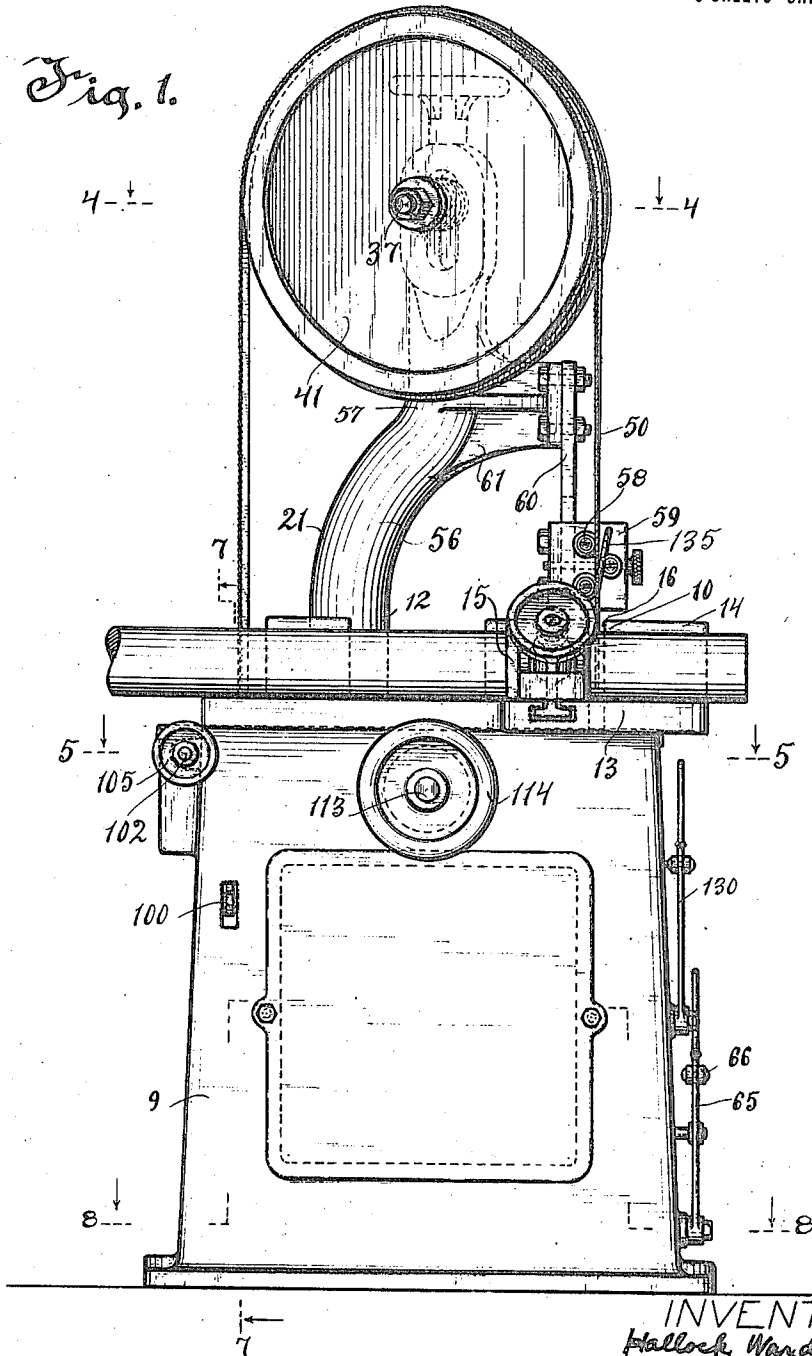


1,280,341.

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APPLICATION FILED JAN. 3, 1916.

Patented Oct. 1, 1918.  
6 SHEETS—SHEET 1.

*Fig. 1.*



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Fig. 2.

