

No. 693,337.

Patented Feb. 11, 1902.

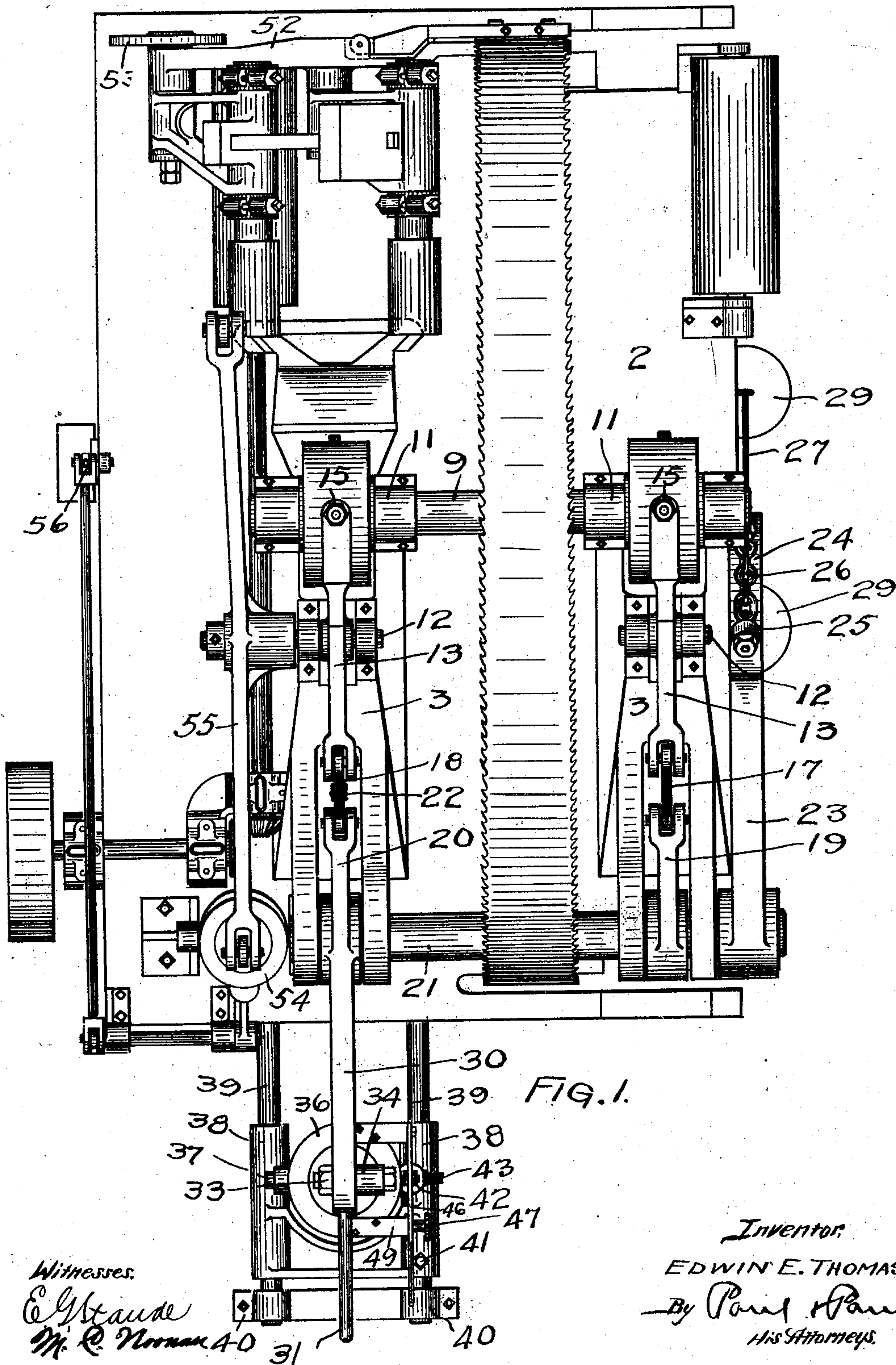
E. E. THOMAS.

BAND MILL.

