(No Model.) 4 Sheets—Sheet 1.

J. H. LANDIS.

BAND SAW MACHINE.

No. 473,468. Patented Apr. 26, 1892.

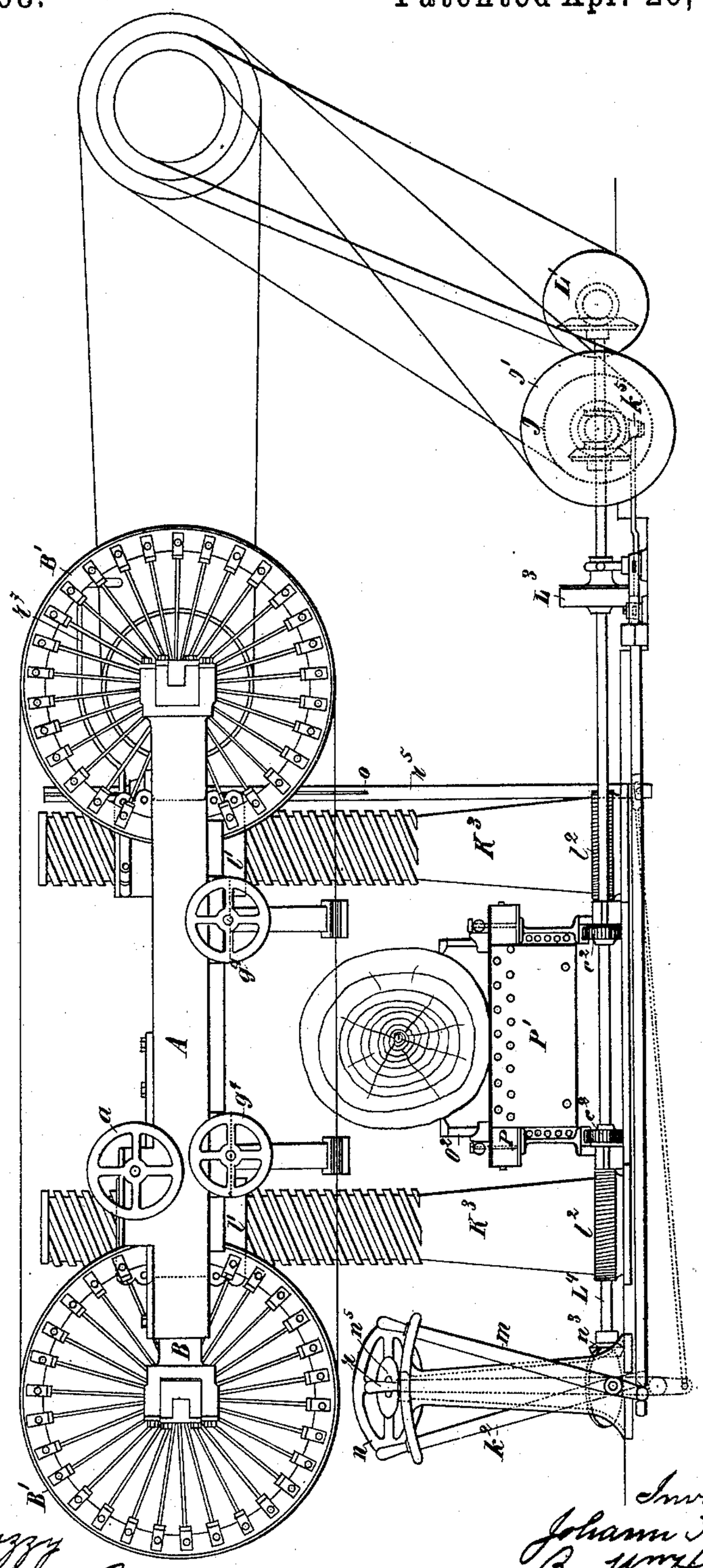

Fig. 1

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(No Model.) 4 Sheets—Sheet 2.

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Fig. 2.