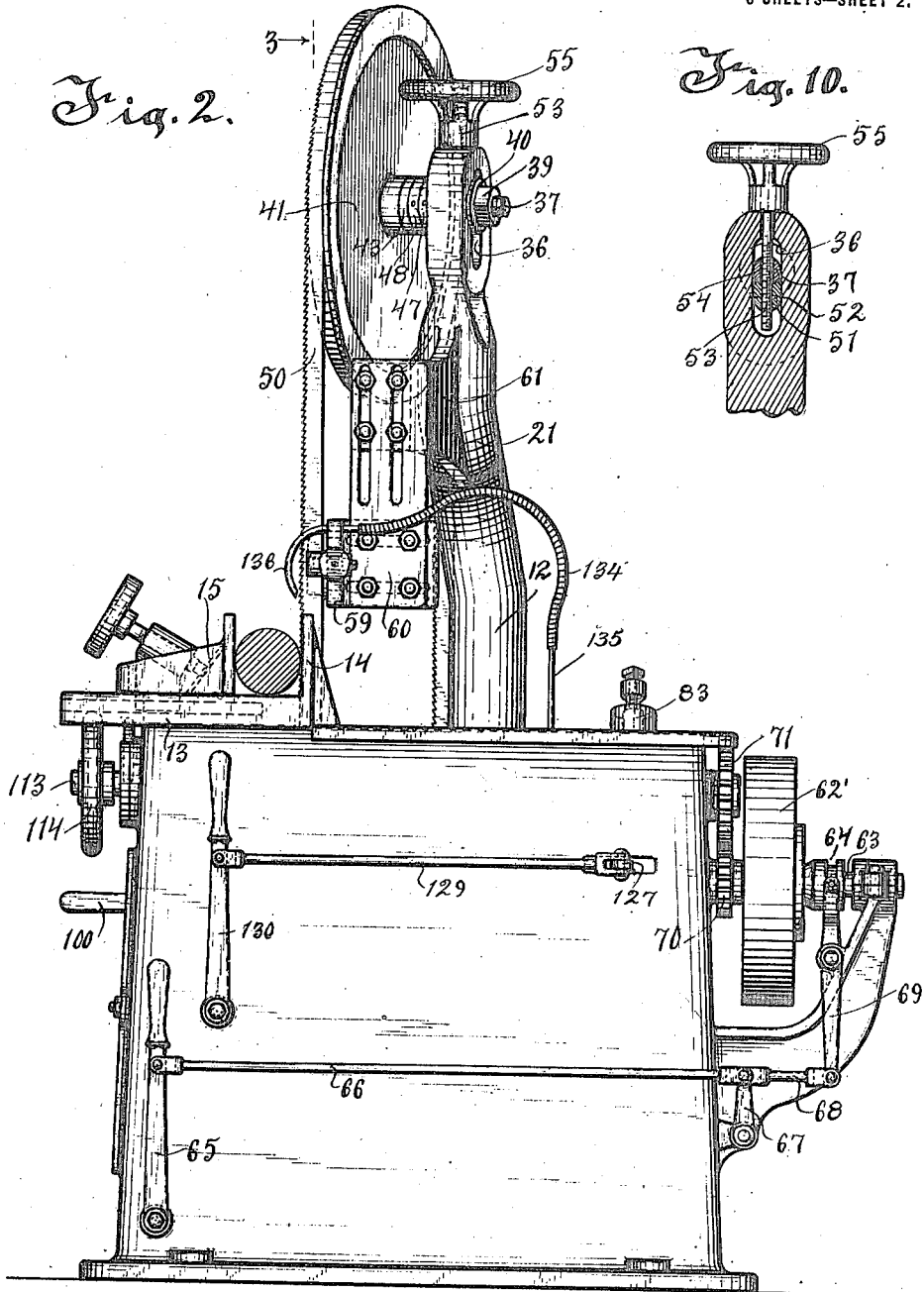
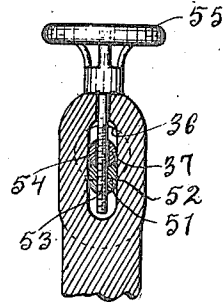


Fig. 10.



→ 3

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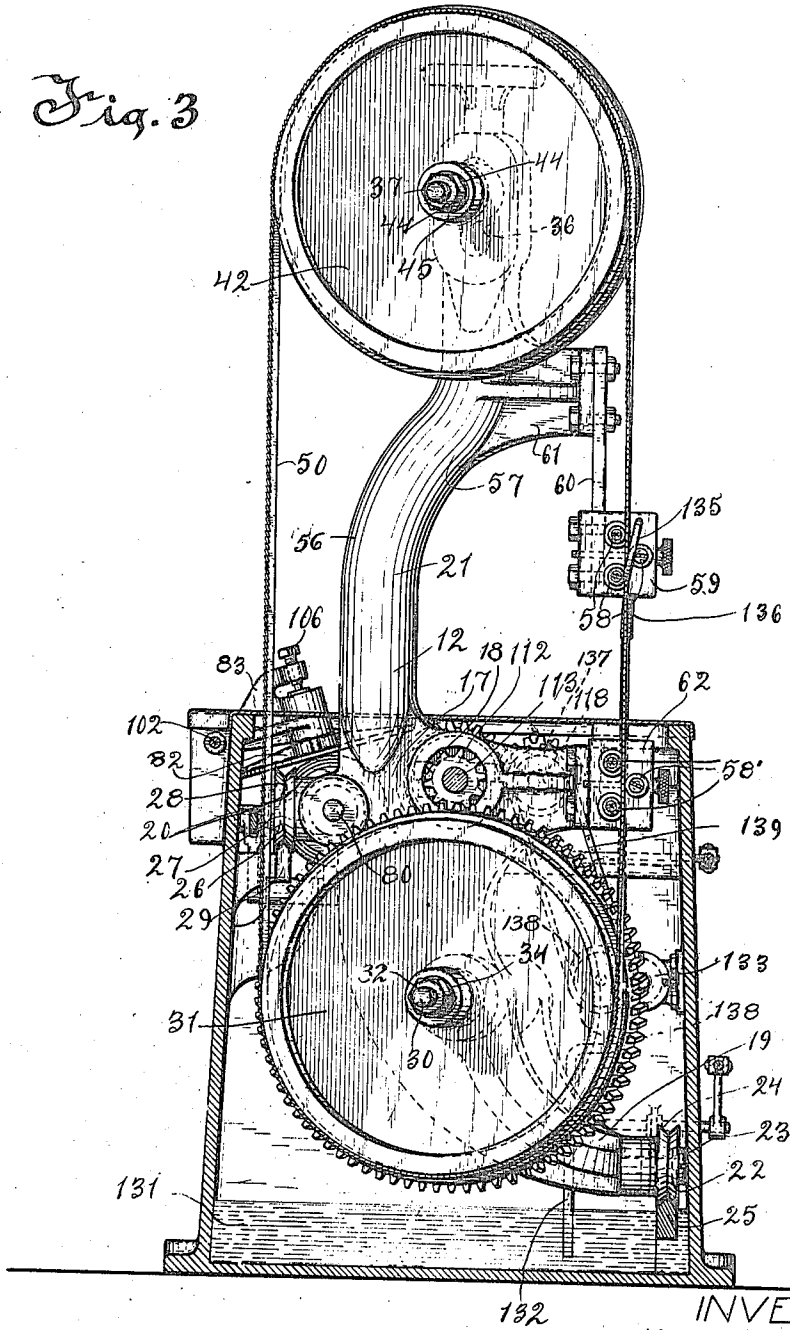
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Fig. 3



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6 SHEETS—SHEET 4.