(Application filed Nov. 8, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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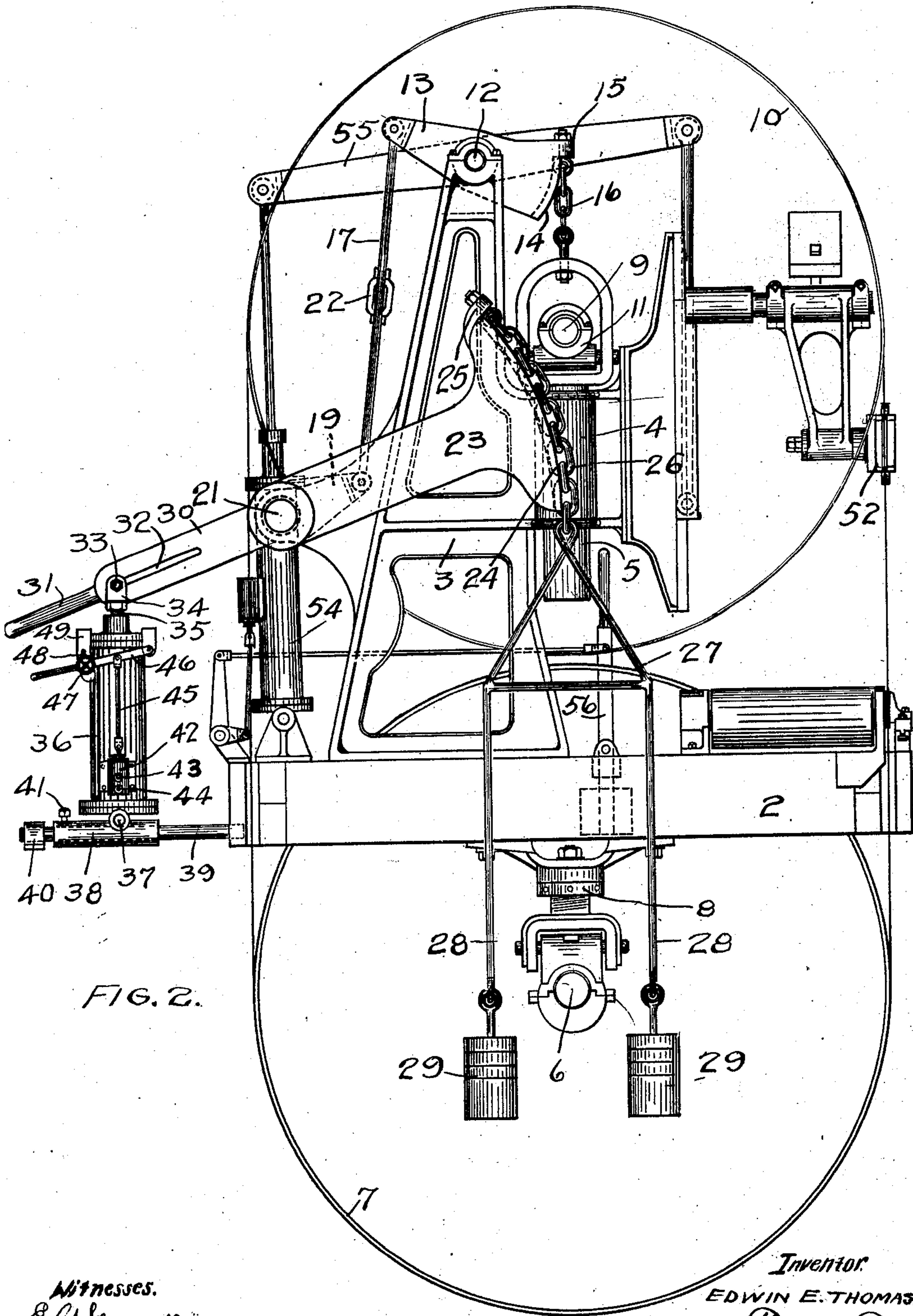


FIG. 2.

