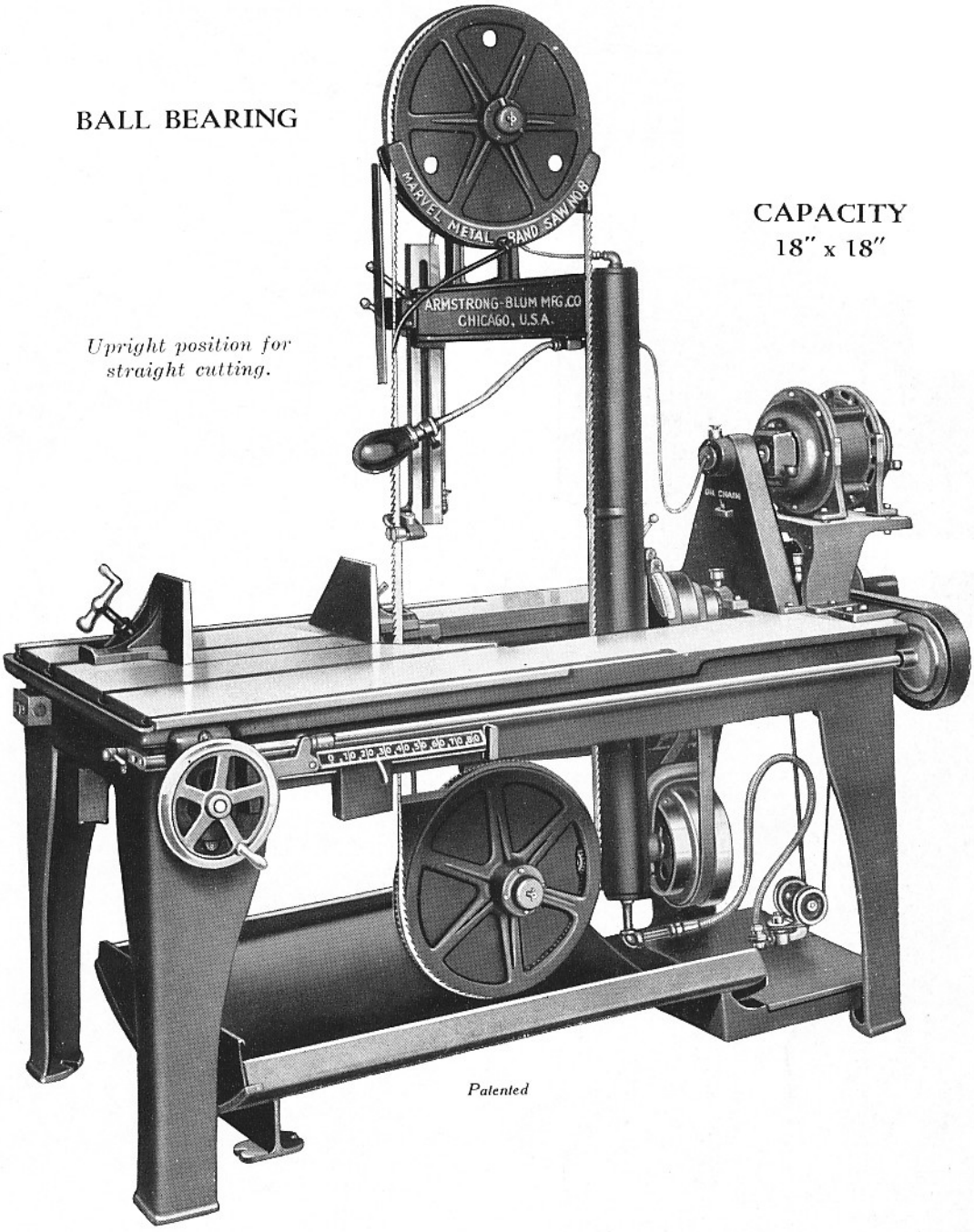
Marvel Metal Band Saw No. 8

BALL BEARING

CAPACITY
18″ x 18″

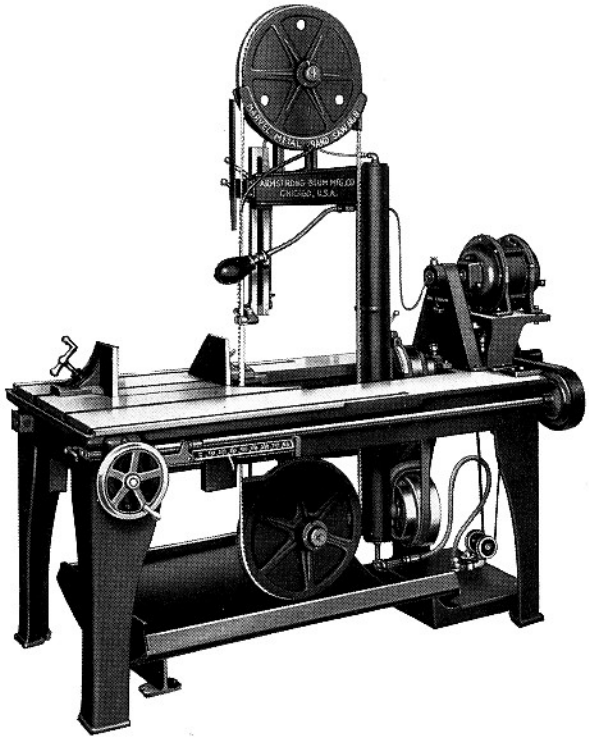
Upright position for straight cutting.



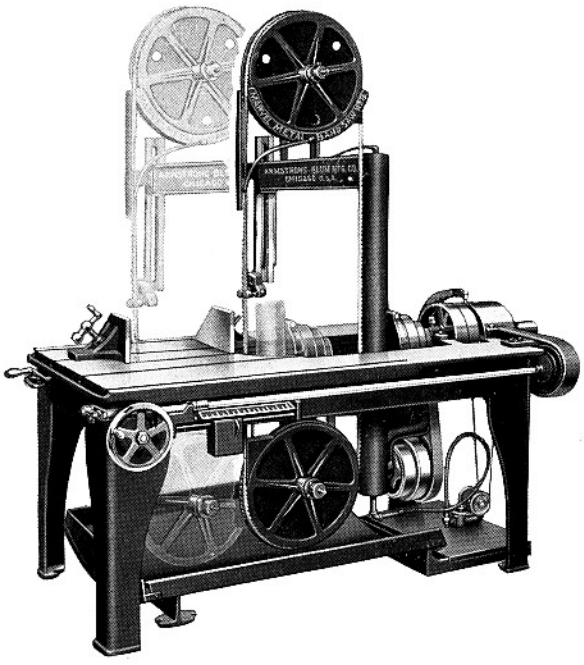
Patented

A FULLY UNIVERSAL metal cutting band saw that will handle almost every conceivable sawing problem. The largest capacity metal band saw available, yet equally efficient on the smallest, most delicate work. Will cut off bar steel, pipe, tubing, mouldings, structural shapes, etc., with maximum speeds and feeds—will do everything that any other metal saw will do, more conveniently, more accurately; and in addition, a vast variety of work no other metal saw will handle, such as cutting at any angle up to 45 degrees without moving the work, coping, index slotting, etc.

A CONTINUOUS, ROTARY MOTION machine that uses every tooth of the endless blade regardless of the size of work. Free from the many objectionable characteristics of the large capacity reciprocating saw, and has added universality, range, accuracy, speed, and economy. Simple and easy to operate, with the work in plain sight of the operator, and the power feed under perfect control—by means of a direct reading feed index that is extremely sensitive. Highest grade machine tool design, with totally enclosed ball bearings in carriage ways, band wheels and guides.



Upright position for straight cutting. Blade in rear or starting position. Chuck opened 18 inches. Shows motor driven machine.