1,280,341.

Fig. 4.

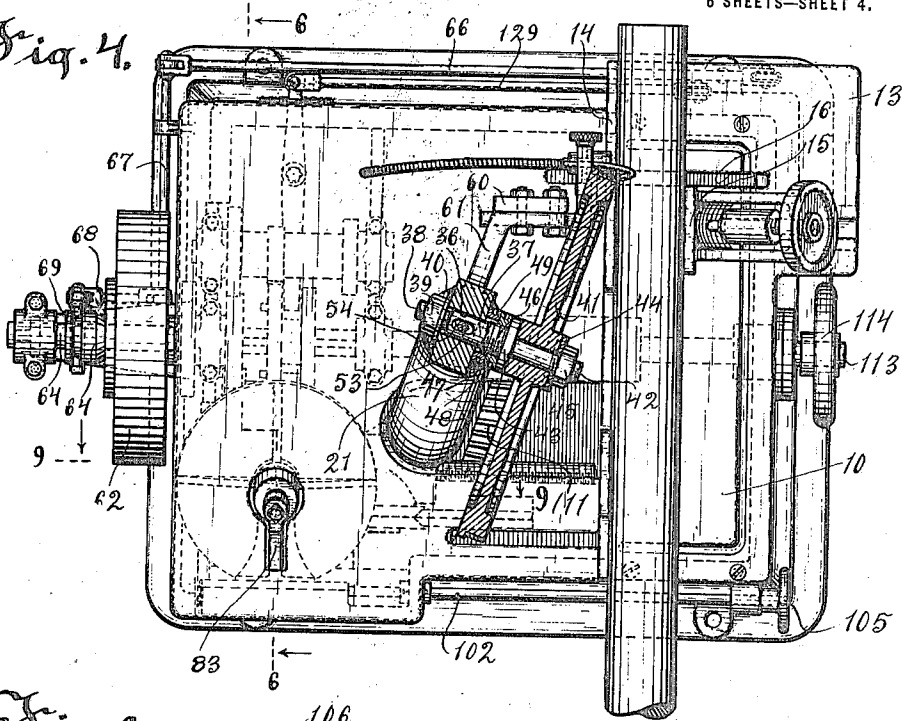
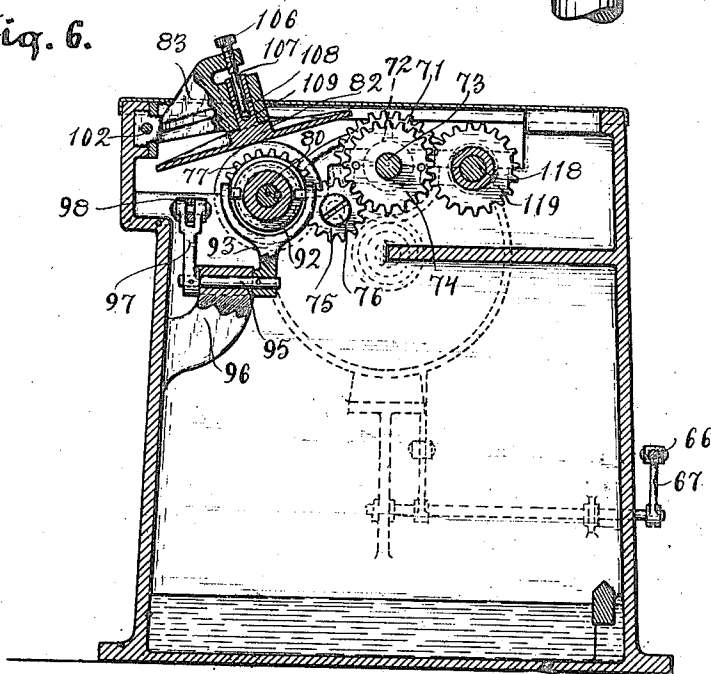


Fig. 6.



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6 SHEETS—SHEET 5.

Fig. 5.