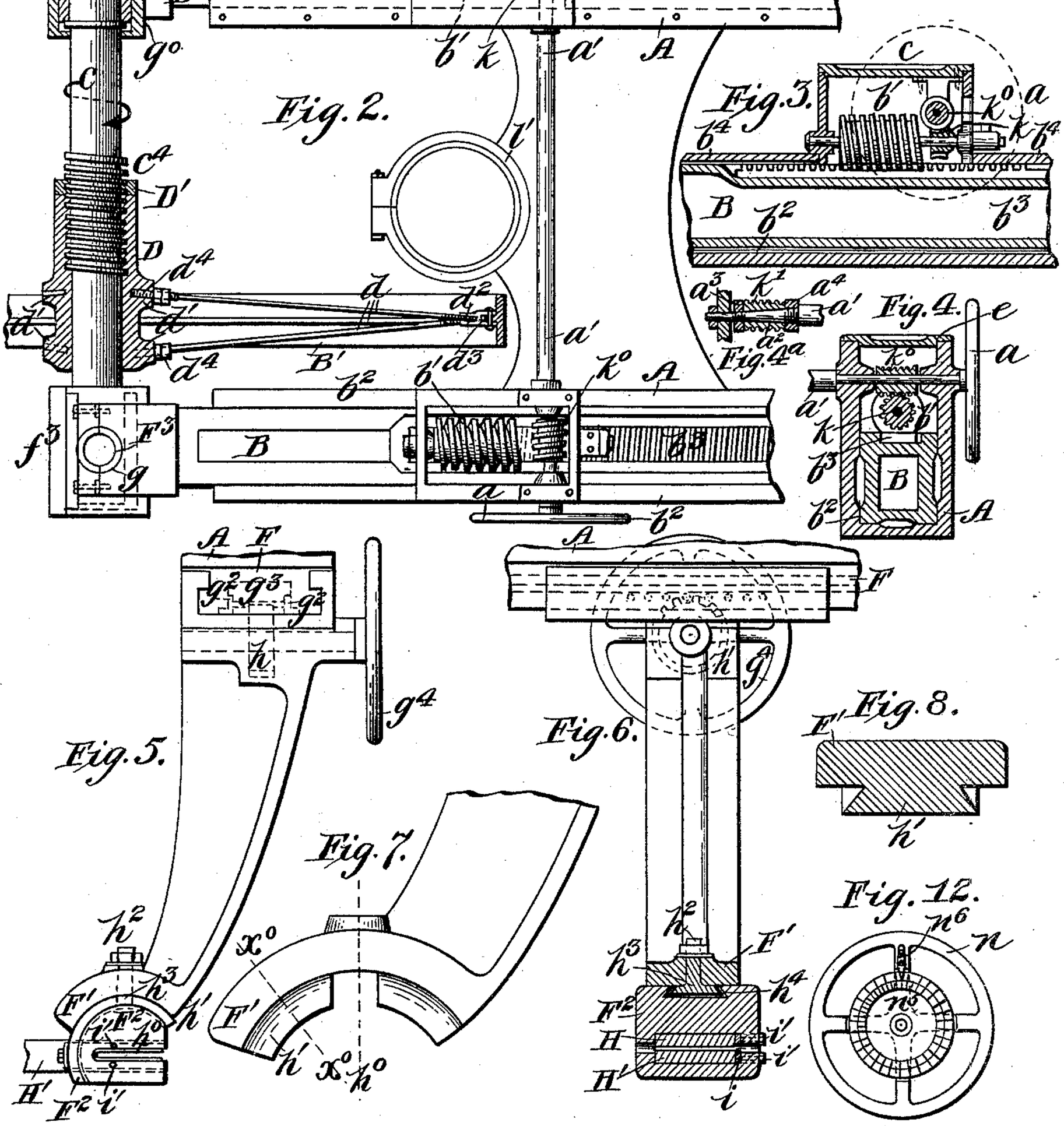

Fig. 3.

Fig. 4a

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 8.

Fig. 7.

Fig. 12.

