UNITED STATES PATENT OFFICE.

JAMES T. MILNE, OF BRANTFORD, CANADA, ASSIGNOR TO THE WATEROUS ENGINE WORKS COMPANY, LIMITED, OF SAME PLACE.

BAND-SAW MILL.

SPECIFICATION forming part of Letters Patent No. 455,635, dated July 7, 1891.

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To all whom it may concern:

Be it known that I, JAMES THOMPSON MILNE, master mechanic, of the city of Brantford, in the county of Brant, in the Province of Ontario, Canada, have invented a certain new and Improved Band-Saw Mill, of which the following is a specification.

The object of the invention is to provide a strong, simple, and easily-regulated band-saw mill in which all parts are readily got at and adjusted; and it consists in the peculiar formation and arrangement of mechanical parts hereinafter more particularly explained, and then definitely claimed.

Figure 1 is a perspective view of my improved band-saw mill with portions broken away to expose the working parts. Fig. 2 is a detail showing the means for adjusting the bearing-boxes of the shaft of the top pulley. Fig. 3 is a cross-section of the log-carriage, showing the means for automatically adjusting the log-carriage away from the saw when the said carriage is making its return-trip. Fig. 4 is a sectional elevation of the saw-carriage, showing the mechanism for operating it. Fig. 5 is an enlarged detail showing the means for raising and lowering the frame by which the shaft of the top pulley is supported. Fig. 6 is a detail of the saw-guide. Fig. 7 is a detail of two disks of the friction driving-gear. Fig. 8 is a detail of one of the pulleys of the rope-drive. Fig. 9 is a detail of the friction mechanism by which the saw-guides are instantly raised or lowered, as required.

In the drawings, A represents the triangular base-plate, and B the triangular top plate. The corners of the two plates are connected together by the columns C, which fit into sockets formed on the corners of each of the plates A and B, as indicated. The base-plate A is supported on any suitable kind of foundation—for instance, such as indicated in the drawings; but in this part I claim nothing new.

D is a bracket pivoted at one end on the lugs *a*, formed on the bottom of the base-plate A, its other end extending between the lugs *b*, also formed on the bottom of the base-plate A, as indicated. Bearings E are formed at each end of the bracket D and support the shaft F, on which the saw-pulley G is fixed. A clevis H is pivoted on the bracket D, and its shank extends through the base-plate A, a nut being screwed onto the said shank on the top side of the base-plate A, and it is this clevis so connected to the base-plate A which supports the otherwise loose end of the bracket D. Consequently this end of the said bracket may be raised or lowered, as may be necessary, in order to make the shaft F absolutely horizontal. A set-screw I, screwed through the base-plate A and pressing against the top of the bracket D in proximity to the clevis H, serves as a lock to secure the rigidity of the bracket D when it has been properly adjusted by the nut of the clevis H.

The driving-pulley J, which is fastened to the shaft F, is mostly shown by dotted lines, for if entirely shown in full lines it would hide the friction driving mechanism of the machine.

K and L are disks (shown partly broken away) fixed to the shaft F. These disks may be independently connected to the said shaft F, or they may be connected to the driving-pulley J.

M is a beveled friction-pulley fixed to the shaft N and held in contact with the face of the disk K. On the opposite end of the shaft N a friction-pulley N′ is fixed.

O is a friction-disk (shown in dotted lines) fixed to the shaft P, on the opposite end of which a friction-pulley Q is fixed.

Q′ is a friction-pulley fixed to the shaft O′, on the opposite end of which is fixed a spur-pinion P′, meshing with the spur-wheel M′, which operates the rope-driving gear of the carriage L′. The shaft O′ is carried in bearings, so that it may be slightly moved so as to come in contact with either the friction-pulley N′ or the friction-pulley Q, one pulley being designed to drive the friction-pulley Q′ in one direction, while the other friction-pinion drives it in the opposite direction, a lever K′ being provided for the purpose of enabling the sawyer to throw the friction-pulley Q′ against either one or other of the pinions referred to, as may be necessary to propel the carriage L′ in the direction required. The periphery of the friction-disk O acts against the face of the disk L, from which it derives its motion.