Double-exposure photograph, showing the blade moved forward through entire feeding travel of 18 inches. Note that blade is always perpendicular, and is fed on a line parallel with the long dimension of the table. Also shows belt driven machine with tight and loose pulleys and belt shifter.

Straight Cutting

The saw blade, on the cutting side or in its downward travel, is twisted one-quarter turn by means of ball bearing blade guide rollers. One pair of guides is fixed to the carriage just below the surface of the table, and the other pair is adjustable for height of work above the table. Any length bar can therefore be cut in two without interfering with the upright column, since the face or flat side of the blade is always in line with the carriage travel.

The upright that carries the band wheels and blade is mounted in a traveling carriage that travels parallel with the long dimension of the table or bed on four ball bearings that roll in straight ways on the under side of the table. The feeding mechanism moves this ball bearing carriage, and thus feeds the upright and blade straight toward the front end or operator's position (to the reader's left when looking at photographs on this page). Both the table and the work, therefore, are fixed and do not move. The blade is fed straight through the work, and is always perpendicular. The work is clamped to the fixed or rigid table by means of the quick action vise jaws.

The upper photograph on the next page shows the blade just finishing a square cut through an 18 inch I-beam. Note that the I-beam or bar could be of any indefinite length and cut in two, since the blade is twisted one-quarter turn.