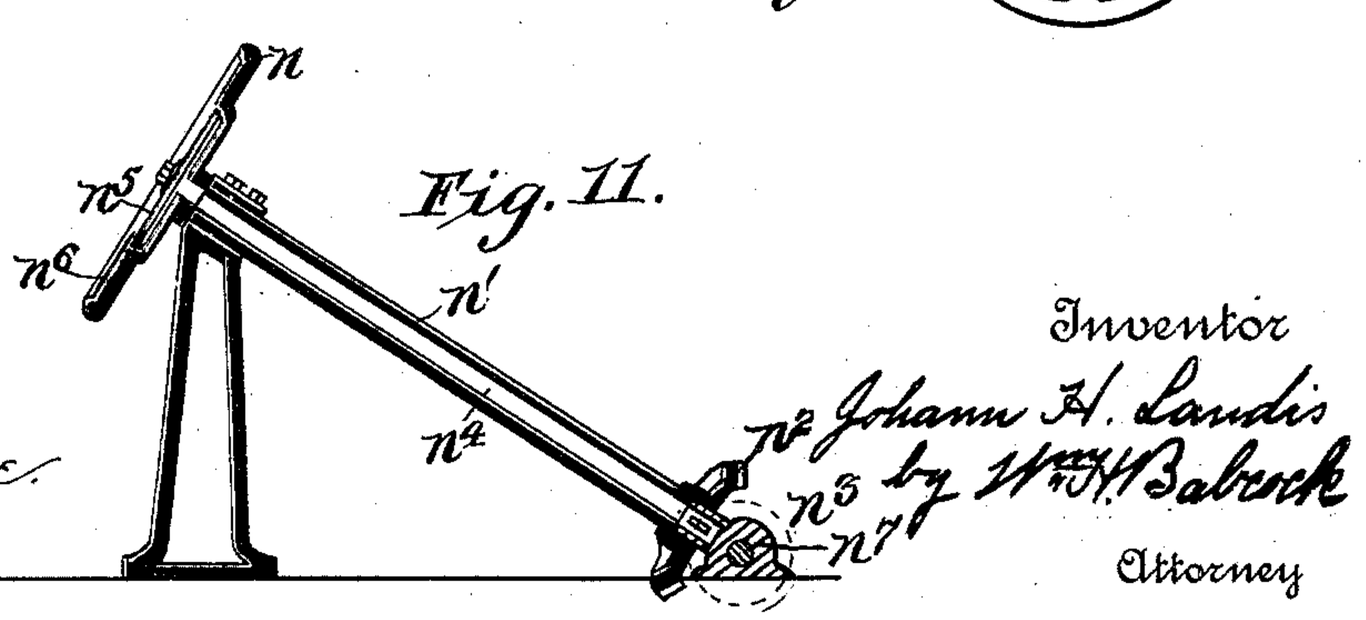

Fig. 11.

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(No Model.)

4 Sheets—Sheet 3.

J. H. LANDIS.

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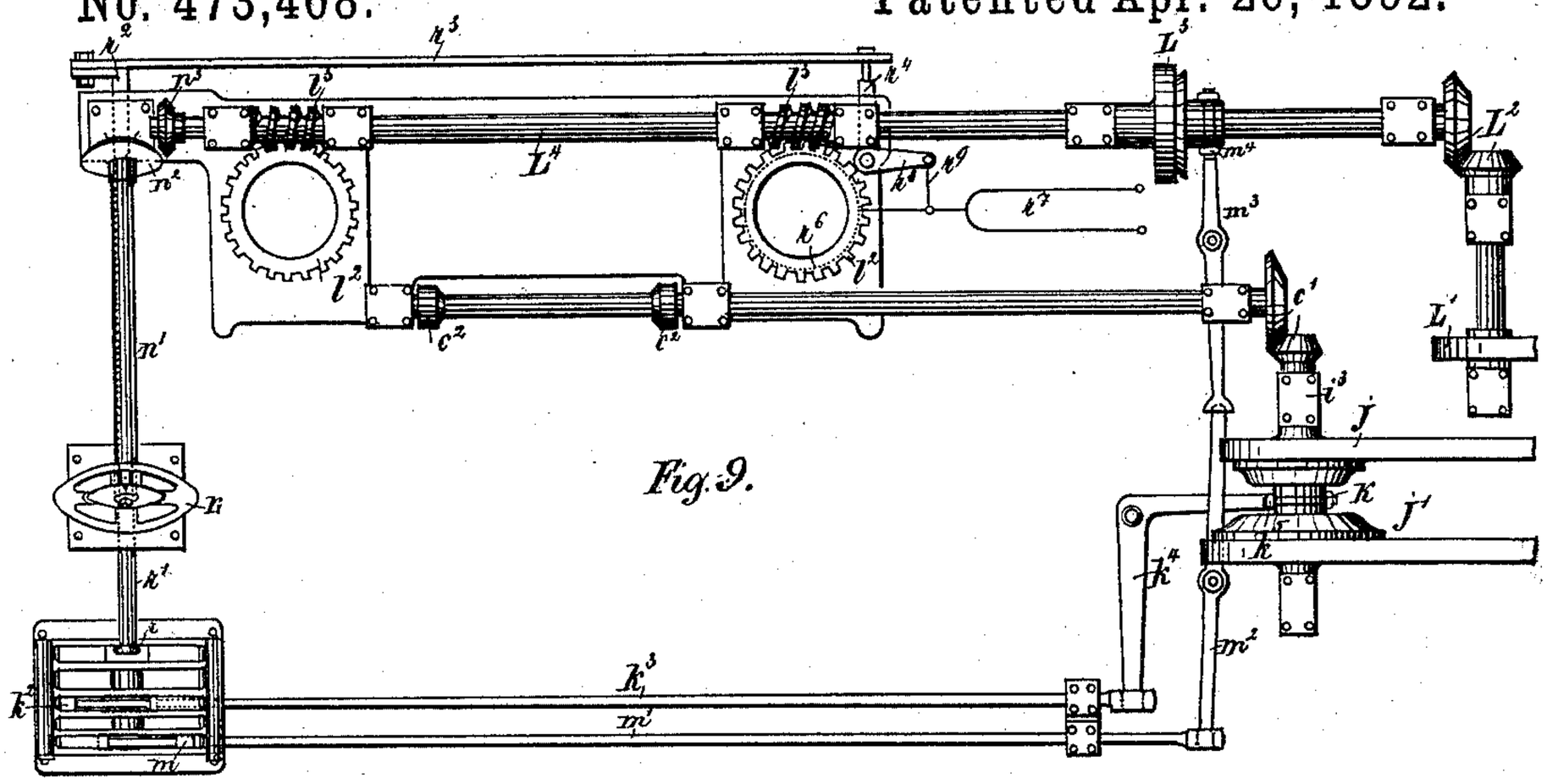
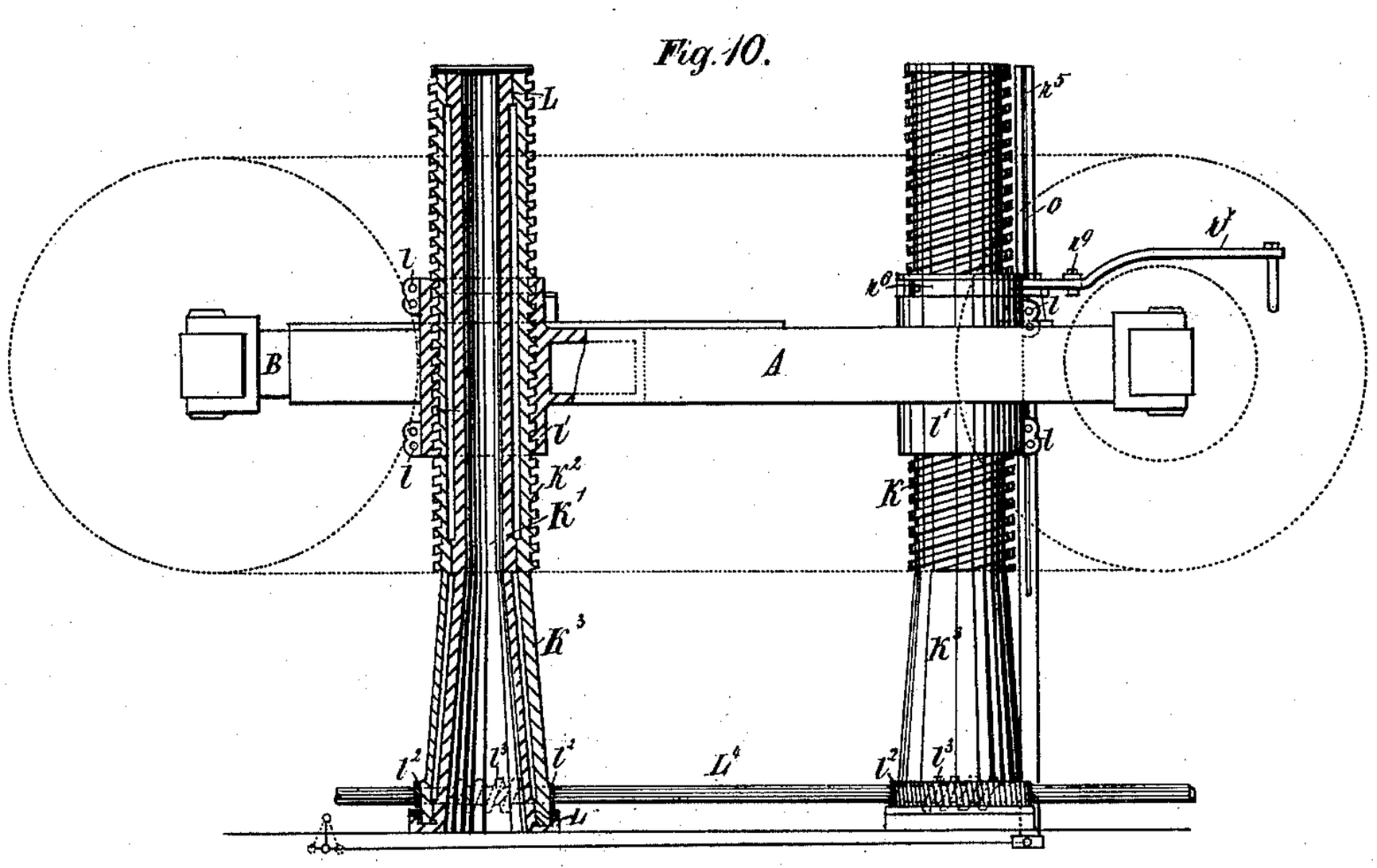


