over-feeding, while in light cuts the feed is faster. It is our most popular type feed, and is regular equipment on the long log Special model.

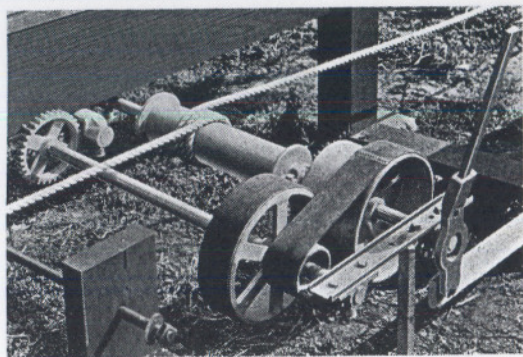


Fig. 6—DUO-SPEED TYPE POWER FEED.

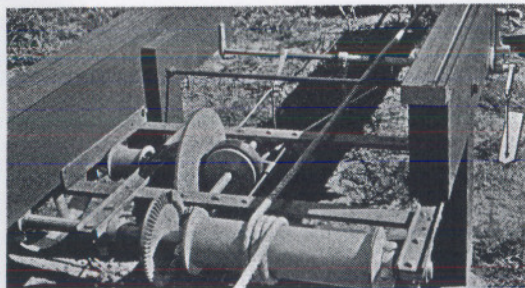


Fig. 7—VARI-SPEED TYPE POWER FEED.

commercial producers, and is regular equipment on long log Standard model.

Any of the three types is adaptable to any model and may be added or substituted for any other at the cataloged difference in price.

SAWDUST REMOVER: Only in exceptional cases is a mechanical sawdust remover used with the Belsaw. Its design is such that the saw sets above and clear of the ground, making manual removal practical. But for those large scale commercial producers who prefer every operation mechanized there is a special Belsaw remover assembly which may be quickly attached to any model. It is of the conventional drag chain type, one sprocket being set in pit below saw and the other at top of post back of mill, the chain being driven by belt from live shaft of power feed unit. Sawdust remover attachment is shown on mill in Fig. 15.

VARI-SPEED TYPE

is the conventional variable friction power feed used on the costliest big sawmills. A foot treadle controls the clutch to throw feed in or out of gear. A hand lever regulates the rate of speed by moving the driven friction wheel to position on driving disc, which varies the rate of feed and gig-back as desired. This feed is preferred by large scale

Chapter 7. Mill Saws

THERE ARE THREE TYPES of circular saws: The spring set and swage set solid tooth, and the inserted tooth type. The spring set type is set by bending the points of the teeth outward alternately, similar to cross-cut saws. The swage set type is made of higher grade steel which permits swaging, or "upsetting" the metal to give a set projection at both sides. This is the most generally used grade. Being made of tool steel, it requires much less frequent sharpening and setting than the cheaper spring set type. Mill saws are not made from sheet steel, but from "billets" which are hammered into discs, thus giving circular grain to the metal.

THE INSERTED POINT (I. P.) saw has separate teeth set in holders which fit into milled sockets in the body of saw, the body steel being the same as a swaged saw. The teeth are die forged to a chisel form similar to the swaged tooth. The advantages of the I. P. saw are that a damaged tooth can be quickly replaced, and resharpenings do not reduce the saw diameter.

PROPER USE of a saw includes running it at the correct speed and keeping it properly set and sharpened. Set is required so saw will have a slot, or "kerf," in which to run with sufficient clearance to prevent body from rubbing log. Frequent sharpening is necessary because of the high speed of the saw and the great number of times teeth strike the wood.

CORRECT SPEED is essential because all saws when made are "tensioned" for the speed at which they cut most effectively. When run at high speed the rim of a saw is stretched by the centrifugal pull. This would cause the rim to "flutter" if not counteracted. This is done by stretching the metal of the body by hammering. Therefore, when standing still or running slow the saw has a slight bulge, or "dish," but when run at proper speed it flattens out uniformly.

Obviously, running the saw too slow will result in the bulged center rubbing the log and burning the metal. And running it faster than its hammered speed will result in its fluttering. In either case it will refuse to follow a true lead, and will give trouble.