Notching, Coping

The lower illustration on this page is a double-exposure photograph showing the upright and blade moved forward through the entire feeding travel of 18 inches. The dark portion of the photograph shows the blade in starting position; and the phantom or light tinted portion shows the blade position at the end of its 18 inch feeding travel or finish of an 18 inch cut. Note that the blade is always vertical or perpendicular to the table through its entire feeding travel, and does not "tilt" or change angle when cutting off straight or square. This is a very important feature, making the machine available for notching, coping, slotting, shanking dies, jig work, etc., by making two cuts—by turning the work one-quarter way around after the first cut, and making the second cut to meet the bottom of the first cut, thus removing a square piece of metal from the end of a bar, structural shape, plate, etc.

Automatic Stop

Automatic knock-off or stop is provided, to stop the machine at any required depth of cut; so it is not necessary for the carriage to make its entire 18 inch travel when cutting off small work. The blade can be started to feed at any point, and automatically stopped at any point. On belt driven machines, the automatic stop dog or cam automatically shifts the driving belt from tight to loose pulley; and on motor driven machines, it opens a limit switch that is connected in series with the relay circuit of the motor starter to cut off the line current and stop the motor. The motor therefore never runs idle, and troublesome clutches are eliminated.

Quick Return

After a cut is completed, the blade is quickly returned to starting position by means of the hand wheel at the front or operator's position. This hand wheel also provides convenient hand feed and perfect control for delicate work of notching, slotting, etc. Power feed is engaged or disengaged at any time—either when the machine is cutting or running idle—by simply tripping the thumb lever at the front of the machine.

Cutting Angles

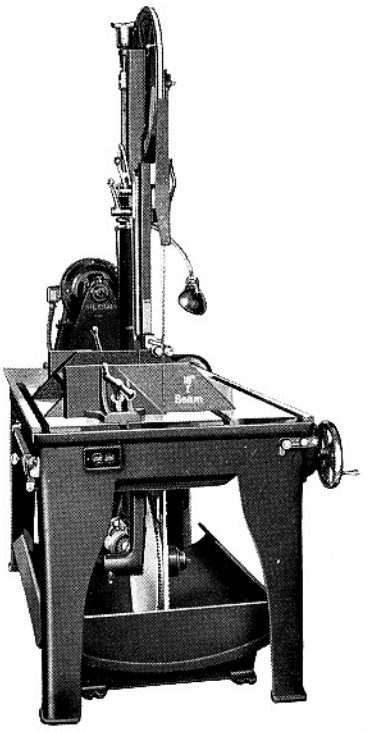
The upright column and blade can be tipped or tilted to any angle up to 45 degrees to either right or left for cutting at an angle or mitre—an exclusive feature not to be found in any other metal band saw. The lower photograph on this page is a view from the front or operator's position, showing the blade just finishing a 45 degree cut through an 18 inch I-beam. The upper photograph on this page is a view from the same position, but showing a straight or square cut through the same I-beam. To cut at an angle or mitre, the upright column is simply swung or rotated around the driving shaft and is locked with the blade at the desired angle to the table surface by means of a quick action ball handle and clamp ring. Note that for angular cutting, the work is held stationary and in the same position as for straight cutting, and that the action of the blade when cutting angles is just the same as when cutting straight, or square. The blade therefore strikes the work squarely and there is no tendency for the blade to "run off" to one side when starting an angular cut as there is with other machines in which it is necessary to turn the work at an angle to the blade. This angle tilting feature also saves a great deal of room in the shop, as it is not necessary to swing long bars at a clumsy angle to the machine table.

Convenient degree graduations on the clamp ring give instant setting of the desired angle without lay-out.