Fig. 9.

Fig. 10.



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(No Model.) 4 Sheets—Sheet 4.

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BAND SAW MACHINE.

No. 473,468. Patented Apr. 26, 1892.

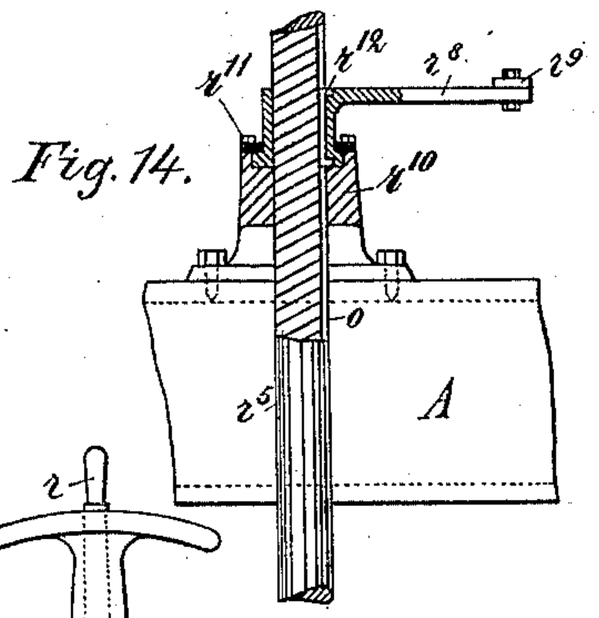

Fig. 14.