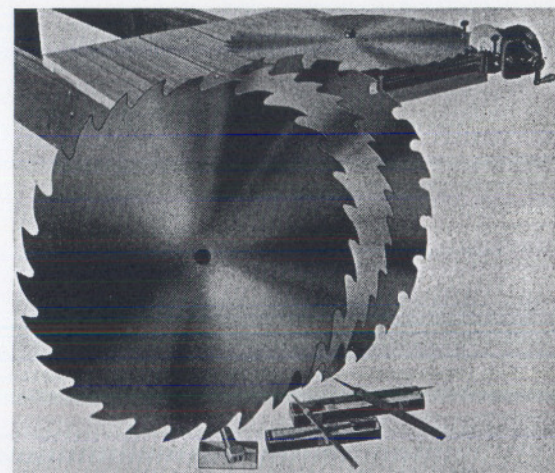


Fig. 8—THE THREE TYPES OF SAWS ALSO SHOWING GUMMING MACHINE, SWAGE, AND SAW FILES

(Continued on page 12)

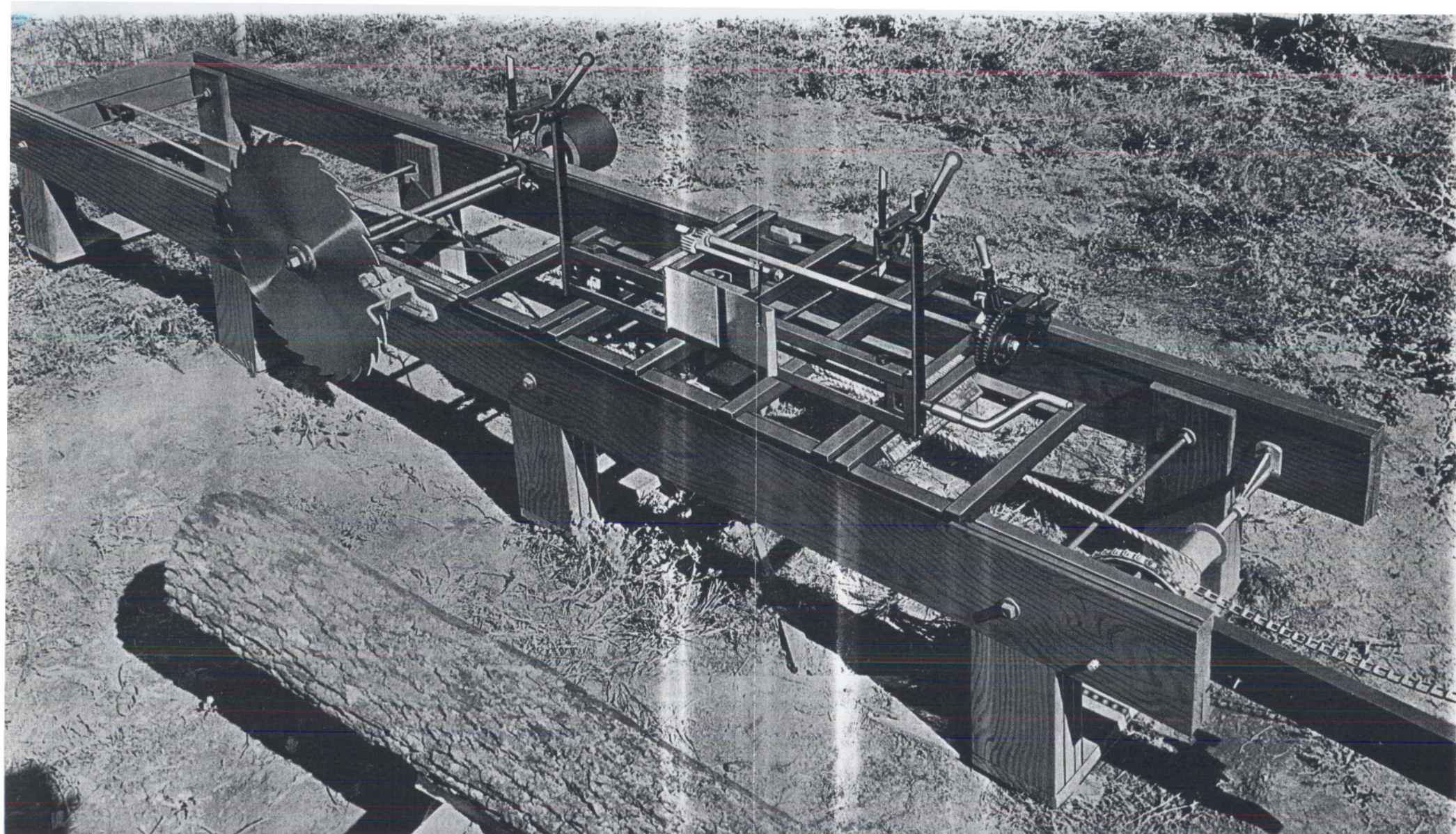


Fig. 9.

BELSAW MODEL 10S18—WORLD'S LEADING LIGHT SAWMILL

Here is the sawmill that set new standards of efficiency and economy in timber utilization; that met with the most enthusiastic acceptance ever known to sawmill history. Thousands of farmers in many lands vouch for the savings and earnings it is bringing them. Colleges demonstrate it as the most practical sawmill for farm use. And authorities acclaim it as the sawmill of the future.

Its patented design is radically different, and is based on the changed conditions of timber supply and requirements. It represents the triumph of inventive engineering genius in meeting the conditions of the present. It supercedes the sawmill designed for conditions of the past.