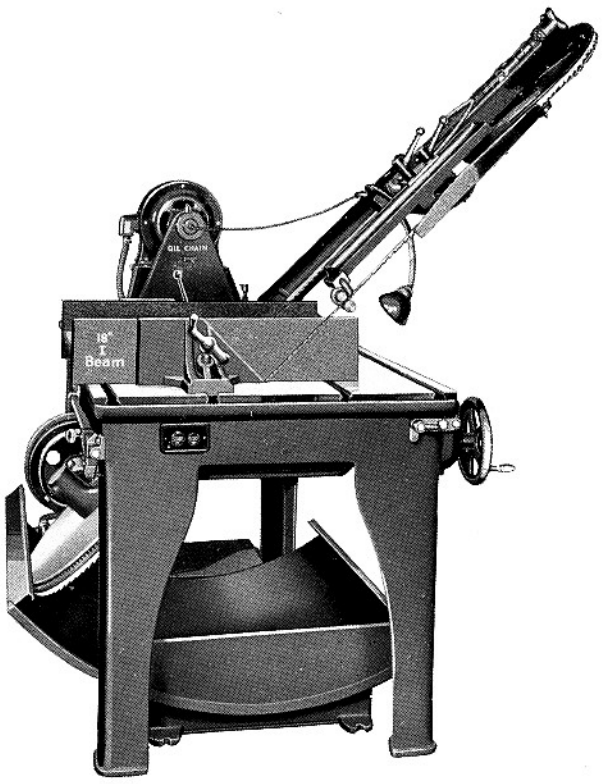
Perfect Mitres

The machine will cut perfect mitres in formed sheet metal, pressed steel, or cast iron mouldings as well as in heavy structural shapes and steel bars, with little or no appreciable burr. Ornamental and structural iron workers, sheet metal contractors, tool makers, and factory maintenance departments will find this the handiest machine in the shop because of the exclusive angle tilting feature and universal application. Those who may have little or no use for the angle tilting feature will not be inconvenienced by it, because the angle tilting feature does not in any way affect the convenience and efficiency of this tool on straight cutting or coping work.

Note that the lubricant drip pans are telescopic to catch the drip from the lower band wheel when cutting at an angle, to return excess lubricant to the pump reservoir.



View from front or operator's position, showing the blade just finishing a square cut through an 18 inch I-beam.



View from same position as above, but with upright and blade tilted to 45 degrees, the blade just finishing a mitre cut through an 18 inch I-beam.

Power Feed

The new, improved type of feeding mechanism of the latest model machine is extremely sensitive, most convenient, and wear-proof; and eliminates all guesswork as to proper feed for every class of work.

By this new mechanism, power feed or pressure on the blade is affected by means of a direct reading scale balance beam that automatically compensates or offsets the thrust of the feed worm and worm gear. Sliding the indicator along the balance beam or feed index, which is graduated in actual pounds, immediately changes the feed or pressure on the blade. The most inexperienced operator can therefore definitely follow the convenient feed chart attached to the machine, just the same as in milling and automatic drilling operations. The feed can be set or changed instantly, even while the machine is running, from a few ounces up to 80 pounds pressure. With this "pound pressure" method of feeding, the blade will progress only as fast as it can freely remove the metal, and will automatically retard its feeding rate as the vertical length of cut increases or as the blade becomes dull. Similarly, the blade will automatically feed faster—within safe limits—when the vertical length of the cut decreases, and thus affect a very appreciable increase in cutting speed in contrast to the positive feed method of other band saw machines which determine a definite rate of feed travel regardless of the changing area of the stock being cut, the encountering of hard spots in the metal, etc.

Hand Feed

Feeding can also be done entirely by hand, if desired, by means of the convenient hand wheel, which places the machine under the perfect control of the operator when doing fine, delicate work, such as in jig, tool, and die making, pattern work, etc.

Chuck

Vise or chuck jaws are machined accurately, 6 inches high by 12 inches wide, and are of special quick-acting type. They are secured in planed T-slots of the machine table by means of ratchet dogs. Both jaws can be moved forward or back, will open 21 inches, can be shifted to either side of the blade for cutting on either the left or right-hand side, and are reversible to bring the angular sides close to the blade when mitering either right or left. Can also be removed entirely, leaving the machine table clear to fasten fixtures or work of irregular shapes.

Table

The saw table is surfaced, unusually large and heavy and free from obstruction, being 32 inches wide by 5 feet long. Has four ¾ inch T-slots, the two center ones machined and notched to hold the vise or chuck jaws. Both outer edges and center T-slots are machined straight-edges in exact parallel with the carriage travel, which are very convenient for laying-out special work such as double angles, setting gauges and angle plates, etc.

Design and Action

For those who desire to investigate or become familiar with the entire design and construction of this machine, the following description is given of all mechanical actions and moving parts.

The tight pulley of the belt driven machine, or the motor of the motor driven machine, drives the heavy bronze main driving shaft of the machine which runs in liberal sized journals at the rear of the machine. This bronze shaft is bored its entire length to admit a sliding steel spline shaft which in turn drives the upper three-step cone pulley. The lower cone pulley, which is driven by a 1½ inch leather belt from the upper cone pulley, drives a hardened steel bevel pinion which in turn drives the lower band wheel which is a machine-cut bevel gear.

The upright that carries the band wheels, cone pulleys, blade, etc., is mounted in a traveling carriage that runs forward and back the long way of the table on four ball bearings that roll in straight ways on the under side of the table.

This liberal sized carriage, which measures 26 inches by 18 inches, is obstructed from view in the photographs, since it is enclosed or hidden beneath the bed—away from all dirt and saw chips. In the photographs, the table also conceals the solid arm extending forward from the upright column just below the upper cone pulley, similar to the arm at the top of the column that supports the upper band wheel.

This lower arm carries the lower band wheel, lower blade guide rollers, and also acts as a mounting for the front swivel bearing which supports the upright column in the front of the traveling carriage.