Witnesses.
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By *Paul & Paul*
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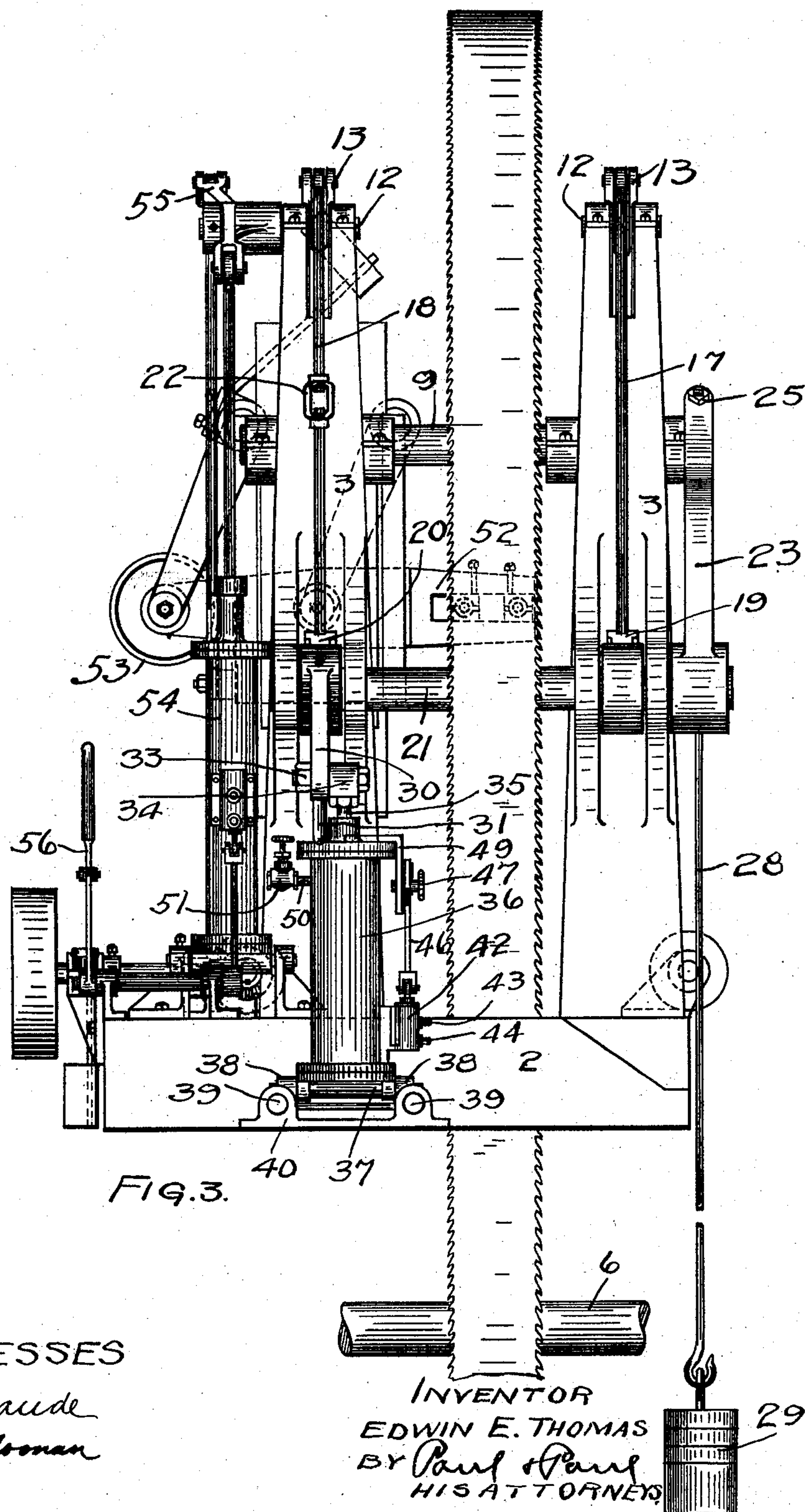
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3 Sheets—Sheet 3.



WITNESSES
C. G. Staude
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INVENTOR
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UNITED STATES PATENT OFFICE.

EDWIN E. THOMAS, OF ST. PAUL, MINNESOTA, ASSIGNOR OF ONE-HALF TO UNION IRON WORKS, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

BAND-MILL.

SPECIFICATION forming part of Letters Patent No. 693,337, dated February 11, 1902.

Application filed November 8, 1901. Serial No. 81,581. (No model.)