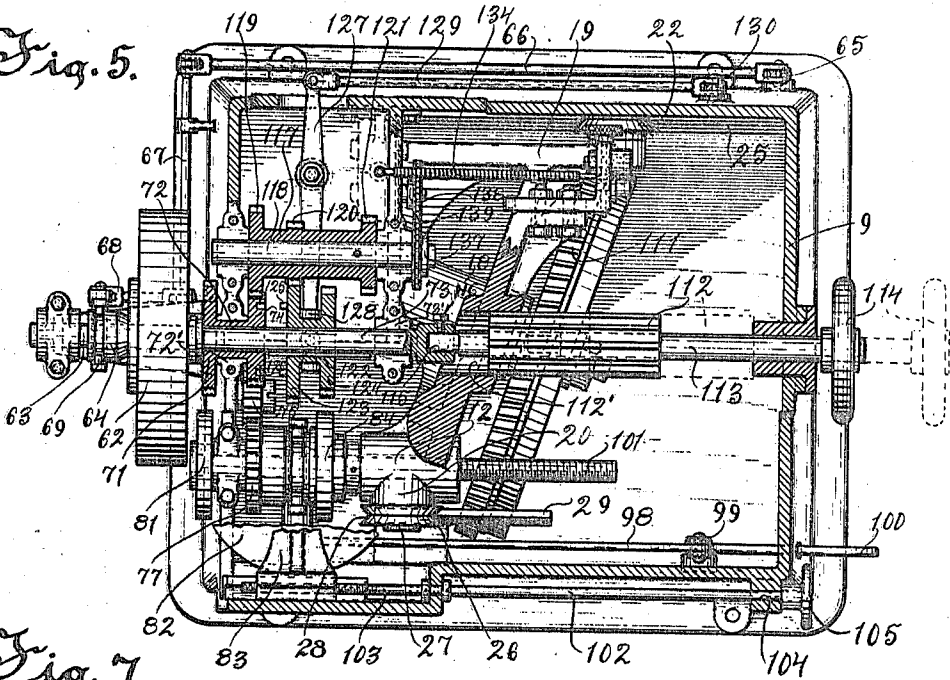
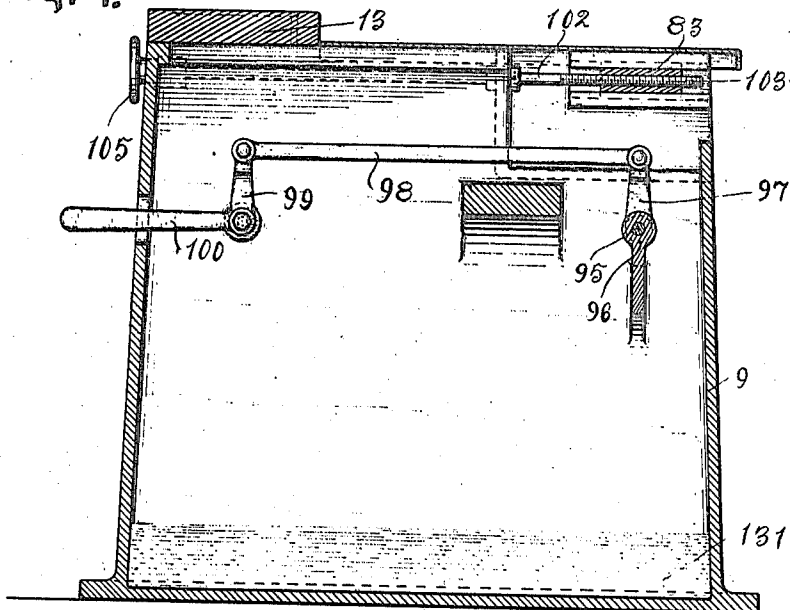


Fig. 7.



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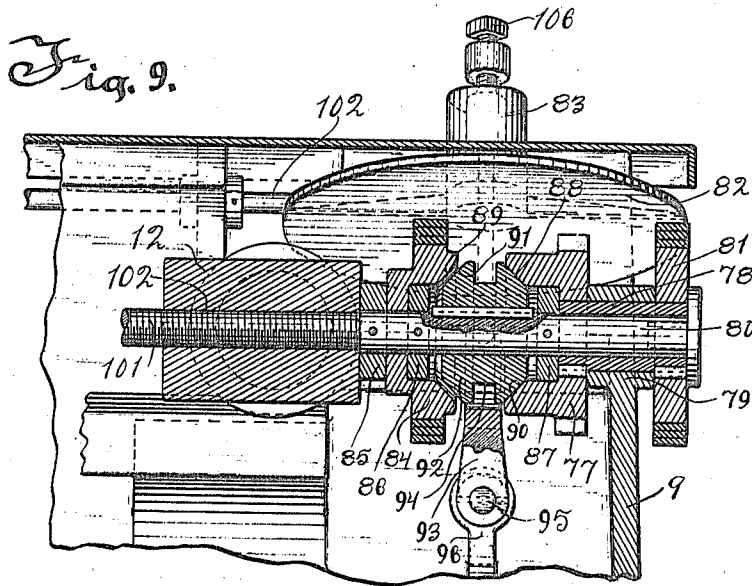
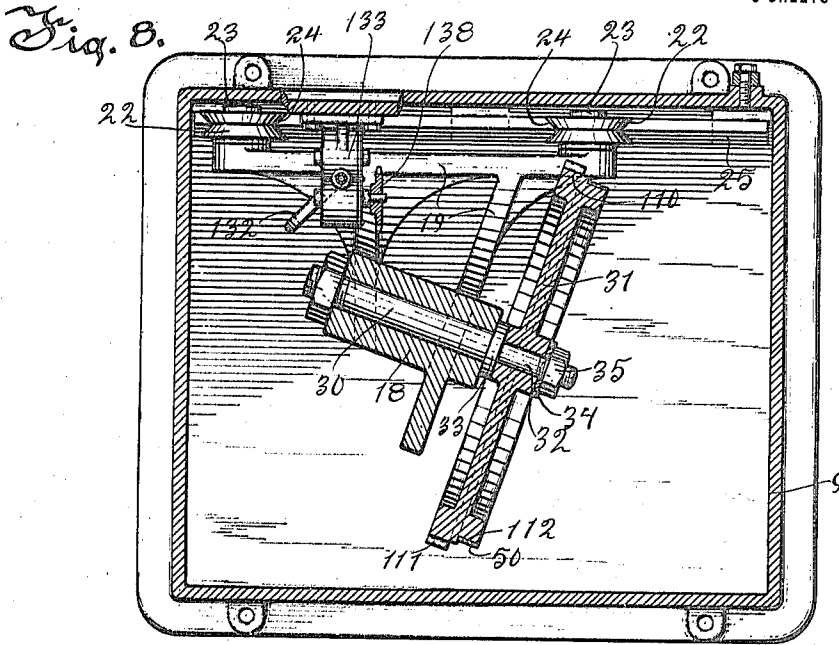
BAND SAW.

APPLICATION FILED JAN. 3, 1916.

1,280,341.

Patented Oct. 1, 1918.

6 SHEETS—SHEET 6.



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# UNITED STATES PATENT OFFICE.

HALLOCK WARDMAN, OF RACINE, WISCONSIN, ASSIGNOR TO J. MOORES JONES, OF RACINE, WISCONSIN.

## BAND-SAW.

1,280,341.

Specification of Letters Patent.

Patented Oct. 1, 1918.

Application filed January 3, 1916. Serial No. 69,716.