The column is supported or suspended from the rear of the carriage by means of a clamp ring just in front of the upper cone pulley. The upper cone pulley runs on its own bearing within the clamp ring, fixed to the upright column.

The carriage is an open cage or rectangle, and the endless band saw blade runs within its rectangular opening.

There is no weight or parts of any kind carried on the steel spline shaft or drive shaft—not even the upper cone pulley. The entire weight of the moving column and all parts that travel with it is supported by the ball bearing carriage mounted in the machine table or bed; and the spline shaft carries nothing but its own weight, its whole function being to only rotate or drive the upper cone pulley.

The machine is assembled with the center of the spline shaft exactly in the plane of the table surface; so that when the upright is swung to cut at an angle, or revolved around the center of the spline shaft, the cutting edge

of the blade does not move laterally from its position in the center of the blade slot at the surface of the table.

The action of the power feed is as follows:

A 1-inch leather belt runs from a small pulley on the rear of the fixed tubular bronze main driving shaft to the feed pulley at the rear of the long feed shaft. This pulley therefore runs at constant speed whenever the machine is in operation, or whenever the main shaft is running; and it is not fixed to the long feed shaft, being supported in a bearing held by a bracket concealed behind the pulley guard. This feed pulley has cork inserts in its front side which contact with a smooth friction plate fixed to the rear end of the long feed shaft, forming a friction feed clutch of a type that will unquestionably outwear the machine.

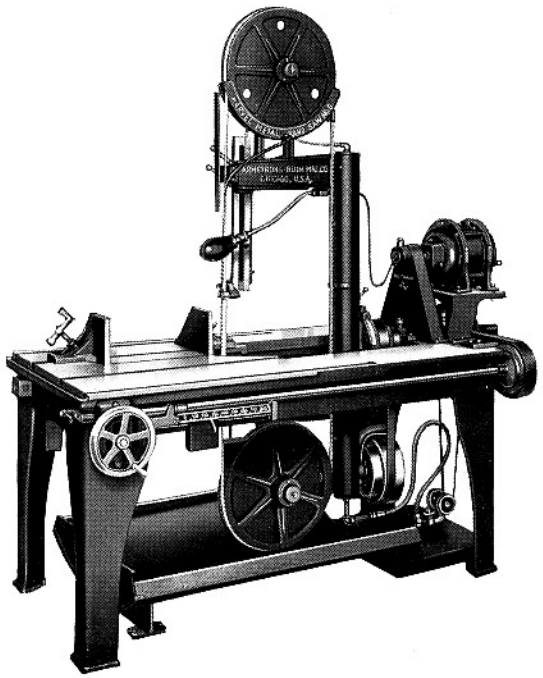
A hardened steel worm, fixed to the front end of the long feed shaft, engages a worm gear on the hand wheel or cross-shaft. A slight longitudinal movement of the long feed shaft is allowed, to engage and disengage the friction feed clutch and also to allow the worm and worm gear to act as a rack-and-pinion when the feed shaft is not revolving. The fork of the graduated scale balance beam or feed index engages a ball thrust collar on the long feed shaft, so that the weight or indicator on the beam will tend to hold the friction clutch in contact and revolve the long feed shaft. When the friction feed clutch drives or rotates the worm on the long shaft, the worm tends to act as a screw and therefore exerts an end thrust or tries to carry the long feed shaft forward which would disengage the feed clutch and stop the rotary motion of the worm; but at the same time, the balance beam is holding the clutch in contact and is causing the worm and worm gear to act as a rack and pinion. Therefore, the feed clutch is acting only intermittently to hold the balance beam in balance or horizontal. The balance beam or feed index is acting to equalize the driving power of the worm and its rack-and-pinion action, and at the same time is predetermining the feed energy exerted or the amount of feed in actual pounds imparted to the blade —depending only upon the position of the small weight or indicator which can be moved along the entire length of the graduated beam.