And now, after mature service experience, its design has been perfected to the highest degree. This picture shows the new heavy boxed steel carriage with full 20"

depth headblock opening, large gear shaft with keyed main ratchet, perfected high speed top dogs and high extra capacity end dogs, high rib guide track and deep groove rollers, quick setting saw guide, super-efficient manual mechanical carriage feed, and numerous other improvements and refinements in design and new features.

This model, the most popular one, is the basic Belsaw, with shingle-making feature. Mounted on base 18 ft. long it saws lumber up to 10 ft. long; with Carriage Lengtheners added and base 30 ft. long it saws up to 14 ft.; and with Duplex trailer added and base 36 ft. long it saws over 20 ft. lengths. All other models are simply variations of this basic one, all units being interchangeable.

Note: Details shown in illustrations are subject to any changes that may result from further developments in design.

SAW SPEED is determined by properly proportioning the size of the mandrel pulley to that of the engine. Each Belsaw purchaser is required to furnish engine data to enable us to calculate proper size of mandrel pulley.

A SWAGED SAW is set with a hand tool having spreading and smoothing jaws. This swaging tool is placed over the cutter and struck with a hammer.

Sharpening is done with special saw files made of crucible steel, except the spring set type, which can be filed with ordinary files. Saw files cost no more than open hearth steel files but are handled by comparatively few concerns. Customers as far away as Africa depend on us for their saw files.

AFTER REPEATED FILINGS a saw loses the original shape of its teeth and requires "gumming," to grind out the gullet and restore the original angle of hook to face of teeth. This formerly required the services of a saw filing shop, but the introduction of the Belsaw Precision Gummer makes it possible for all sawyers to do their own gumming with this extremely low cost machine.

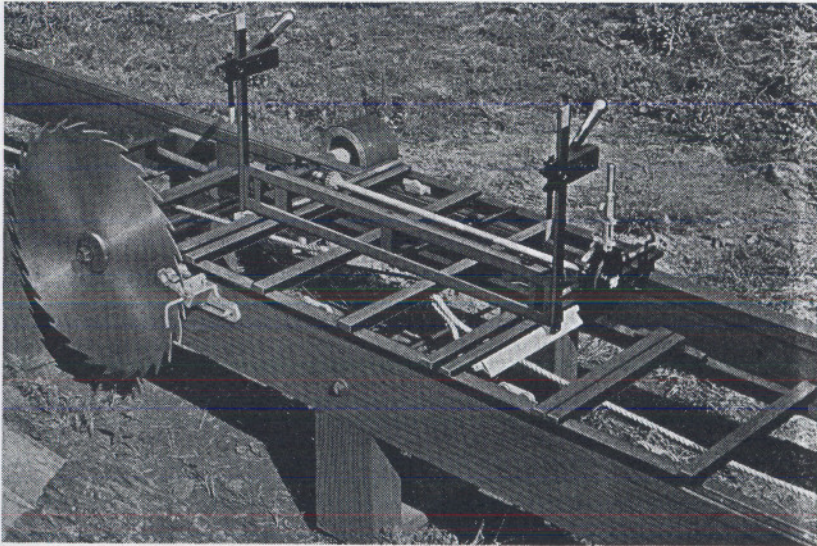


Fig. 10. MODEL 10X18 BELSAW, also showing Carriage Lengtheners. This model is popular with those desiring to start out with minimum investment. It gives a straight sawmill with provisions for addition of shingle feature, long log extension, power feed, etc. at any time.

It is ideal for making dimension lumber and ties, and by adding End Dogs it becomes an excellent small dimension machine. As the top dogs are spaced wide apart it is necessary to have end dogs for shorter lengths.

As a tie mill it has no equal, its product complying uniformly with the most rigorous specifications. Customers report producing as high as 250 ties per day with it.

Carriage Lengtheners are not regular equipment, but are sold separately. They are bolted to the ends of carriage, and support the overhang of over-length logs.

Chapter 8. Belsaw Products

BOARDS, SCANTLINGS, AND TIMBERS, sawed to the standard sizes are known as Dimension Lumber. As it comes from the sawmill it is called Rough Dimension, and if planed, Surfaced Dimension. Rough Dimension made on local sawmills is usually referred to as "native" lumber.

Native rough dimension as made on the average portable sawmill has rough saw marks and is seldom sawed uniformly. But that sawed on the Belsaw is so smooth and uniform that it never fails to excite surprise and admiration. As a result, when a Belsaw operator is in competition with any other type small outfit he usually gets a higher price for his lumber, because the buyers find it preferable to work with.

DIMENSION LUMBER is measured and sold by the foot "board measure," and this measure is always taken in full inches. For example, a board $\frac{1}{2}$ " thick by $3\frac{1}{2}$ " wide is counted as full 1" x 4". The volume table mentioned in Chapter 1 gives the contents in board feet of all standard sizes of dimension lumber, as well as the contents of sawlogs.