*To all whom it may concern:*

Be it known that I, HALLOCK WARDMAN, a citizen of the United States, and resident of Racine, in the county of Racine and State of Wisconsin, have invented new and useful Improvements in Band-Saws, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

10 The invention relates to band-saws.

The invention is designed more particularly to provide a band-saw of the type in which the material or work is held on a table and the bandsaw is mounted on pulleys carried by a movable frame which moves forwardly during the operation of the band-saw to saw through the work.

15 The invention is further designed to provide a band-saw mounted on a pulley in a frame movably mounted at three points in guideways upon the main frame of the machine so as to form a self-aligning frame.

20 The invention is further designed to provide a new and improved mechanism for feeding the movable saw carriage or frame.

25 The invention is further designed to provide a mechanism for imparting three speeds to the saw.

30 The invention is further designed to provide means for simultaneously cooling the saw and removing the chips.

35 The invention is further designed to provide a friction drive for feeding or driving the movable saw carriage which permits of slip, when a certain predetermined force is imparted to the saw, to prevent breakage of the saw.

40 In the present construction the saw-carrying pulleys are set at an angle to the line of movement, so that the return run of the saw is set back from the forward or cutting run, and the frame upon which said pulleys are mounted is provided with an angularly disposed gear provided with angularly disposed teeth which are constantly in mesh with a long gear carried by the main frame so that the angularly disposed gear not only rotates with respect to the long gear but may be moved lengthwise thereof on the movement of the saw carriage.

45 The invention is further designed to provide a new and improved form of band-saw.

50 The invention consists in the several fea-

tures hereinafter set forth and more particularly defined by claims at the conclusion 55 hereof.

In the drawings:

Figure 1 is a front elevation of the device embodying the invention;

Fig. 2 is a side elevation thereof;

Fig. 3 is a section taken on line 3—3 of Fig. 2;

Fig. 4 is a section taken on line 4—4 of Fig. 1;

Fig. 5 is a section taken on line 5—5 of Fig. 1;

Fig. 6 is a section taken on line 6—6 of Fig. 4;

Fig. 7 is a section taken on line 7—7 of Fig. 1;

Fig. 8 is a section taken on line 8—8 of Fig. 1;

Fig. 9 is a section taken on line 9—9 of Fig. 4;

Fig. 10 is a detail view of the upper pulley bearing.

In general the device comprises a supporting frame and base 9, a work-supporting table 10, a movable saw carriage 12, means for guiding the saw, means for driving the carriage, means for driving the saw, and means for cooling the saw and removing chips therefrom.

55 The work-supporting table 10 may be of any suitable construction, and in the present instance consists of a base plate 13 provided with a fixed jaw 14 forming with a movable jaw member 15 a vise in which to hold the work, a vertical slot 16 being provided in said table to permit the passage of the saw therethrough during the sawing operation, Figs. 1, 2 and 4.

60 The movable saw carriage 12 consists of a body portion 17 provided with a bearing 18, a depending curved forked portion 19 extending laterally from said body portion on one side thereof, a lug portion 20 extending laterally from said body portion on the other side thereof and an upwardly extending portion 21, Figs. 2, 3, 4 and 8. Means are provided for movably mounting the carriage 12 in the frame 10. This consists of a pair of rollers 22 pivotally mounted on studs 23 carried at the ends of the forked portion 19 and provided with peripheral V-shaped grooves 24 which register with an 105

inverted V-shaped track or guideway 25 mounted in one side of the frame 10 near the bottom thereof and a roller 26 pivotally mounted on a stud 27 carried by the lug portion 20 and provided with a peripheral V-shaped groove 28 which registers with an inverted V-shaped track or guideway 29 mounted in the other side of the frame 10 adjacent the upper part thereof, Figs. 3, 5 and 8. Thus the carriage 10 is mounted on the tracks in the frame at three points and this three point suspension is of decided advantage in maintaining the alinement of the carriage and together with the rollers reduces the friction necessary to be overcome in moving the carriage within the frame and forms a self-aligning easily operated carriage.

The movable saw carriage is provided with a stud shaft 30 secured in the bearing 18 and carrying the lower flanged saw-carrying pulley 31 at its end 32 between a shouldered portion 33 and a collar 34 secured in position by a nut 35 in threaded engagement with said shaft, Figs. 3 and 8. The upwardly extending portion 21 is provided with a vertical slot 36 for adjustably receiving a stud shaft 37, Figs. 2 and 3. The end 38 of said shaft 37 is threaded to receive a nut 39, a washer 40 being disposed between said nut and the frame 21. The upper flanged saw-carrying pulley 41 is carried on the other end 42 of the shaft 37 between a shouldered portion 43 and a washer or collar 44 secured in position by a nut 45 in threaded engagement with said shaft, Fig. 4, said shaft 37 is also provided with an intermediate threaded portion 46 upon which interiorly threaded tapered collars 47 and 48 are mounted, said collars being provided with recesses 49 for permitting them to be moved upon said stud shaft, Figs. 3 and 4. Thus the nut 39 and the collars 47 and 48 clamp the stud in position within the slot and if it is desired to tilt the shaft 37 vertically in the slot to tilt the pulley 41 so that the saw may more or less tightly contact with the flange of said pulley, the tapered collars 47 and 48 are adjusted to accomplish this purpose. The band saw 50 is mounted upon the peripheries of the upper and lower pulleys 41 and 31 and its rear edge rests against the flanged portions of said pulleys. Means are also provided for varying the tension of the saw band and this consists of means for raising and lowering the stud shaft 37 in the slot 36. This consists of a block 51 upon which the stud shaft rests and which is provided with a threaded aperture 52 for receiving the threaded shaft 53 which passes through a slot 54 in the shaft 37, said shaft 53 being provided with a hand wheel 55 so that the turning of said wheel will raise or lower the block 51 and consequently the shaft 37 and pulley 41 and thus vary the vertical tension on the band saw, Figs. 2, 4

and 10. The upper supporting arm 21 is curved rearwardly at 56 so as not to interfere with the saw and is curved outwardly at 57 so as to bring the stud shaft 37 in alinement with the stud shaft 30, Figs. 1 and 3. 70