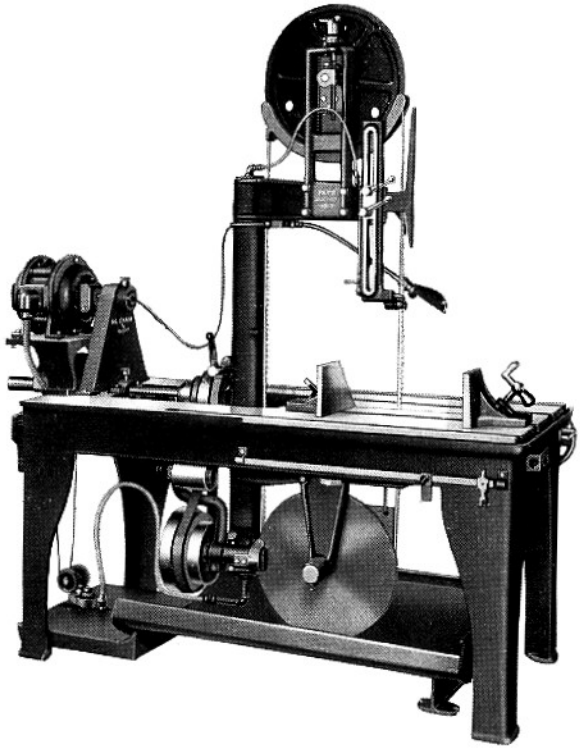
A convenient brass etched feed chart is attached to each machine, showing the recommended feed pressures or setting of the feed index indicator for each size and class of work within the entire range or capacity of the machine. The most inexperienced operator can therefore follow the feed chart without any guessing as to the proper feed to use on any and every job. All the operator does is to glance at the feed chart to read off the suggested feed for the particular job—determined by the height of the cut—slide the feed indicator to the figure on the scale beam to correspond with the chart, and throw in the thumb lever which engages the power feed. The feeding mechanism above described then automatically applies that very feed pressure—extremely sensitive—throughout the entire cut or travel of the carriage. After the cut is completed, the operator reverses the thumb lever to disengage the feed (which can be done even while the machine is cutting, if desired) to stop the feed, and then returns the carriage and blade to starting position quickly by means of the hand wheel.

The hand wheel shaft, or cross-shaft, is connected to the carriage by means of two hardened roller chains and cut steel sprockets, one on each side of the carriage, under the table. One end of each chain is fixed to the front of the carriage to pull the carriage forward; the chains then pass over the two sprockets fixed to the hand wheel shaft; the other ends of the chains pass back to the rear of the machine, around tension-adjusting idlers, and are fixed to the rear of the carriage to return the carriage or draw it backward to starting position Thus are the hand wheel shaft and carriage connected directly, so that any movement of the hand wheel or cross-shaft will move the carriage forward or back.

The feed worm and worm gear are engaged or disengaged by simply tripping a small thumb lever at the front or operator's position, which either raises the worm from the worm gear or drops the worm into mesh with the worm gear —similar to the worm and gear arrangement on the feed mechanism of drilling machines. When the power feed is thus disengaged, the hand wheel provides perfect hand control of the carriage for both hand feeding and return movement.

All feed parts are practically free from wear, including the friction feed clutch, and should last a lifetime without any attention.





View from left hand side, blade in upright position for straight cutting, the blade half-way through its 18 inch feeding travel.

Exclusive Features

1. Largest capacity metal band saw on the market, yet equally efficient on the smallest, most delicate work.
2. Most universal metal saw available. No work too large, none too small; cuts straight and cuts at 45 degree angles without moving the work.
3. The only metal band saw that will satisfactorily cut angles and mitres.
4. Every tooth of the blade does the same amount of work, no matter what size work is being cut—in contrast to large capacity reciprocating saws that use only a few teeth on average work.
5. All smooth, continuous, rotary motions. No "jerky" reciprocating actions.
6. Power feed controlled by means of direct reading feed index, instantly set or changed even while machine is running.
7. Perfect hand control or hand feed for delicate, accurate work.
8. Blade is always perpendicular so that notching, coping, and slotting can be done conveniently.
9. Automatic blade tension device applies correct tension to the blade, prevents blade breakage from over-strain, and assures proper tension for accurate work.
10. Three blade speeds provided by means of trouble-free cone pulleys.
11. Large, roomy table, with removable chuck, and four T-slots for holding special fixtures, gauges, and work of irregular shapes.
12. Chuck is quick action type with reversible jaws, and can be used on either side of the blade.
13. Equipped with centrifugal lubricant pump that delivers a stream of lubricant directly to the blade at the point of cutting. Surplus lubricant returned to the reservoir.
14. Convenient operator's lighting fixture that travels with the carriage.
15. Motor driven machines equipped with automatic magnetic motor starter, remote control start-and-stop push button station, and limit switch for automatic stop that cuts off the line current and stops the motor at any desired depth of cut—thus eliminating troublesome clutches.