There is never any scarcity of buyers for *good* dimension lumber. Whenever a Belsaw is set up there are many visitors. When they see the quality of its lumber the word goes out and thereafter all the operator has to worry about is filling orders.

SHINGLES run a close race to dimension in market demand. The two are naturally connected, as roofing is just as necessary as lumber, and shingles are by far the most used form of roofing.

Contrary to a common impression, shingles do not require any special kinds of wood. Almost any straight-grained wood will make good shingles. The reason the cedars are so widely used commercially is because of their light weight. Lumber yard prices for shingles usually include as much for freight as for shingles.

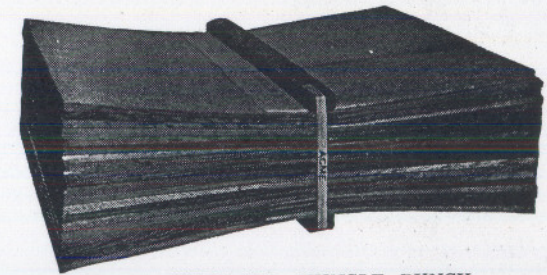


Fig. 11—STANDARD SHINGLE BUNCH.

DURABILITY OF SHINGLES depends on thickness. Commercial producers have to make theirs thin to save on shipping cost. But Belsaw operators usually make theirs somewhat thicker because of the selling advantage it gives them.

Shingle-making is an important factor in utilizing trees to the greatest profit. Among our customers are many operators of other type sawmills who found how greatly the ability to make shingles would increase their earnings.

Some of them have changed to shingle-making exclusively, and we now have hundreds of customers specializing in this one line.

The Belsaw makes shingles just as perfect as any on the market, and in all sizes. Very complete information on shingle-making is given in the Instruction Book furnished with each Belsaw.

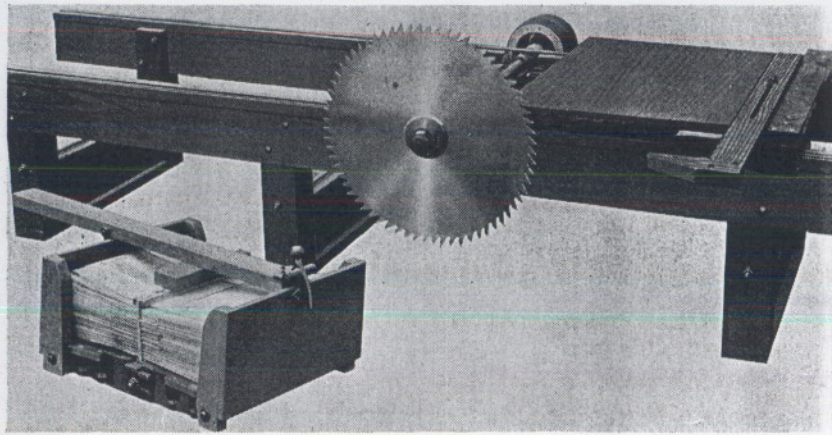


Fig. 12. This picture shows two important accessories. The saw table is home-made from drawings we furnish, and is used for cross-cutting flitches into bolts for shingles, lath, and other small dimension products. It is used with a cross-cut saw, as shown.

The shingle packer is also home-made from our drawings, and provides for packing in standard commercial size and count bunches.

We supply simple hardware fittings for these units, also shingle bands and nails.

LATHS, also produced profitably on the Belsaw, provide a further means of utilizing small timber. In volume production they are made by sawing the log into flitches $1\frac{1}{2}$ " thick, trimming to 4 feet long on the cross-cut table, and then placing a number of the bolts on the Belsaw carriage and ripping to $\frac{3}{8}$ " thickness with a thin saw. They are packed in bundles of 50, tied with twine.

TIES can be more profitably produced on the Belsaw than on any other type equipment. One tie contractor who was operating a very large mill changed to three Belsaws and thereby more than doubled his profits. A Colorado Belsaw owner reports that his were the only ties purchased all during the depression by one broker, who told him he could always sell ties of that quality.

TIE PROFITS are increased by making the "sidings" into dimension lumber. A Michigan tie contractor reports that he got 25 M feet of lumber in connection with 5 M ties. He averaged 140 ties per day, plus the side lumber. And he reported that he effected a great saving by piling his logs in ten piles to each of which he moved his Belsaw, thus saving the use of horses or any form of power for logging.

MINING TIMBERS rank very high among our customers as a means of earning a living. Mining timbers include props, collars, rails, ties, and caps, all of which are small dimension and can not be produced profitably on other sawmills. In fact, several mining companies who formerly operated their own mills have changed to buying from Belsaw operators, as it saves them money.