The means for guiding the saw consists of guide means mounted above and below the top of the frame respectively. The upper guide means consists of three rollers 58, two of which are in the same vertical plane and the other of which is parallel to the first two so as to receive the saw therebetween, and preferably equi-distant from the first two, said rollers being mounted on a block 59 which is transversely adjustably mounted on a plate 60 which is vertically adjustably mounted on an extension 61 on the arm 21, Figs. 1, 2 and 3. The lower guide means consists of three rollers 58', two of which are in the same vertical plane and the other of which is parallel to the first two so as to receive the saw therebetween, said rollers being mounted on a block 62 which is adjustably mounted in the frame, Fig. 3. The saw 50 passes over the pulleys 41 and 31, the cutting run of the saw passing between the sets of rollers 58 and 58' mounted on the carriage so as to maintain the saw in a plane parallel to the movement of the carriage and to present the cutting edge of the saw at right angles to the base of the supporting table and thus correct the inclination due to the angularity of the axes of the pulleys. The use of three guide rollers arranged in the manner above described produces a construction with decided advantages over the usual form of two oppositely disposed rollers with the saw running between them as the three rollers form a large bearing area for the saw and the two rollers in the same vertical plane cooperating with the third form in effect a long guide without the friction attendant upon the use of long bearing surfaces. 75 80 85 90 95 100 105

The means for driving the saw carriage includes a drive pulley 62' loosely mounted on a drive shaft 63 and adapted to be connected up by a belt (not shown) to any suitable source of power. A clutch 64 is mounted on the shaft 63 to secure said pulley in driving engagement with said shaft and is controlled through a hand lever 65 operatively connected thereto through a link 66, a crank shaft 67, a link 68, and a forked lever 69 operatively connected to the clutch, Figs. 1, 2 and 5. The shaft 63 has a gear 70 mounted thereon which meshes with a gear 71 carried by a sleeve 72 journaled in bearings 72' loosely mounted on the saw drive shaft 73 which is journaled in bearing 73' and in the sleeve 72. The sleeve 72 carries another gear 74 which meshes with an idler gear 75 mounted on a stud 76 secured to the frame and the gear 75 meshes with a gear 77 keyed to a sleeve 78 journaled in a 110 115 120 125 130



bearing 79 in the frame 9 and loosely mounted on the carriage feed shaft 80, Figs. 2, 5 and 9. The sleeve 78 carries a friction wheel 81 which engages a friction disk 82 journaled in a longitudinally adjustable sliding bracket 83. Another friction wheel 84 engages the disk 82 and is loosely mounted on the shaft 80 between collars 85 and 86 secured thereto, Fig. 9. A collar 87 secured to the shaft 80 cooperates with the bearing 79 to secure the gear 77 in position on said shaft. The gear 77 and the wheel 84 are provided with oppositely disposed clutch faces 88 and 89 respectively which are adapted to be engaged by clutch faces 90 and 91 respectively on a clutch member 92 keyed to the shaft 80. Means are provided for operating the clutch member 92 comprising a forked arm 93, the arms of which are disposed in the annular groove 94 in said member, said forked arm 93 being mounted on a shaft 95 journaled in a bearing 96 in the frame and carrying an arm 97 to which one end of a link 98 is pivotally connected, the other end of said link being pivotally connected to a bell crank 99 journaled in the frame, one of the arms 100 of said crank forming an operating handle. The front end 101 of the feed shaft 80 is threaded and the threads thereof engage in the threaded bore 102 of the carriage 12, Figs. 5 and 9. In the construction above described the forward drive of the carriage is as follows: from the gear 77 to the wheel 81 connected therewith, disk 82, wheel 84, which is now in engagement with said wheel through the clutch faces 89 and 91 and thence to the shaft 80, thus rotating said shaft to move the carriage 12 forwardly advancing the saw during the cutting operation. After the cut is made the saw is returned on the return or rearward movement of the carriage by shifting the clutch 92 through the handle 100, link 98, crank 97, shaft 95, and arm 93 so as to bring the clutch faces 90 and 83 into engagement with each other whereupon the drive is direct from the gear 77 to the shaft 80 through the clutch member 92.

It will be noted that the wheels 81 and 84 are spaced apart from each other and thus engage different portions of the disk 82 so as to reduce the speed of the shaft 80 from that of the gear 77 in making the forward or cutting movement of the saw. Means are also provided for varying the speed of movement of the carriage which consists of means for varying the position of the disk 82 with respect to the wheels 81 and 84. This consists of means for moving the disk bracket 83 with respect to the frame and comprises a rod 102 journaled in the frame, and the rear end 103 of which is in threaded engagement with the bracket 83 and the front end 104 of which is provided with a

hand wheel 105, Figs. 5 and 7. Thus by turning the wheel 105, and consequently the shaft, the bracket 83 may be moved in the frame to bring different portions of the disk 82 in contact with the wheels 81 and 84. Means are also provided for varying the gripping engagement between the disk 82 and the wheels 81 and 84. This means consists of a thumb screw 106 in threaded engagement with the bracket 83 and extending into a recess 107 in the hub 108 of said disk and bearing against a ball 109 in the bottom of said recess, Fig. 6. Thus by the screwing in or out of the thumb screw more or less pressure may be exerted upon said disk 82 to hold it in engagement with the wheels 81 and 84. The use of a friction drive for feeding the saw carriage is of advantage in a device of this kind for if too great a pressure is put upon the saw during its cutting stroke, the friction gearing will slip and thus prevent the breakage of the saw.