Improvements

1. Standard SAE ball bearings, totally enclosed, in upper and lower band wheels, blade guide rollers, and carriage—to affect long life, rigidity, and accuracy of cut.
2. High carbon hardened bevel driving pinion. All cut gears.
3. Feed worm and worm gear enclosed in oil case, to eliminate wear.
4. Substitution of hardened roller chain and cut steel sprockets instead of the old flexible cable method for moving the carriage —an absolutely trouble-free method that will last a lifetime.
5. Pound pressure feed mechanism, instantly set or adjusted by means of direct reading feed index—eliminates all guesswork as to proper feeds for all classes of work, and is absolutely trouble-free.
6. Heavier guide roller holders employing eccentric action for roller adjustment instead of the old split-casting method—nothing to break or get out of order—more fool-proof.
7. Nickel plated ball handles on upper guide roller holder and angle tilting clamp that affect quick action in set-up and eliminate the use of wrenches.
8. Automatic blade tension device, assures proper blade tension.
9. Convenient operator's lighting fixture.
10. Automatic motor starter, with limit switch for automatic stop.

Guide Rollers

Saw blade guide rollers are dirt-proof ball bearings. There are two pairs of guide rollers, one pair just below the surface of the table, and one pair above the table. The upper pair is mounted on a sliding head so that it can be brought down close to the work.

Pump

A centrifugal pump (submerged) with two ball bearing belt idlers delivers a steady stream of lubricant to the blade at the upper guide rollers. A stop cock is provided to shut off the lubricant when desired for dry cutting.

Guards

Substantial guards are provided at all essential places.

Speed

Saw Speeds of 80, 115 and 200 feet per minute are obtainable by means of three step cone arrangement.

Motor Drive

Can be furnished motor driven complete with motor, or arranged for motor drive without motor, as desired by the customer; but we most urgently recommend that customers allow us to furnish the complete motor driven machine with motor so that we can connect and test machine and electrical equipment thoroughly as a complete operating unit before shipment. We have selected the motor and electrical equipment which in our judgment is best suited to the requirements.

When machine is furnished "arranged for motor drive without motor," certified dimension print of customer's motor, together with all specifications of speed, voltage, and phase must accompany the order.

Motor required: 1 H. P. ball bearing, 1800 RPM for 60 cycle, 30 cycle, and D. C.; 1500 RPM for 50 and 25 cycle.

Motor is direct connected to the main drive shaft of the machine by means of silent chain and sprockets which are covered with a cast iron guard. Automatic magnetic type motor starter with overload and undervoltage protection is mounted on the back of the machine below the motor, and is connected with start-and-stop push button station conveniently located at the front or operator's position. Wiring between push button, starter, and limit switch is enclosed in rigid conduit concealed under the machine table; and wiring between motor and starter is enclosed in Greenfield flexible metal conduit to allow raising or lowering the motor to take up stretch and wear of the chain.

Specifications

Normal capacity, 18 by 18 inches.

Maximum capacity of throat, depth 18½ inches, height 21 inches; at 45 degree angle, depth 18½ inches, height 14¼ inches.

Feed or travel of carriage and blade, 18½ inches.

Uses endless saw blade 14 feet 8 inches long by ¾ inch wide by .032 inch thickness. 12 pitch or 12 teeth per inch is standard and suitable for most work except for cutting thin sheet metal sections which require 18 pitch blade. 6, 8, 10, 12, 14, 18, and 24 pitch blades regularly carried in stock. Three band saw blades are furnished with each machine, 12 teeth per inch unless otherwise specified.

Three blade speeds, 80, 115, and 200 feet per minute, obtained by means of three-step cone pulleys which are a part of the machine proper. No countershaft required.

Belt driven machine is driven by 10 inch diameter tight and loose pulleys for 2 inch leather belt. Speed of machine pulleys 400 RPM for three speeds above mentioned. Belt shifter attached to the machine. Customer must furnish his own line shaft pulley, which must be straight face at least 4½ inches wide, of proper diameter depending upon the speed of his line shaft.

Standard electrical equipment, motor driven machines: Motor: 1 H. P. Ball Bearing, General Electric or Westinghouse, 1800 RPM for 60 cycle, and D. C.; 1500 RPM for 50 cycle and 25 cycle. Motor Starter: For A. C. motors, Allen-Bradley No. 709 automatic starter with separate push button station; for D. C. motors, Allen-Bradley No. 265 automatic starter with separate push button station. Limit Switch: (Provides automatic stop) Industrial Controller class 9007-H-1.

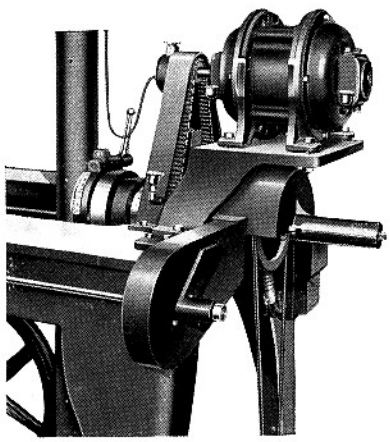
Diameter of band wheels, 18 inches.