To all whom it may concern:

Be it known that I, EDWIN E. THOMAS, of St. Paul, Ramsey county, Minnesota, have invented certain new and useful Improvements in Band-Mills, of which the following is a specification.

My invention relates to sawmill machinery.

In the operation of a band-mill it is necessary several times each day to lower and raise the upper band-wheel for the purpose of removing and replacing and applying tension to the saw. Heretofore it has been customary to counterbalance the upper wheel and operate the same with a lever mechanism which, however, has proved awkward and cumbersome to handle, besides making expeditious movement of the wheel difficult.

The object, therefore, of my invention is to provide conveniently-operated means for effecting a quicker movement of the upper band-wheel, to the end that it may be more easily and rapidly lowered and raised in removing the saw and putting the saw under tension when replaced.

A further object is to provide means for applying tension to the saw which will be much more sensitive than a dead counterbalance-weight and will respond more quickly to adapt the tension to the varying strains to which a saw is subjected. Other objects of the invention will appear from the following detailed description.

The invention consists generally in providing a fluid-pressure motor having operative connections with the upper band-wheel for raising the same to apply tension to the saw.

Further, the invention consists in providing means for adjusting the motor with respect to its connections to vary the leverage and adapt the tension device to different pressures.

Further, the invention consists in an improved arrangement of the counterbalance-weights.

Further, the invention consists in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan

view of a band-mill embodying my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevation.

In the drawings, 2 represents the base of a band-mill, and 3 3 upright brackets provided with vertical sleeves or bearings 4 4 for the columns 5 5. The shaft 6 of the lower band-wheel 7 is supported in adjustable bearings 8 on the mill-base, and the shaft 9 of the upper band-wheel 10 is mounted in bearings 11, provided on the upper ends of the columns 5 5. Upon the brackets 3 3 I arrange a horizontal shaft 12, provided with rock-arms 13 13, that are mounted at points intermediate to their ends upon said shaft. The arms 13 are provided with curved faces 14 and with lugs 15, that are connected by chains 16 with the columns 5 5, the faces 14 forming bearing-surfaces for said chains as said arms are rocked. The opposite ends of said arms from the chains 16 are connected by rods 17 and 18 with arms 19 and 20, that are secured upon a rock-shaft 21, mounted in bearings upon the brackets 3. The rod 18 is preferably in two parts, connected by a turnbuckle 22 to permit the adjustment of said rods. Near the outer end of the shaft 21 I provide a lever-arm 23, having a curved or quadrant face 24 and a lug 25, that is connected to a chain 26, whereon a counterbalance-frame 27 is suspended. This frame preferably has legs 28, which straddle or depend upon each side of the lower band-wheel shaft, and upon these legs I suspend counterbalance-weights 29, which support the upper band-wheel wherever it may be adjusted. The counterbalance-frame (shown clearly in Fig. 2) I prefer to arrange on the front of the mill in order that the frame-weights may be suspended within the saw-pit, where they will not in any way interfere with removing or replacing the saw.

30 is a lever-arm which I have shown as forming a continuation of the arm 20 on the outside of the rock-shaft. It may be, however, secured on said shaft independently of said arm, if preferred. This lever-arm is provided with a handle portion 31 and with a longitudinal slot 32, wherein a bolt 33, provided on a block 34, is slidable and is adapted to be locked at any point in said slot by