BOXES, CASES, AND CRATES, are a profitable product in which many hundreds of Belsaw owners are specializing. Some furnish the rough stock, some the "shooks" or flats cut to size and bundled, while others make the finished containers, either for the market or for their own requirements.

When the box must have a smooth finish, for stamped label, we can supply a planer type saw, which gives same finish as surfacing.

When the box must be of extra thin stock we can supply a veneer-type saw, which is very thin at rim and tapers to thicker center. This saw is also excellent for shingle-making, owing to its low sawdust waste on thin stock. All our customers who specialize in egg cases and cheese boxes use this type saw.

SMALL DIMENSION STOCK refers to "squares" or blanks used by makers of such wood products as furniture, handles, toys, etc. The required woods are oak, maple, gum, birch, poplar, beech, elm, basswood, sycamore, and others that are found only in farm woodlots. Therefore, it is a logical product for farmers, and many thousands of them engage in its production.

MOST PRODUCERS use a sawmill for making the flitches, which are then sawed on saw tables. Only the Belsaw is adapted for sawing from log to finished product. The log is flitched with regular mill saw; the flitches are then ripped (before trimming) to specified size with thin saw, of which two or three may be used in gang on the Belsaw mandrel. They are then trimmed to length, with defects cut out, stacked and left 60 to 90 days to reach shipping dry condition, and bundled with metal strapping.

ALSO UNDER THIS general classification comes numerous other products. Hardly a day passes but what some customer writes us in connection with some new form of small dimension for which he is filling orders. Mention of a few of these may be of interest: Battery cants, skids for shipping machinery, grain doors, concrete form chamfers, fish boxes, handles, brush backs, spool and shuttle stock, tobacco boxes, pencil stock, barrel headings, seeder and feed boxes, wagon tongues, trees, eveners and other parts, shoe forms, signboards, boat materials, porch and lawn furniture, sleds, veneer coring, and many hundreds of others.

ON THE INTRODUCTION PAGE we emphasized that the small producer must have low operating costs and wide range of utilization to make money from his trees. This chapter gives an idea of the scope of utilization provided by the Belsaw. Any mill not having this range of utilization provides limited opportunity for making money.

MARGOLIS ESTIMATES that as little as one third of a tree is utilized by the ordinary sawmill. With a Belsaw there is almost no waste. The tops can be made into stovewood; the branches into shingles, lath, pickets, battens, etc.; sawdust sells to garages and meat markets, to packers of smoked meats, and to shippers for packing, slabs are valuable for siding and roofing sheds, and the sawlog goes into dimension lumber. Only the leaves go to waste.



THE JUNIOR MODEL BELSAW

(Base and shingle gear not regular equipment)

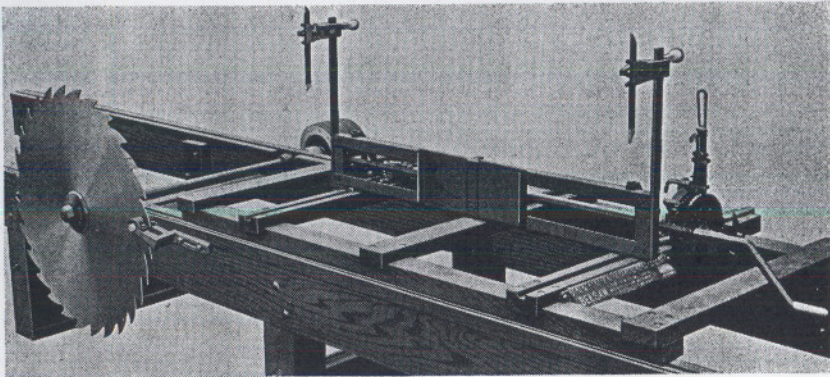


Fig. 14.

Here is the sensationally low priced Junior Belsaw. Carriage frame is wood, dogs and gearshaft are slightly lighter, and headblock depth slightly less, but otherwise it corresponds in general dimensions to the regular models.

Originally the Belsaw was offered in but one price range, which was so much below that of other sawmills that no cheaper grade was necessary. But this situation was altered by two events. First, imposition of higher duties by foreign countries, which increased ultimate costs. Second, arrival of the depression, which reduced the buying power of farmers everywhere.

To meet the new situation, and realizing that farmers needed Belsaws even more than ever, we introduced the extremely low priced Junior model. It met with astounding success, and quickly became our largest seller. Its service surpassed expectations, hundreds being used for heavy-duty commercial service.

This model is particularly well suited to two classes. First the farmer who wants to saw principally for his own needs; for him it saves more than its cost on even one farm building and yields a profit even if used no further.

The second class is those who want to get into the sawmill business with the least possible investment. To these the Junior Belsaw is a godsend. With it they can earn enough to pay for any other units desired, which the Belsaw "unit system" makes practical.