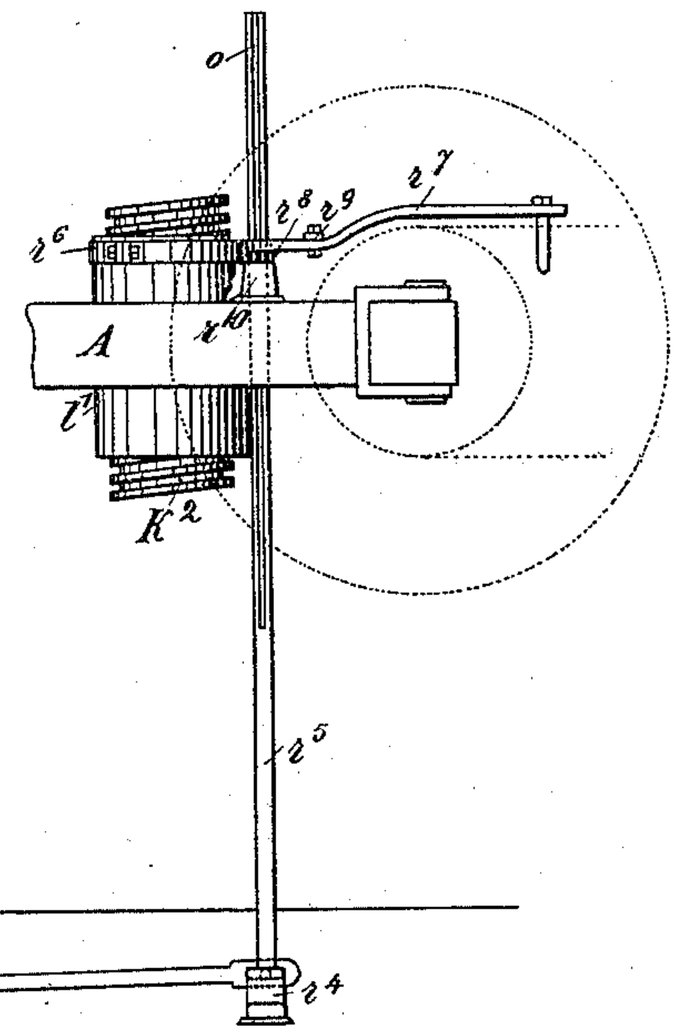

Fig. 13.