The means for driving the saw comprise means for driving the lower band wheel 31. This means consists of a gear wheel 110, which, in the present instance, is formed integral with the wheel 31 and means for driving said gear. This gear wheel 110 is provided with angularly disposed teeth 111 and meshes with a long gear 112 mounted on a shaft 113 journaled at one end in the frame and carrying a hand wheel 114 at said end and detachably secured at its other end in a recess 115 in the shaft 73 by a set screw 116, Figs. 5 and 8. The long gear 112 passes through an aperture 112' in the carriage 12. The detachable connection of the shaft 113 with the shaft 73 permits said shaft 113 and gear 112 to be moved forwardly so that the band saw may be slipped over the band pulleys without interference. The shaft 73 is driven from the main drive pulley 62 through transmission gearing which will now be described.

This transmission mechanism comprises a gear-carrying sleeve 117 mounted on a shaft 118 journaled in the frame and carrying gears 119, 120 and 121, Fig. 5. The gear 119 is always in mesh with the gear 74 on the shaft 73. A shift gear member 122 is slidably, but non-rotatably mounted on the shaft 73 and carries gears 123 and 124 which are adapted to be thrown into mesh with gears 120 and 121 respectively. The member 122 is also provided with pins 125 which may be brought into register with apertures 126 in the gear 74. When the member 122 is shifted so that the gear 121 is in mesh with the gear 124 the drive will be from the gear 74, which is driven from the pulley 62 through gearing previously described, to the gear 119, gear 121, gear 124 to the shaft 73. This drives the shaft 73 at slow speed and consequently through the

shaft 113, gears 110 and 112 moves the band saw at slow speed. When the member 122 is shifted so that the gear 120 is in mesh with the gear 123, the drive will be from the gear 74 to the gear 119 as before, gear 122, gear 123 to the shaft 73 thus driving said shaft at second speed. When the member 122 is shifted so that the pins 125 are disposed in the apertures 126 in the gear 74 the drive will be direct from said gear 74 to the shaft 73 through the member 122 and the saw will be driven at high speed. Means are provided for controlling the speed of the saw comprising means for shifting the member 122 into different position. This means consists of a lever 127 pivotally mounted on the frame of the machine and provided with a forked arm 128 which engages the member 122, a link 129 pivotally secured at one end to said lever and pivotally secured at the other to a hand lever 130 pivotally mounted on the side of the machine, Figs. 2 and 5. The member 122 may also be shifted by the lever 130 through the linkage just described so as to be disposed between the gears 120 and 121 under which conditions the drive of the saw will be stopped.

The means for cooling the saw and removing the chips therefrom comprises means for directing a fluid under pressure against the cutting run of the saw. This medium may be any suitable fluid and in the present instance is soap water which is contained in the lower part 131 of the frame, as shown in Fig. 7. A tube 132 extends down into the fluid and connects with any suitable form of suction pump 133 and a flexible pipe 134 leads from the pump to a curved pipe section 135 secured in the saw guide block 59. The end 136 of the pipe 135 forms a nozzle which is turned so as to direct the stream of soap water against the saw. The soap water not only cools the saw but being delivered against it under pressure cleans off from it any adhering chips which might otherwise be carried around and get into the gearing within the frame. The pump 133 is driven continuously through a sprocket wheel 137 on the shaft 118 connected to a sprocket wheel 138 on the pump shaft by an endless chain 139.

The operation of the device in brief is as follows:—The work is placed on the supporting table 12 and securely clamped between the jaws 14 and 15 of the device. The position of the frictional disk 82 is adjusted with respect to the friction wheels 81 and 84 so as to drive the saw carriage forward at the desired speed, which of course is dependent upon the thickness of the material to be sawed, by turning the hand wheel 105. The clutch 92 is thrown into engagement with the wheel 84 for the forward travel of the carriage by manipulating the lever 100. The clutch 64 is then thrown in to connect the

pulley 62 with the drive shaft 63 by manipulating the lever 65. The clutch or shift gear member 122 is thrown in by manipulating the lever 130 so as to drive the band saw at either high, low or second speed as desired. The rotation of the drive shaft 63 will, through the gearing and transmission previously described, simultaneously drive the saw and move the carriage forward to make the cut. After the cut is made the lever 100 is shifted so as to cause the return or backward travel of the carriage and the lever 130 may be operated to shift the gearing to neutral position to stop the drive of the saw. While the machine is running a constant stream of soap water is directed against the saw to cool it and remove any chips adhering thereto. If it is desired to replace the saw the shaft 113 is disconnected from the shaft 73 to permit of so doing, as previously described.

The invention thus exemplifies a band saw machine which is well adapted for the purpose described and which may be run at high speed, the saw being cooled by the cooling medium and protected against breakage through the use of the friction drive.

I am aware that the details of construction herein set forth are capable of considerable variation and modification and consequently any construction which comes within the scope of the appended claims I deem to be within the spirit of my invention.

What I claim as my invention is:—

1. In a band saw machine, the combination, with a frame having guides, of a movable saw carriage having a three point suspension on said guides, band wheels carried by the carriage, a band saw running on said wheels, means to drive the carriage, and means to drive the saw.

2. In a band saw machine, the combination, with a frame provided with guides, of a movable saw carriage carrying rollers mounted on said guides to provide a three point suspension for the carriage upon the frame, band wheels carried by the carriage, a band saw running on said wheels, means to drive the carriage, and means to drive the saw.