The Junior model is within the reach of almost everyone, but for those who can not afford even the modest price of the factory-built outfit there is an even lower cost method—that of home construction from the Belsaw Licensed Plans.

These plans show how to construct the various units, and give pictures and prices of the metal parts. They also include all instruction and service sheets, and a subscription to the Belsaw Bulletin. They are, therefore, well worth the price.

And if a certain amount of parts is purchased the plans cost nothing, their price being remitted and credited on price of the parts.

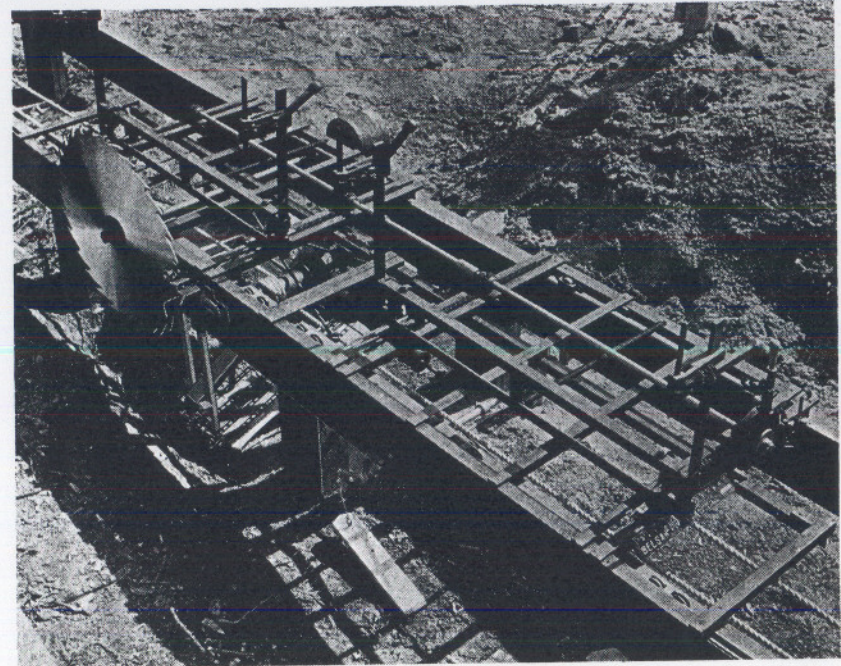


Fig. 15. **MODEL 18X36 BELSAW:** This different view of long log outfit shown in Fig. 1 shows the controls of Vari-Speed type feed, which is regular equipment on Model 18S36. Control of Duo-Speed feed, which is regular equipment with this model, may be either by the vertical lever shown in Fig. 6, or by one placed at head of mill and connected by wood link attached to bottom of lever socket, also indicated.

THIS COUNTRY CONSUMES annually 16 billion board feet of dimension lumber, 15 billion in shingles, 10 billion in small dimensions, and 15 billion in planing mill products.

Formerly the small producer was shut off from the market for planing mill products. The only equipment available was the light type intended for tinkers, or the heavy production type. There was no grade in between.

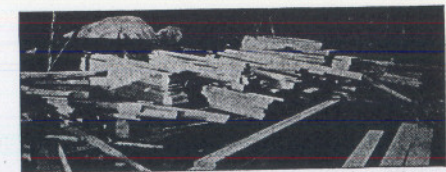


Fig. 16—A TYPICAL BELSAW YARD OF DIMENSION LUMBER

WE WERE CONSTANTLY importuned by our customers to bring out equipment that would be to the planing mill business what the Belsaw is to the sawmill business. Many Belsaw operators wanted to be able to extend their operations to include surfaced dimension, shiplap, flooring, etc.

THEIR NEED WAS MET by the introduction of the Belsaw One-Man Planing mill. Its price is very little higher than that of the toy outfits, but it is full size and does the work of the expensive machines.

This important contribution to the needs of small producers will be described in the following pages.



Fig. 17—A CONVENIENT LUMBER THICKNESS GAUGE.

THE BELSAW ONE-MAN PLANING MILL

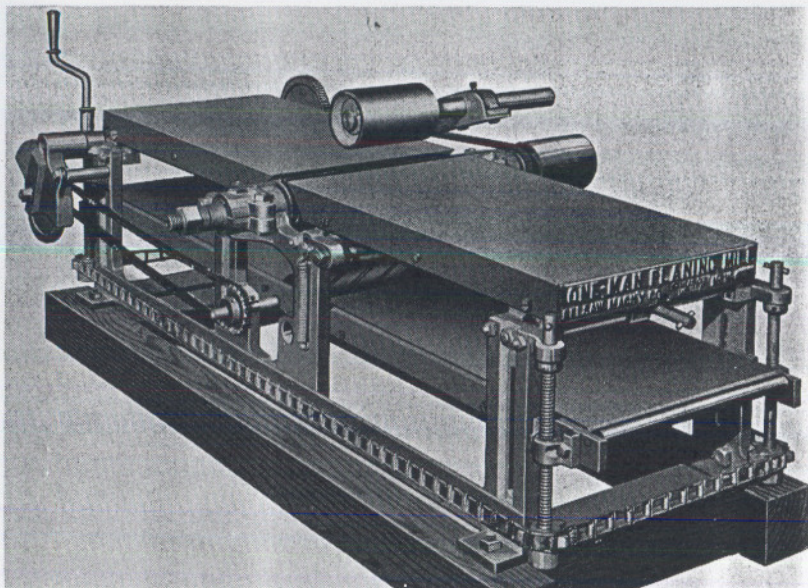


Fig. 18.