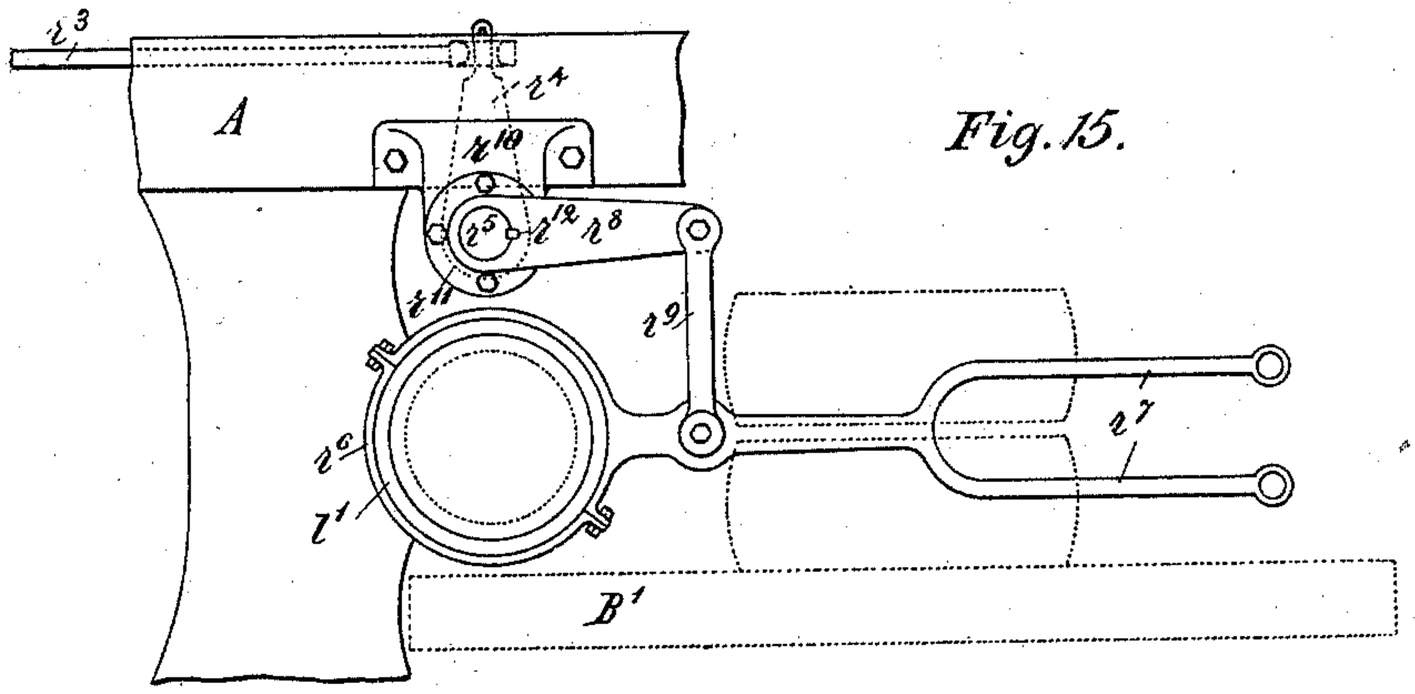

Fig. 15.

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UNITED STATES PATENT OFFICE.

JOHANN HEINRICH LANDIS, OF OERLIKON, NEAR ZURICH, SWITZERLAND.

BAND-SAW MACHINE.

SPECIFICATION forming part of Letters Patent No. 473,468, dated April 26, 1892.

Application filed September 4, 1891. Serial No. 404,748. (No model.) Patented in Switzerland May 16, 1889, No. 956; in France June 24, 1889, No. 199,147; in Germany June 28, 1889, No. 55,599; in Austria-Hungary November 13, 1889, No. 28,827 and No. 53,446; in England May 13, 1890, No. 7,458, and in Belgium September 2, 1891, No. 96,241.

To all whom it may concern:

Be it known that I, JOHANN HEINRICH LANDIS, a citizen of Switzerland, residing at Oerlikon, near Zurich, in the canton of Zurich and Republic of Switzerland, have invented certain new and useful Improvements in Band-Saw Machines, (for which I have obtained Letters Patent in France, No. 199,147, dated June 24, 1889; in Germany, No. 55,599, dated June 28, 1889; in Austria-Hungary, No. 28,827 and No. 53,446, dated November 13, 1889, in England, No. 7,458, dated May 13, 1890; in Switzerland, No. 956, dated May 16, 1889, and in Belgium, No. 96,241, dated September 2, 1891;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to band-saw machines, and more especially to such machines of the sort arranged to cut horizontally.

The said invention has for its chief objects the safer adjustment of the rollers over which the band-saw passes, the feeding of the said band by devices which allow it to turn on its axis, and the general improvement of the machine. These objects are accomplished by the construction and combination of devices hereinafter particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a front elevation of a machine embodying my invention. Fig. 2 represents a plan view of the double-armed cross-beams A (one beam shown with its cover and the other without it) and hand-roller adjusting devices. Figs. 3 and 4 represent detail sectional views of the latter. Fig. 4^a represents a detail sectional view of the devices for fastening one of the adjusting-screws of the shaft. Figs. 5 and 6 represent, respectively, a side elevation and a rear elevation, the latter partly in section, of the guinding parts of the band-feeding devices. Figs. 7 and 8 represent detail views of the guideway forming part of the guiding-head, which is an important feature of the said band-feeding devices. Fig. 7 shows the head and guideway in side elevation. Fig. 8 shows them in cross-section on the line $x^\circ x^\circ$ of Fig. 7. Fig. 9 represents a detail plan view of the mechanism for reciprocating the saw-truck. Fig. 10 represents a side elevation of one of the supporting-beams for the band-saw rollers and of the mechanism for moving the said beam up and down, a part of the said mechanism being shown in vertical section and the band-saw and its rollers being indicated by dotted lines. Fig. 11 represents a vertical section, partly in elevation, of a hand-wheel, shaft-sleeve, or tube hand-wheel support and bevel-pinion forming part of the mechanism for raising and lowering the beams which support the saw-hand rollers. Fig. 12 represents a front elevation of the said hand-wheel and the dial and pointer attached thereto. Fig. 13 represents a side elevation of the devices for putting the machine into or out of action. Fig. 14 represents a sectional detail view of a part of the same, and Fig. 15 represents a plan view of a part of the same.