means of a bolt-nut. The block 34 is secured to the piston-rod 35 of a single-acting steam-cylinder 36, that has trunnions 37, supported on sleeves 38, that are slidable upon parallel rods 39, secured at one end in the mill-base and extending horizontally therefrom. These rods are connected at their outer ends by a bar 40, which has suitable bearings for said rods. The sleeves 38 may be locked in any desired position upon said rods by means of a set-screw 41. By sliding the sleeves on said rods the cylinder may be moved toward or away from the mill-base and its leverage with respect to the band-wheel-operating mechanism changed at will. On one side of the cylinder I have provided a valve 42, having steam inlet 43 and exhaust pipes 44. The valve-stem is connected by a rod 45 with a lever 46, that is pivoted at one end on the cylinder and near its opposite end is provided with a threaded locking device 47, engaging a slot 48 in a bracket 49. After adjusting the valve by the operation of the lever 46 the operator may lock the same by means of the device 47 and prevent accidental movement of the valve. The size of the cylinder may be varied according to the size of the mill where it is used and the tension desired on the saw. In the mechanism which I have shown the outer end of the slot 32 is substantially twice as far from the shaft 21 as its inner end, and hence if the pressure applied to the cylinder-piston is sufficient to exert a power of three thousand five hundred pounds upon the lever-arm at the inner end of the slot 32 then at the outer end of said slot the power applied will be substantially seven thousand pounds and any force intermediate to the above-named can be obtained by adjusting the cylinder at a point intermediate the ends of said slot. I am thus able to adjust the cylinder to obtain the desired leverage and to adapt the device to variations in the normal steam-pressure. The cylinder oscillating on its bearings will automatically adjust itself with respect to the slotted lever. I prefer to provide appropriate marks on the slotted lever representing the leverage in pounds with normal steam-pressure at these points. Near the top of the cylinder, on one side thereof, I provide a pipe 50, communicating with the interior of the cylinder above its piston and provided with a valve 51, through which air may be admitted to the upper part of the cylinder to assist in lowering the piston and the band-wheel mechanism.

The upper band-wheel having been lowered and the saw placed upon the wheels, the operator will raise the lever 46, open the cylinder-valve, and allow the steam to flow in beneath the piston. As the piston rises in the cylinder the upper band-wheel will be raised to the desired position and the saw put under tension. This tension will vary, of course, according to the amount of steam-pressure, the size of the cylinder-piston, and

the position of the cylinder with respect to the slot 32. No effort will be required on the part of the operator except to open the valve to allow steam to enter the cylinder. I have found that a tension device of this kind is extremely sensitive and will adapt the tension automatically and very quickly to the varying strains to which the band-saw is subjected. It will also act quickly to take up the slack that arises from the stretching of the saw when entering a log. The space within the cylinder above the piston will always form an air-cushion to prevent damage to the cylinder or other parts of the mill in case the piston is suddenly relieved of its load, as by the breaking of the saw or of the connecting mechanism. To lower the upper wheel for the purpose of removing the saw, the operator shuts off the steam below the piston and opens the exhaust, and then opens the air-valve 51 to admit air above the piston and prevent the formation of a vacuum. The piston will then slowly descend, and the operator by grasping the handle 31 may aid in lowering the band-wheel to the point where the saw may be conveniently removed. The band-wheel being counterbalanced by the weights 29, it follows that the operator may arrest the downward movement at any point.

I have shown and described a steam-cylinder for operating the tension mechanism; but other power-operated means may be employed if preferred.

I have shown in the drawings of this application a saw-guide 52, adapted particularly for a double-cutting band-mill, being provided with an antifriction-wheel 53 and in position to be struck by the log on the return or backward movement of the carriage. I have also shown a cylinder 54, having its piston operatively connected by a sway-bar 55 with said guide, the valve of said cylinder being operated by a crank-and-rod attachment and a balance-lever 56. This mechanism, however, of the guide and the means for raising and lowering the same form the subject-matter of a companion application, and I do not make any claim to the same herein.

I claim as my invention—

1. The combination, in a band-mill, with an upper band-wheel and its shaft, of a fluid-pressure motor located outside the band-mill base, and oscillating-lever connections provided between said shaft and said motor for raising or lowering said shaft to apply tension to the saw or relieve the same when said motor is operated.

2. The combination, in a band-mill, with an upper band-wheel and its shaft, of a fluid-pressure motor, oscillating-lever connections provided between said shaft and said motor for raising or lowering said shaft when said motor is operated, and a counterbalance mechanism connected with said band-wheel and shaft and adapted to support and balance the same when the pressure is removed from said motor.

3. The combination, in a band-mill, with an upper band-wheel and its shaft, of a fluid-pressure motor, suitable connections provided between said shaft and motor for raising or lowering said shaft when said motor is operated to apply tension to the saw or relieve the same, and means for adjusting said motor with respect to said shaft connections.