THERE ARE CERTAIN BASIC woodworking operations which in planing mills are performed by separate machines for each. For example, most planing mills have (1) Jointer, (2) Planer, (3) Saw Table, (4) Matcher, (5) Borer, (6) Lathe, and other machines depending on extent of operations. All of the listed operations are performed by the Belsaw One-Man Planing Mill. For the benefit of those not experienced in woodworking, each of these operations will be explained, together with the section of the machine which handles each.

JOINTING means single surfacing. The name originated from smoothing the edge of surfaces for jointing with glue, the panels usually being too wide to be placed in a planer. But the machine proved of such wide utility that its original purpose has been lost sight of.

For example, Dimension is often marketed Single Surfaced, or with just one side and edge dressed. Much box material is surfaced on only one side, to give neat finish and to take stamping. In all such cases a jointer meets all requirements.

The Jointer Section of the Belsaw Planer consists of the two top adjustable tables in connection with top of cutterhead stroke. As a board is fed over these its lower surface is dressed. The rear table is always adjusted level with top of cutting stroke, and the front table is adjusted to desired thickness of cut. Each of the thickness tables has single control adjustment.

RABBETING is also done with the jointer section, and consists of milling a lengthwise groove with one open side. A groove proper has two sidewalls, and a dado cut is a groove across the grain of the wood.

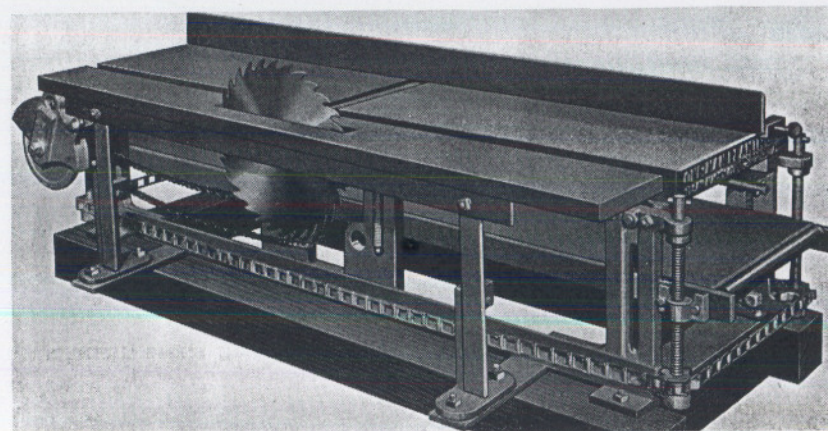


Fig. 19.

For rabbeting, the front jointer table is dropped to desired depth of rabbet and the side table is brought level with it. The guide fence is placed to desired width of rabbet. As the board is fed with rabbet portion resting on jointer tables the left corner portion of cutterhead removes the required amount of stock.

Common examples of rabbeted work are the jambs of door frames, and shiplap.

PLANING MEANS surfacing to accurate and uniform thickness. A planer is properly a "thicknessing" machine.

The planer section of the Belsaw Planer consists of the adjustable long lower table in connection with the bottom of the cutterhead stroke. Back of the cutterhead is a "leveling" roller which is kept leveled with bottom of cutting stroke, just as rear table of jointer is kept leveled with top of same. This roller prevents the board springing up from table and making mill marks. A "chip breaker" rests on the board immediately in front of the cutterhead: Stock is fed from front end of machine in jointing and from rear end in planing.

SAW TABLE WORK includes edging, trimming, and such. Edging means ripping board to remove bark or other defective edge and to bring to exact uniform width. Trimming usually refers to cutting boards off to desired length, or making such as box stock exact length and width. Some shingle manufacturers also prefer to make their shingles from bolts instead of flitches, which then requires trimming.

For this work a small saw is placed on the offset arbor at left end of cutterhead and the jointer tables are raised to close over the cutters, the side table being brought level with them.

MATCHING AND GROOVING are operations required in making tongue and grooved flooring and such products. Special cutters are placed on the offset arbor and the stock is run on edge over them, being guided between two blocks clamped on the side table. Shiplap is often made the same way.