Motion is imparted by the hand-wheel a to shaft a' and to the driving-screw k° and k', causing the worm-wheel k, Figs. 3 and 4, as well as the two larger screws b', to rotate. The screws b' gear with corresponding rack-rods b^3, which are fixed to the arms B B°, sliding the box-like guides b^2 and carrying in common the shaft of the band-rollers. According to the direction of rotation of the hand-wheel a the sliding pieces B B° move forward or backward, whereby the saw-band receives the tension required between the two band-rollers B', one of which is not adjustable. The whole tension mechanism is arranged upon an extension of the guiding-box b^2, and is tightly closed by the lid or cover b^4. The screw k' for driving the rear sliding piece B° is connected movably with the hand-wheel shaft a' in such a manner as to be pressed according to requirements upon the corresponding conical bosses, formed on the shaft a^2, Fig. 4, by means of the nut a^3, from which conical bosses the said screw k' can be released by the nut a^4. The firm connection of the two screws k° k' with the hand-wheel shaft a' causes a simultaneous lateral motion of the two sliding pieces B B°. When the screw k' is dis-

connected from the shaft a', the front sliding piece B is the only one to move forward or backward, which causes the shaft of the band-rollers to turn pivotally upon the pin E^3 of the rear bearing—that is to say, upon the fixed point x. The shaft C carries a screw-thread c^4, ascending on the left-hand side, the nut for which is placed in the prolonged nave D. There is, moreover, provided a counter-nut D', which prevents the roller B' from shifting upon the shaft C when the said roller has once assumed its proper position. As the band-roller B' moves in the direction of the arrow, the tension due to the screw-thread c^4 cannot be loosened. The band-roller B' differs from other known band-rollers by the lightness of its construction, which does not impair its strength or solidity. At each end of the spoke d, Fig. 2, is arranged a screw-thread, the inclination or pitch of the screw-thread at the outer end being contrary to that of the inner end of the spoke. The spokes are alternately displaced from the center to the right or to the left and are screwed inwardly in the strengthening-rings d' of the nave D. The outer ends of the spoke are screwed in the cylindrical projection d^2 of the fork d^3, which is riveted with the inwardly-projection stem of the crown of the roller, which has a T shape. The nuts d^4 d^4 serve, further, to secure the spokes in their screwed-up position. The band-roller (the position of which is not adjustable and which is not shown on the drawings) carries the driving-wheel upon a prolongation of the nave.

As shown in Figs. 5 and 6, upon the lower side of a cross-beam is arranged a prismatic guide F, in the hollow part of which are inserted angle-irons g^2, which carry at regular intervals the pins or rods g^3. In these pins or rods gears a pinion h, driven by a hand-wheel g^4, whereby the band-feeding device is moved along the guide F. The shaft of the said pinion and hand-wheel has its bearings in a movable arm extending downward from the said guide and movable along it with said wheel and pinion. The guiding-head F' has on its lower side a dovetailed guideway h', Figs. 7 and 8, the curvature of which is formed according to a circle drawn from h°. At the place where the screw h^2 passes through F' the guideway h' is broken. The head h^3 of the screw h^2, having the same sectional shape as the guideway h', enters this gap. A groove h^4, corresponding to the guideway h', is formed in the piece F^2. When F^2 has assumed its proper position, the screw is tightened. In the piece F^2 there is formed a cavity for the reception of the wooden guide H, which is provided with a slot H' for the saw-band, said guide being firmly held by the pressure-plate i and the set-screws i'. With the aid of this arrangement the saw-band can turn upon h° as pivot.

Fig. 12 is a side view of the guiding-head F' with the guideways h' shown at an enlarged scale, the screw h^2 being omitted.

In Figs. 9 and 10 is shown the mechanism for the to-and-fro motion of the saw-truck, for the up-and-down motion of the horizontal double-armed cross-beam A, and for the reversal of the motion.

Figs. 11 and 12 are details appertaining thereto. The two driving-pulleys j j' receive the motion directly from the motor-pulley and rotate loosely and in different directions upon the shaft i^3, upon which is mounted by means of a sleeve the coupling-piece K, this sleeve enabling the said coupling-piece to slide along the shaft i^3. Motion is communicated by means of an arrangement of bevel-wheels c' to the pinions c^2 and to the saw truck or carriage. According as K is coupled with the large or with the small pulley j' or j, the said carriage moves forward or backward. The coupling is effected by friction, the coupling-piece K being provided with two leather surfaces, while the pulleys j and j' have corresponding cast frictional surfaces. The leverage k^2 k^3 k^4, with the fork k^5, effects the reversal of motion.

Fig. 10 shows the arrangement of the upright frame and the manner in which the cross-beam moves. K' is a hollow standard or pillar, the lower part of which has a conical enlargement and is fixed to the foundation-plate. This pillar K' is provided at its upper and central part and in the conical enlargement with annular frictional surfaces L. Around this pillar K' is arranged a second hollow pillar K^3, provided with a screw-thread K^2 and with corresponding frictional surfaces, which bear upon those of the pillar K'. The lower end of the pillar K^3 is carried by a bearing of the pillar K'. The nut belonging to K^2 is placed in a split receptacle l', held together by the screws l and arranged between the two cross-beams A, Figs. 2 and 10, to which it is connected. The lower end of the pillar K^3 carries a toothed wheel l^2, with which gears a screw l^3. The screw-shaft receives its motion from the pulley L' and the bevel-gearing L^2. The direction of rotation of the said screw-shaft may be reversed by crossing the belt which drives the pulley L', and such reversal also reverses the rotation of the pillars K^3.