In order to enable the speed of the shaft P to be increased or decreased, as required, I connect the friction-disk O to the said shaft in such a manner that it may be longitudinally adjusted thereon, and I connect a sleeve 46 to the friction-disk O in such a manner as not to interfere with the revolving of the said disk with the shaft, the said sleeve having a rack formed on it to engage with a pinion 47, fixed to the shaft 48, which is carried to a point indicated in Fig. 1, easily accessible to the sawyer. By turning the shaft 48 the pinion 47, acting on this rack, formed on the sleeve 46, moves the said sleeve, which carries the friction-disk O with it, moving it nearer to or farther from the center of the disk L, thus decreasing or increasing the speed of the said disk O.

It will be observed on reference to Fig. 1 that the end of the shaft P is carried in a bracket 49, which is secured to the frame of the machine by a bolt 50, which passes through an elongated hole made in the said bracket 49. The spring 51 presses against the bracket 49 so as to force the periphery of the friction-disk O against the face of the friction-disk L.

R is a triangular frame, having bearing-boxes S, T, and U fixed, respectively, to each corner of the said frame. The bearing-box S is fitted onto the rod or column C, while the bearing-boxes T and U fit onto the rod or column V, which is secured to the plates A and B, as indicated.

W is a rod pivoted, as shown in Fig. 2, on the top of the frame R. The lower end of this rod is screw-threaded and passes through a nut X, which rests upon the spring-cushion Y, (see Fig. 5,) which spring-cushion is supported on the short arm of the pivoted lever Z. The long arm of the lever Z is connected to the lever 2, which is itself pivoted on a bar 3, extending from the base-plate A, as shown. An adjustable ball 4 is placed on the lever 2, so that the upward pressure against the frame R may be regulated by the adjustment of the said ball. It will be observed, therefore, that the triangular frame R is supported by the lever Z, and the support is elastic, as the lever Z is supported by the adjustible ball 4.

On reference to Fig. 2 it will be seen that the rod W is hinged on a bracket 5, fixed to the top of the triangular frame R. This hinging of the rod W permits the said rod to be thrown out of perpendicular without straining any of the connections. The fact that the rod is supported by the lever Z, which is movable, necessitates a provision of this kind.

6 is a bearing-box bracket pivoted at *d* and supporting the axle 7, on the end of which the band-saw pulley 8 is fixed. It will be observed that this band-saw pulley 8, as well as the saw-pulley G, has a continuous web extending from the rim to the hub. In Fig. 1 a portion of the web of the pulley 8 is broken away for the purpose of exposing the hub 9, which is located entirely on one side of the web, and as this web is in the center of the pulley 8 the bearing-box against which it butts is brought inside of the saw strain. The solid continuous web gives the wheel greater strength and presents less resistance to the revolving of the pulley than the armed pulleys heretofore in use. I make the rims of both pulleys 8 and G of soft iron, smoothly turned to a perfect shape, which presents an adhesive surface to the saw, and consequently less strain on the saw is required. The bearing-box bracket 6, which is pivoted at *d* on the bracket 5, which is fixed to or forms part of the triangular frame R, is supported at its other end by the screwed spindle 10, which is supported, as indicated in Fig. 2, by a lug 11, cast onto the frame R. Collars *f*, fixed to the spindle 10 on either side of the lug 11, hold the spindle 10 to the said lug in such a manner as to permit the free revolving of the spindle without allowing any vertical movement thereof. The screw-threaded end of the spindle 10 passes through a nut formed in the lug 12, which is cast or otherwise fastened to the bearing-box bracket 6. The revolving of the spindle by means of the hand-wheel 13 will thus raise or lower the end of the bearing-box bracket 6, on which the lug 12 is fixed. A pinch-screw 14 is screwed into the frame R through a vertically-elongated hole made in the bracket 6. This pinch-screw is tightened in order to hold the bracket 6 solid after it has been adjusted by the spindle 10.