Floor space, 3 feet by 6½ feet.

Height over all, 7 feet.

Height of table from floor, 32 inches (Bench height).

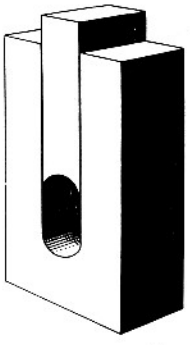
Shipping weight, belt driven machine, 1900 pounds; motor driven machine, 2000 pounds.



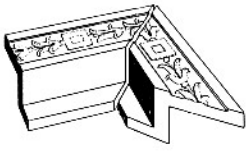
Showing silent chain drive and method of attaching motor.

Uses—The Work It Will Do

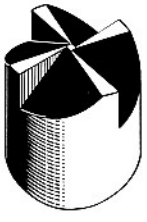
The Marvel Metal Band Saw No. 8 will cut off bar steel, pipe, tubing, structural shapes, etc., with a fine degree of accuracy, with maximum speed, with strict economy—will do everything that any other metal saw will do, and do a better job. In addition, a vast variety of work can be done, not possible on any other metal saw of ordinary type. The sketches below suggest only a few of many practical operations that make this machine a truly universal machine tool that will never be idle in any metal working shop.



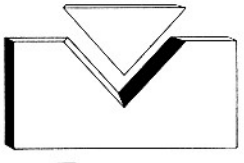
Just drill a hole and saw down to the hole to make a clamp or holding fixture quickly. The machine is always ready for work such as this. No special tools or special set-up required.



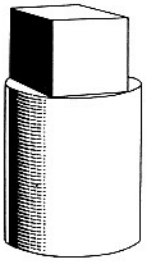
For mitering mouldings of cast iron, steel, sheet metal, copper, etc., the Marvel Band Saw cannot be equaled. Perfect miters are sawed without any lay-out or special equipment. The smallest window sash moulding and large structural shapes are mitered with the same ease and accuracy.



Example of roughing out tools, using dividing head and chuck. Similar operations will eliminate a great deal of expensive shaping and milling in the tool room.

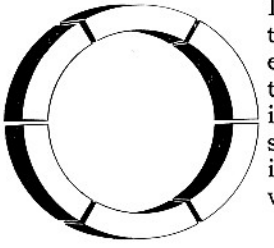


Sawing double angles and saving the piece cut out. This job would have required four difficult milling operations, but was done on the Marvel Band Saw with only two cuts, easily and quickly.

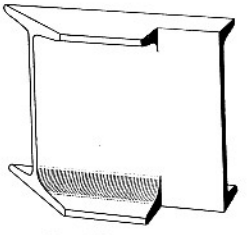


The end of this round bar has been squared by making eight saw cuts. This operation can be done in about one-quarter the time required to mill it.

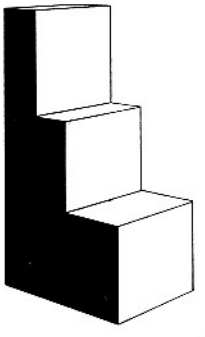
Shear blades, etc., can be cut from double width bars, then sawed in two at any angle desired, thus saving a great deal of metal and labor.



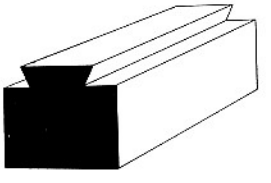
Index cutting. This ring is twenty-four inches in diameter and has been sawed into equal segments. Special indexing fixtures for this sort of index work are easily attached to the large work table of the machine.



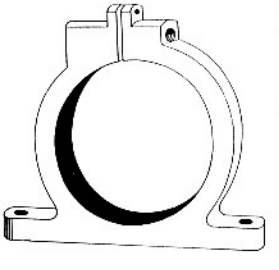
An I beam, mitered at one end, coped at the other end. The MARVEL Band Saw is truly indispensable in the ornamental and structural iron shops where this sort of work is a daily occurrence. The machine will cut off square, miter, and cope any bar shape from the smallest moulding to 18 inch I beams.



Use up your scrap steel. When you want an odd sized piece of steel, just cut it out of a piece of your scrap.



The shanks can be sawed on drop forge dies, etc. Quicker and cheaper than planing, and saves pieces sawed out that make good tool steel stock for punches, shear blades, etc.



Splitting clamp rings, connecting rods, bushings, collets, etc., is a simple operation on the Marvel Metal Band Saw. Perfect control of the machine, quick chucking facilities, accuracy and speed are features that especially adapt this machine to work of this class.

Manufactured by

Armstrong-Blum Manufacturing Co.

"The Hack Saw People"

333-357 N. Francisco Ave. Chicago, Ill., U. S. A.