4. The combination, in a band-mill, with the upper band-wheel and its shaft, of a fluid-pressure motor, suitable lever connections provided between said shaft and motor for moving said shaft to apply tension to the saw or relieve the same, means for adjusting said motor with respect to its shaft connections to adapt it for the tension desired and the pressure of the fluid at the motor, and a counterbalance mechanism connected with said band-wheel and adapted to hold the same in its raised position when the fluid-pressure is cut off from the motor.

5. The combination, in a band-mill, with an upper band-wheel and its shaft, of a steam-engine, suitable lever connections provided between said shaft and the piston of said engine for moving said shaft vertically to apply tension to the saw or relieve the same, and a counterbalance mechanism connected with said wheel and shaft and adapted to balance the same when steam is shut off from said engine.

6. The combination, in a band-mill, with the upper band-wheel and its shaft, of rocking arms arranged above said shaft and having suitable connections therewith to raise or lower said shaft when said arms are rocked, a steam-engine, and suitable connections provided between said rocking arms and the piston of said engine.

7. The combination, in a band-mill, with the upper band-wheel and its shaft, of rocking arms provided above said shaft, a rock-shaft, arms secured thereon, means connecting said rock-arms with said band-wheel shaft and with said rock-shaft arms, whereby when said arms are oscillated said shaft will be raised or lowered, a lever provided on said rock-shaft, a steam-cylinder having its piston connected with said lever, and a counterbalance mechanism provided on said rock-shaft.

8. The combination, in a band-mill, with the upper band-wheel and its shaft, of a rock-shaft, a lever secured thereon, operative connections provided between said lever and said band-wheel shaft for raising or lowering said shaft to put the saw under tension or relieve the same when said lever is operated, and a steam-cylinder having its piston adjustably connected with said lever, for the purpose specified.

9. The combination, in a band-mill, with the upper band-wheel and its shaft, of an oscillating lever, operative connections provided between said lever and said band-wheel shaft for raising or lowering said shaft when said lever is oscillated, a fluid-pressure motor, means adjustably supporting said motor, and

an adjustable connection provided between said motor and said lever.

10. The combination, in a band-mill, with the upper band-wheel and its shaft, of an oscillating lever provided with a slot, operative connections provided between said lever and the band-wheel shaft for raising or lowering said shaft to put the saw under tension or relieve the same, a fluid-pressure motor, means adjustably supporting said motor, and means adjustably connecting said motor with said slot.

11. The combination, in a band-mill, with the upper band-wheel and its shaft, of an oscillating lever, operative connections provided between said lever and said shaft for raising or lowering the shaft to tension the saw or relieve the same when said lever is oscillated, a steam-cylinder, sleeves whereon said cylinder is pivoted, means adjustably supporting said sleeves, and an adjustable connection provided between said cylinder-piston and said lever.

12. The combination, in a band-mill, with the upper band-wheel and its shaft, of an oscillating lever provided with a longitudinal slot, means connecting said lever and said shaft for raising or lowering said shaft to tension the saw or relieve the same when said lever is oscillated, a steam-cylinder, parallel bars, sleeves mounted on said bars and pivotally supporting said cylinder and an adjustable connection provided between said cylinder-piston and said slot.

13. The combination, in a band-mill, with the upper band-wheel and its shaft, of a rock-shaft, arms secured thereon, operative connections provided between said arms and said band-wheel shaft for raising or lowering said shaft to tension the saw or relieve the same when said rock-shaft is operated, a lever secured on said shaft, a steam-cylinder, means adjustably supporting said cylinder to permit the movement of the same toward or from said band-wheel, a valve for controlling the admission of steam to the lower end of said cylinder, an air-valve provided near the upper end of said cylinder, and an adjustable connection provided between said cylinder-piston and said lever.

14. The combination, in a band-mill, with an upper band-wheel and its shaft, of a rock-shaft, arms secured thereon, operative connections provided between said arms and said shaft for operating said shaft to put the saw under tension or relieve the same, a counterbalance-lever provided on said shaft, a counterbalance-frame depending from said lever and straddling the shaft of the lower band-wheel, and suitable weights carried by said frame.