With the view of laterally adjusting the axle 7, so as to make it run true with the lower axle, I journal on one of the columns C an eccentric 15 and connect a lever 16 to the said eccentric. This lever 16 is connected by the rod 17 to a lever 18, pivoted on the frame R and having screwed through its other end a spindle 19, suitably carried in a bracket 20, connected to the bottom of the frame R. A bar 21 is located on each side of the eccentric 15, and is secured to the frame R, as shown. As the bars 21 press against the eccentric 15, the revolving of the said eccentric will act against either one or other of the bars 21, and in this way the turning of the eccentric 15, will push the frame R either toward one side or the other, and this is effected by simply revolving the spindle 19.

The following simple means are provided for the purpose of raising and lowering the saw-guides 22, by which means the said guides may be raised or lowered instantaneously by the sawyer without letting go of the feed-lever, as he has merely to push or pull the rod 23, which, acting on the pivoted lever 24, connected at its other end to the spindle 25 of the friction-disk 26, tilts the said disk so that one edge of its face will come in contact with the revolving axle 7, causing the spindle 25 to revolve in either one or other direction, and as the cord 27, which is connected to the saw-guides 22, is carried round a drum 28, fixed to the spindle 25, the revolving of the said spindle will act on the said cord and cause it to raise or lower the guides, as desired. This

cord, it will be noticed, is fixed at one end to the saw-guides 22, is then wound entirely round the drum 28, and thence it passes over the pulleys 29, and from thence to the weight 30, as shown in Fig. 1.

On reference to Fig. 4 my improved rope-driving mechanism will be seen. 31 is the rope or cable, both ends of which are connected to the ratchet-wheel 52, suitably carried on the carriage L′ and provided with any suitable means for turning and holding it from revolving. The rope or cable 31 passes round grooved pulleys 33, located one at each end of the saw-carriage track 34. It is also carried round a grooved pulley 35, fixed to the spur-wheel M′, which derives its motion from the friction mechanism hereinbefore described. The rope or cable 31 is carried over the pulley 35, then around under it, and over a guiding-pulley 36, which causes the rope or cable 31 to closely hug the grooved pulley 35. By adjusting the ratchet-wheel 52 the rope or cable 31 may be tightened or loosened, as required. The carriage L′ is supported by the axles 37, which are loosely journaled in suitable bearings connected to the said carriage. The wheels 38, connected to the axle 37, rest upon suitable tracks, as indicated. When the spur-wheel M′ is put into motion by the friction-gear hereinbefore described, the rope or cable 31 is pulled in either one or other direction, according to the way in which the said spur-wheel M′ is caused to revolve. In this way the carriage L′ is caused to travel in the direction required.

With the view of providing automatic means for throwing the log clear of the saw on the return-trip of the carriage L′, I loosely journal on the axles 37 the hub of an arm 39 and cut or form round the circumference of the said hub a cam-groove, as shown in Fig. 3. In this groove I fit a pin 40, which extends from a bracket 41, fixed to the frame of the carriage L′. The hub of the arm 39 is held between two collars 42, fixed to the axle 37. The cam-groove in the hub of the arm 39 is shaped so that the revolving of the said hub will act against the pin 40, so as to push the carriage L′ toward one side or the other. The arms 39 are connected together by a rod 43. In order to make this shifting of the carriage automatic, I connect to the end of one of the arms 39 a foot 44, designed to rest on the rail 53 between the tracks of the wheels 38. This foot 44 is connected to the arm 39, as indicated in Fig. 3, in such a manner that a spring 45 shall hold the foot 44 against the rail 53, but at the same time permit it to recede at any point where more than the normal strain is directed against it. When the carriage L′ is moved toward the saw, the action of the foot 44 on the rail causes the arm 39 to move, thus revolving the hub of the said arm and causing the groove made in the said hub to act against the pin 40 and move and hold the carriage L′ against the saw. When the carriage is reversed and commences to travel back, the foot 44, acting on the rail 53, moves the arm 39 in the opposite direction, thus reversing the action and causing the carriage to move away from the saw.