3. In a band saw machine, the combination, with a frame provided with tracks, of a movable saw carriage carrying grooved rollers running on said tracks and engaging therewith at three points, band wheels carried by the carriage, a band saw running on said wheels, means to drive the carriage, and means to drive the saw.

4. In a band saw machine, the combination of a saw carriage, a band saw and its wheels mounted on the carriage, means to drive the saw, and means to guide the saw comprising three rollers spaced apart and

each having contact with one of the sides of the saw, two of said rollers being on the same side of the saw.

5. In a band saw machine, the combination, with a work-supporting table, of a reciprocating carriage movable in a plane across the plane of the work table, band wheels carried by the carriage, a band saw running on said wheels, the wheels being located at an angle to the line of movement of the carriage so as to dispose one run of the saw in advance of the other, means to drive the saw, and means to guide the saw comprising sets of rollers located above and below the work table adjacent the cutting run of the saw, there being three rollers in each set, two of said rollers being on the same side of the saw and equi-distant from the third roller on the other side of the saw.

6. In band saw, the combination with a frame provided with a work-table, of a saw carriage mounted on the frame and movable forward and backward in a plane across the plane of the work table, band wheels carried by said carriage, a band saw carried by said wheels, means for driving the saw, friction drive mechanism for driving the carriage forwardly whereby the slippage of said drive under a predetermined driving force will prevent breakage of the saw, and mechanism for moving the carriage backwardly.

7. In a band saw, the combination, with a frame provided with a work table, of a saw carriage mounted on the frame and movable forward and backward in a plane across the plane of the work table, band wheels carried by said carriage, a band saw carried by said wheels, means for driving the saw, variable speed friction drive mechanism for driving the carriage forwardly, and mechanism for moving the carriage backwardly.

8. In a band saw machine, the combination, with a frame, of a forwardly and backwardly moving carriage mounted thereon, band wheels carried by said carriage, a band saw carried by said wheels, means for driving the saw, and friction drive mechanism including friction wheels and a friction disk for driving said carriage, means for transversely varying the position of said friction disk with respect to said friction wheels and means for varying the pressure of the friction disk upon said friction wheels.

9. In a band saw machine, the combination, with a frame, of a forwardly and backwardly moving carriage mounted thereon, band wheels carried by said carriage, a band saw carried by said wheels, means for driving the saw, variable speed friction drive mechanism for moving the carriage forwardly including friction wheels and a friction disk, means for varying the position of said friction disk with respect to said wheels,

and means for transversely varying the pressure of the disk upon said friction wheels, and mechanism for returning the carriage.

10. In a band saw machine, the combination, with a frame, of a saw carriage, horizontally reciprocably mounted thereon, band wheels mounted on said carriage, a band saw carried by said wheels, means for driving the carriage, and means for driving the saw comprising a drive shaft journaled in the frame and provided with a long gear, a gear mounted on the carriage and operatively connected to one of said band wheels and in mesh with said long gear, whereby said saw may be continuously driven during the backward and forward movement of said carriage.

11. In a band saw machine, the combination, with a frame, provided with trackways and a work table, of a saw carriage provided with rollers mounted on said trackways, said carriage being movable transversely of said work table, band wheels mounted on the carriage, a band saw running on said wheels, means to drive the carriage, means to drive the saw, means to guide the saw, and means for cooling the saw and removing chips therefrom.

12. In a band saw machine, the combination, with a frame provided with a work table, of a saw carriage mounted in said frame and movable transversely of said work table, band wheels carried by the carriage, a band saw mounted on said wheels, variable speed mechanism for driving the carriage, and variable speed mechanism for driving the saw.

13. In a band saw machine, the combination, with a frame provided with a work table, of a saw carriage mounted on said frame and reciprocably movable transversely of said work table, band wheels carried by the carriage, a band saw mounted on said wheels, means for driving the carriage comprising a carriage feed shaft having a threaded end engaging with a threaded bore in the carriage and means for driving said feed shaft, means for driving the saw comprising a drive shaft journaled in the frame and provided with a long gear, a gear mounted on the carriage and operatively connected to one of said band wheels and in mesh with said long gear and movable lengthwise thereof during the reciprocal movement of said carriage, and means mounted on the carriage for guiding the saw.

14. In a band saw machine, the combination, with a frame provided with inverted V-shaped tracks, of a movable saw carriage carrying rollers having peripheral V-shaped grooves running on said tracks, said rollers engaging said tracks at three points, band wheels carried by the carriage, a band saw running on said wheels, means to drive the carriage, and means to drive the saw.

15. In a band saw machine, the combination, with a frame, of a forwardly and backwardly moving carriage mounted thereon, band wheels mounted on said carriage, a band saw carried by said wheels, means for driving the saw, friction drive mechanism including a friction wheel and a movable friction disk for moving the carriage forwardly, and mechanism for returning said carriage.
16. In a band saw machine, the combination, with a frame of a forwardly and backwardly moving saw carriage, band wheels carried by the carriage, a band saw mounted on said wheels, variable speed friction drive mechanism for moving the carriage forwardly, variable speed mechanism for returning the carriage, and variable speed mechanism for driving the saw.
17. In a band saw, the combination, with a frame provided with a work table, of a saw carriage mounted on said frame for forward and backward movement transversely of said work table, band wheels carried by the carriage, a band saw mounted on said wheels, a drive shaft journaled in the frame, means for driving the carriage comprising a carriage feed shaft, a gear drive between said drive shaft and carriage feed shaft, a friction drive between said drive shaft and carriage feed shaft, a clutch for shifting the drive of the carriage feed shaft from the gear drive to the friction drive, and means for driving the saw.

In testimony whereof I affix my signature, in presence of two witnesses.

HALLOCK WARDMAN.

Witnesses:

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CHRISTIAN JOHNSON.