15. The combination, in a band-mill, with upper and lower band-wheels and their shafts, of a rock-shaft, arms secured thereon, rocking arms provided above said upper band-wheel shaft, operative connections provided between said rocking arms and said rock-shaft

arms and said upper-band-wheel shaft for raising or lowering said shaft, a counterbalance-lever 23 secured on said rock-shaft at the front of the mill, a counterbalance-frame 5 27 suspended on said lever and having legs 28 depending beside and straddling said lower-band-wheel shaft, and weights suspended on said legs, substantially as described.

16. In a band-mill, the combination, with 10 the base provided with upright brackets, of the upper and lower band-wheels, vertically-sliding columns supported in bearings in said brackets and carrying the shaft of the upper band-wheel, rocker-arms provided on said 15 brackets and provided at one end with curved or quadrant faces having flexible connections with said columns, a rock-shaft, arms secured thereon, rods connecting said arms with the ends of said rocker-arms opposite said curved 20 faces, one of said rods being adjustable, a lever provided on said rock-shaft, and a steam-cylinder having its piston adjustably connected with said lever.

17. In a band-mill, the combination, with 25 the base provided with upright brackets, of the upper and lower band-wheels and their shafts, vertically-sliding columns guided by said brackets and carrying the shaft of the upper wheel, rocker-arms supported upon 30 said brackets above said columns and provided with curved faces at one end having flexible connections with said columns, a rock-shaft, arms secured thereon, means connecting said arms and the ends of said rocker-arms opposite said curved faces, a lever pro- 35 vided on said rock-shaft, a steam-cylinder movable toward or from said rock-shaft and having its piston adjustably connected with said lever.

18. In a band-mill, the combination, with 40 a base provided with upright brackets, of upper and lower band-wheels and their shafts, vertically-sliding columns guided by said brackets and carrying the shaft of the upper 45 band-wheel, rocker-arms supported on said brackets above said columns and provided at one end with curved or quadrant faces having flexible connections with said columns, a rock-shaft, arms secured thereon, means con- 50 necting said arms with the ends of said rocker-arms opposite said quadrant faces, a counterbalance lever and weight provided on said rock-shaft, a slotted lever secured on said shaft, a pivoted cylinder slidably supported 55 outside said base and adapted to be moved toward or from the same, and means adjustably connecting the piston of said cylinder

with said slotted lever, substantially as described.

19. In a band-mill, the combination, with 60 a base provided with upright brackets, of the upper and lower band-wheels and their shafts, vertically-sliding supports provided on said brackets for the shaft of the upper wheel, rocker-arms supported on said brackets above 65 said upper band-wheel shaft and having flexible connections at one end therewith, a rock-shaft, arms secured thereon, means connecting said arms with the ends of said rocker-arms opposite said flexible connections, a 70 slotted lever secured on said rock-shaft, an adjustable cylinder having its piston adjustably connected with said slotted lever, a counterbalance-lever secured on said rock-shaft at one end thereof at the front of the mill, a 75 weight-frame suspended on said counterbalance-lever and having legs depending into the saw-pit and straddling the shaft of the lower band-wheel, and suitable weights provided on the legs, substantially as described. 80

20. In a band-mill, the combination, with the base, of the upper and lower band-wheels and their shafts, vertically-sliding supports for the upper-band-wheel shaft, an oscillating lever, operative connections provided be- 85 tween said lever and the supports of the upper wheel-shaft, an oscillating adjustable steam-cylinder, and means adjustably connecting the piston of said cylinder with said lever. 90

21. In a band-mill, the combination, with a base, of the upper and lower band-wheels and their shafts, vertically-sliding supports for the upper band-wheel shaft, an engine having a reciprocating piston, and a lever 95 mechanism connected with said upper band-wheel shaft and adjustably attached to said piston.

22. The combination, in a band-mill, with an upper band-wheel and its shaft, of a re- 100 ciprocating engine having its piston connected with said shaft for raising or lowering it to put the saw under tension or relieve the same, and a counterbalance mechanism connected with said wheel and shaft and adapted 105 to support the same when said engine is inoperative.

In witness whereof I have hereunto set my hand this 5th day of November, 1901.

EDWIN E. THOMAS.

In presence of—
RICHARD PAUL,
M. C. NOONAN.