What I claim as my invention is—

1. In a band-saw mill, a band-saw frame consisting of a triangular base-plate A, rigidly connected to a triangular top plate B by vertical columns C, the shaft of the lower band-saw pulley G being carried in bearings formed in a bracket D, pivoted and adjusted upon the bottom of the base-plate A, substantially as and for the purpose specified.

2. The saw-pulley shaft F, journaled in bearings on the bracket D, which is pivoted at one end on the lug *a*, formed on the bottom of the base-plate A, the other end of the bracket D extending between lugs *b*, formed on the bottom of the base-plate A, in combination with the clevis H, pivoted on the bracket D, and a shank extending through the base-plate A and provided with a suitable nut, a set-screw I being screwed through the base-plate A to press against the top of the bracket D, substantially as and for the purpose specified.

3. A band-wheel and its shaft, a triangular frame R, provided with bearings for the shaft and bearing-boxes S, T, and U to fit onto the vertical columns C and V, and a rod W being pivoted on top of the frame R, in combination with a nut X, provided with a suitable handle and screwed onto the rod W, and a spring-cushion Y, arranged to support the nut X, substantially as and for the purposes specified.

4. A band-wheel and its shaft, a triangular frame R, provided with bearings for the shaft and bearing-boxes S, T, and U to fit onto the vertical columns C and V, a rod W being pivoted onto the top of the frame R, and a nut X, screwed onto the rod W and supported by the spring-cushion Y, resting on the short arm of the pivoted lever Z, in combination with the said pivoted lever Z, connected to the lever 2, pivoted on the bar 3, and provided with an adjustable weight 4, substantially as and for the purpose specified.

5. An eccentric 15, journaled on the column C, a lever 16, connected to the said eccentric and by the rod 17, and a lever 18, pivoted on the frame R and operated by the spindle 19, in combination with bars 21, located on each side of the eccentric 15 and secured to the frame R, as shown, and a band-wheel and its shaft supported by said frame, substantially as and for the purpose specified.

6. A saw-guide 22, journaled on the vertical column C and supported by the cord 27, which is carried around a drum 28, fixed to the spindle 25, and is held tightly on the said drum by the weight 30, in combination with the shaft 7, and the friction-disk 26, fixed to the adjustable spindle 25, the pivoted lever 24 being connected at one end to the spindle 25 and at its other end to the rod 23, substantially as and for the purpose specified.

7. The rope or cable 31, with both ends con-

nected, as described, to the ratchet-wheel 52, suitably carried on the carriage L′, the said rope being carried around groove-pulleys 33, located one at each end of the saw-carriage track 34, and around a groove-pulley 35, fixed to the spur-wheel M′, which meshes with the spur-pinion P′, and around a groove-wheel 36, in immediate proximity thereto, substantially as and for the purpose specified.

8. An arm 39, provided with a hub where it is journaled on the axle 37, a cam-groove being cut around the said hub, and the pin 40, attached to the carriage and fitting in the groove, in combination with the foot 44, having a stem sliding in guides in the lower part of the arm 39 and actuated by the spring 45, surrounding said stem, so as to elastically hold it in contact with the rail 53, substantially as and for the purpose specified.

9. In combination with a saw-mill carriage and an axle 37 thereof, an arm 39, having its upper end journaled on said axle, said arm having a hub with a spiral groove in the same, a pin 40, attached to the carriage and working in the groove, a foot 44, yieldingly attached to the lower end of said arm, and a rail 53, coacting with said foot, substantially as described.

Brantford, June 5, 1890.

JAMES T. MILNE.

In presence of—
D. LEONARD,
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