L^3 is a friction-coupling of a known kind, which is connected or disconnected by means of levers m m' m^2 m^3 and of a fork m^4. When the screw l^3 is operated, the screw-threaded pillar K^3 turns upon its bearing-surfaces and the piece l', with the cross-beam A, moves either up or down. A hand-wheel, Figs. 9, 11, and 12, is arranged to permit of the piece l' and cross-beams A' being moved up and down when the coupling L^3 is disconnected. The hand-wheel n forms one piece with the tube n' and the bevel-wheel n^2 and imparts a motion to the bevel-wheel n^3 and the shaft L^4 of the screw. A shaft n^4 is firmly keyed upon the support n^7 and carries at its upper end a disk n^5, provided with circular divisions. The indicator n^6, fixed to a spoke of the hand-wheel n, indicates as it turns over the circu-

lar divisions of the disk n^5 the extent of the rotation of the hand-wheel n or the ascent or descent of the piece l'.

The disconnecting device of the machine, Figs. 1, 9, and 10, consists of a lever r, a shaft r', with arm r^2, a rod r^3, a lever r^4, a vertical shaft r^5, with lever r^8, and a sliding ring r^6, furnished with a belt-shifting fork r^7. The rotary motion of the shaft r^5 is transmitted by means of the lever r^8 and arm r^9 upon the sliding ring formed of two parts and capable of sliding horizontally within a groove of the receptacle l'. The hub of the arm r^8 is connected to the same shaft and follows the vertical motion of the piece l'.

In order to put the machine in motion, the lever r, Figs. 1, 9, and 13, has to be pushed to the right in order to stop it to the left. By the lever r the horizontal shaft r' is actuated, on the other end of which the arm r^2 is mounted.

r^3 is a connecting-rod loosely connected to the arm r^2 at one end and embracing a pin of the lever r^4, mounted on the vertical shaft r^5, with the other end. The lever r^4 and the shaft r^5 oscillate when the lever r is operated. The shaft r^5 is guided by means of the carrier r^{10}, attached to the rear cross-beam A, the up-and-down motion of which the carrier participates. In this carrier the lever r^8 is mounted in such a manner that it is forced by the bipartite disk r^{11} to participate in the vertical motion of the carrier, but is capable of being rotated. In order to permit this action, a feather r^{12} is inserted in the boss of the lever r^8, Fig. 14, which feather slides in a longitudinal groove o, formed in the shaft r^5. The shaft r^5 imparts, therefore, a rotary motion to the lever r^8 at every position of the carrier r^{11}.

r^9 is an arm connecting the lever r^8 with the belt-shifting fork r^7, provided with a sliding ring r^6, formed of two parts and capable of sliding horizontally with a groove of the receptacle l'.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a band-saw machine, the mechanism for adjusting and stretching the saw-band, consisting of a shaft a', a pair of screws b', and gearing whereby the said screws are driven by the said shaft, a pair of racks engaging the said screws and receiving endwise motion therefrom, sliding pieces connected to the said racks, bearings on the said sliding pieces, and a pair of rollers or wheels over which the saw-band is stretched, one of the said rollers having its shaft journaled in the said bearings in order that it may be moved at will away from the other roller or wheel to tighten the saw-band, substantially as set forth.

2. In combination with a series of pins fixed to the frame of the machine, a pinion engaging therewith, a hand-wheel and shaft for operating the said pinion, an arm affording bearings for the shaft of the said pinion and moving therewith, a guide-head F′, formed on the said arm and provided with a curved dovetailed guideway having a gap or opening, a fixed sliding piece F^2, having a dovetailed recess and constructed to fit the said guide-head, a screw h^2, whereby the said sliding piece is held in any position of such adjustment, the head of the said screw entering the gap in the said guideway, and the wooden guide H, which is held by the said sliding piece and receives the band, substantially as set forth.

3. In a band-saw machine, the cross-beams which support the band-saw rollers, in combination with internally-screw-threaded sleeves constructed to support the said cross-beams, a pair of externally-screw-threaded revoluble hollow pillars K^3, which receive the said sleeves, gearing for turning the said pillars in either direction at will, and a pair of fixed pillars K, on which the said pillars K^3 turn, substantially as and for the purpose set forth.

4. In a band-saw machine, the mechanism for adjusting and stretching the saw-band, consisting of a shaft a', a pair of screws b', and gearing whereby the said screws are driven by the said shaft, a pair of racks engaging the said screws and receiving endwise motion therefrom, sliding pieces connected to the said racks, bearings on the said sliding pieces, and a pair of rollers or wheels over which the said saw-band is stretched, one of the said rollers having its shaft journaled in the said bearings and the said gearing including a conical recessed wheel or screw which is detachably held on a similarly-shaped part of its shaft in order that the adjusting devices for one end of the roller-shaft may be made inoperative at will, substantially as set forth.

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

JOHANN HEINRICH LANDIS.

Witnesses:

HENRY LABHART,

ADAM LEHR.