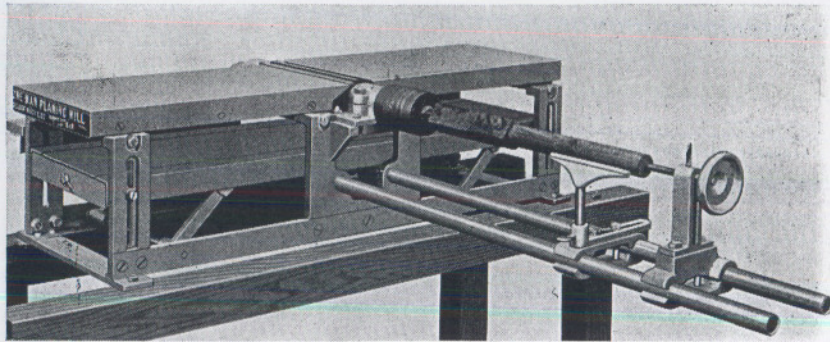


Fig. 20—SHOWING LATHE ATTACHMENT, WITH A SQUARE BEING TURNED.

DADO WORK, or grooving across grain, calls for two outside grooving saws placed the desired distance apart, and with inside cutters between. Dado inside cutters are much the same as matcher cutters and are often used for making tongue and groove, or shiplap rabbet.

BORING AND ROUTING is done on the Belsaw Planer by chucking wood boring bit in socket at right end of cutterhead. For exact work and volume production it is best to have the lathe bed, on which to mount jigs for clamping or guiding the stock to be worked. The expense of routing bits may be saved by using ordinary bits and boring a line of holes, then chiseling the mortise to smooth line.

TURNING stock to round is done by adding the Lathe Attachment. A spur center is placed in the cutterhead socket and a point center in the tail stock, the work being centered and held by these. The tool rest is adjusted to proper position, and a woodworker's chisel resting on same is held against the revolving stock.

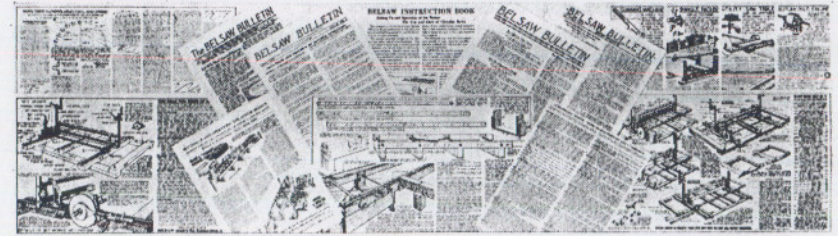
This attachment provides for turning round handles, making turned balusters, and numerous other worked products.

GRINDING can also be done with this machine. A plug arbor is set in the cutterhead socket for the grinding wheel. This provides for sharpening tools, cutters, etc., and gumming saws.

The above list gives an idea of the manifold operations for which the Belsaw One-Man Planing Mill is adapted. Never before has there been offered any machine of such wide scope or at such low cost.

A Canadian operator of a small planing mill found our woodworking machinery so efficient and so economical in operating expense that he replaced his heavy machines with them. Another customer is using one for the commercial manufacture of window sash and doors.

With the Belsaw One-Man Sawmill and the Belsaw One-Man Planing Mill, a farmer can make his own trees into everything required for a complete building, for his own needs and for commercial sale.



A MESSAGE FROM THE PRESIDENT OF BELSAW MACHINERY CO.



In every line of endeavor there are some who make good, some who do just "so-so," and some who fail. I want you to know why the use of Belsaw equipment is your best assurance of success.

Always, the first requirement is a thorough knowledge of the business. It isn't enough to have well designed and constructed equipment. This is essential, of course, but even more important is the knowledge of how to get best results with that equipment, and Belsaw service gives you that knowledge.

This service is threefold, and is the most complete and thorough furnished by any machinery manufacturer.

First: The Instruction Book and service sheets with your mill leave nothing to guesswork. How to set up, align, and adjust everything is shown and explained. This is as far as most manufacturers go, but it is just the beginning of Belsaw service.

Second: You receive the Belsaw Bulletin service magazine in which you read the experiences of other Belsaw operators and are kept posted on current developments.

Third: The Belsaw Service Bureau answers your questions, solves your problems, and gives you any requested advice.

These services are your "success insurance." Belsaw Machinery Co. is recognized as the world's leading authority on light sawmills and small production, and their instruction books are used as text books in certain forestry colleges. They provide a liberal education in the production of forest products.

Is it any wonder that amateur Belsaw operators obtain results that astonish old sawmill men whose knowledge has been acquired at the cost of long years of experience?

Can you afford the high cost of using inferior, obsolete, or makeshift equipment, and the long grind of getting your knowledge through trial and error?

I shall welcome the opportunity to help you to success, just as I have helped thousands of others. Feel free to write me for any further information you may desire.

E. STANLEY FIELD.