(No Model.)

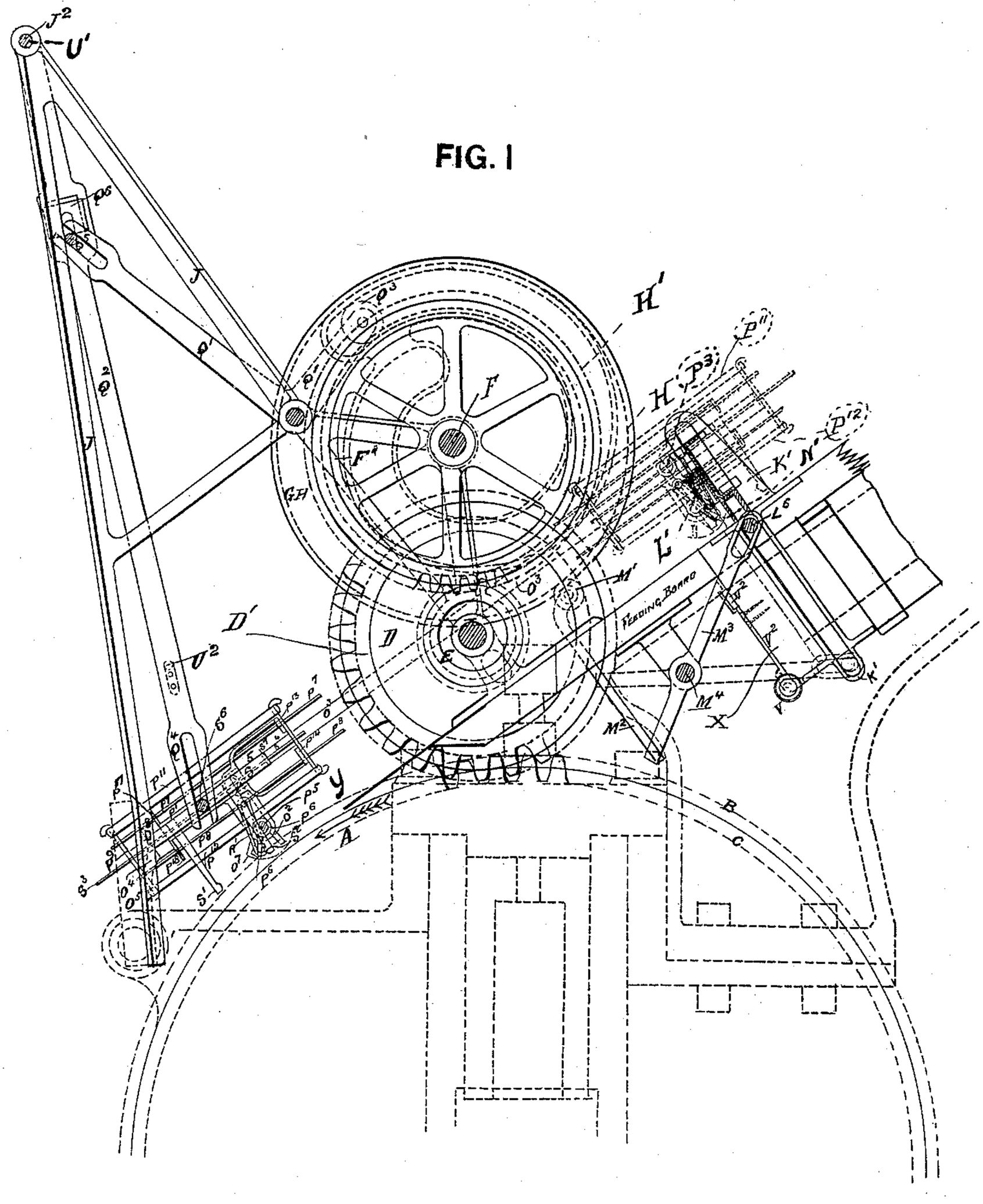
11 Sheets—Sheet 1.

T. R. JOHNSTON.

PRINTING PRESS FEEDER.

No. 462,136. Patented Oct. 27, 1891.

FIG. I



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(No Model.) 11 Sheets—Sheet 2.

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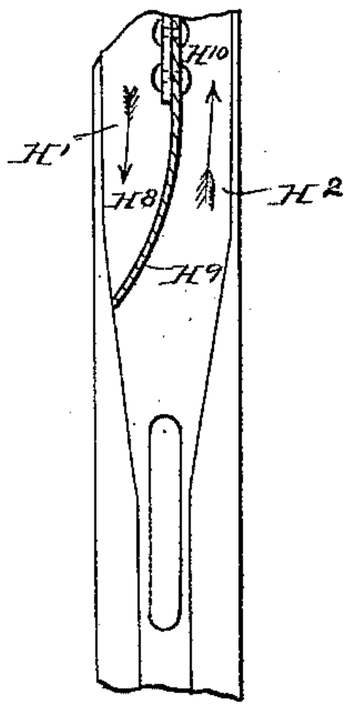
FIG. 8.



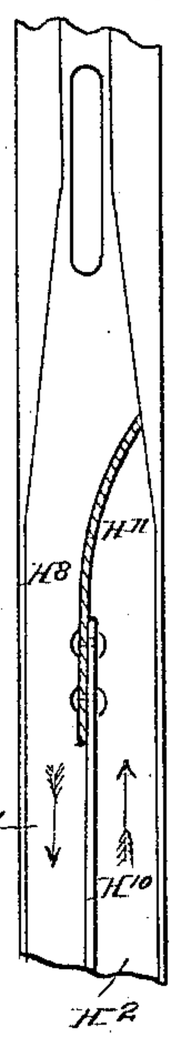
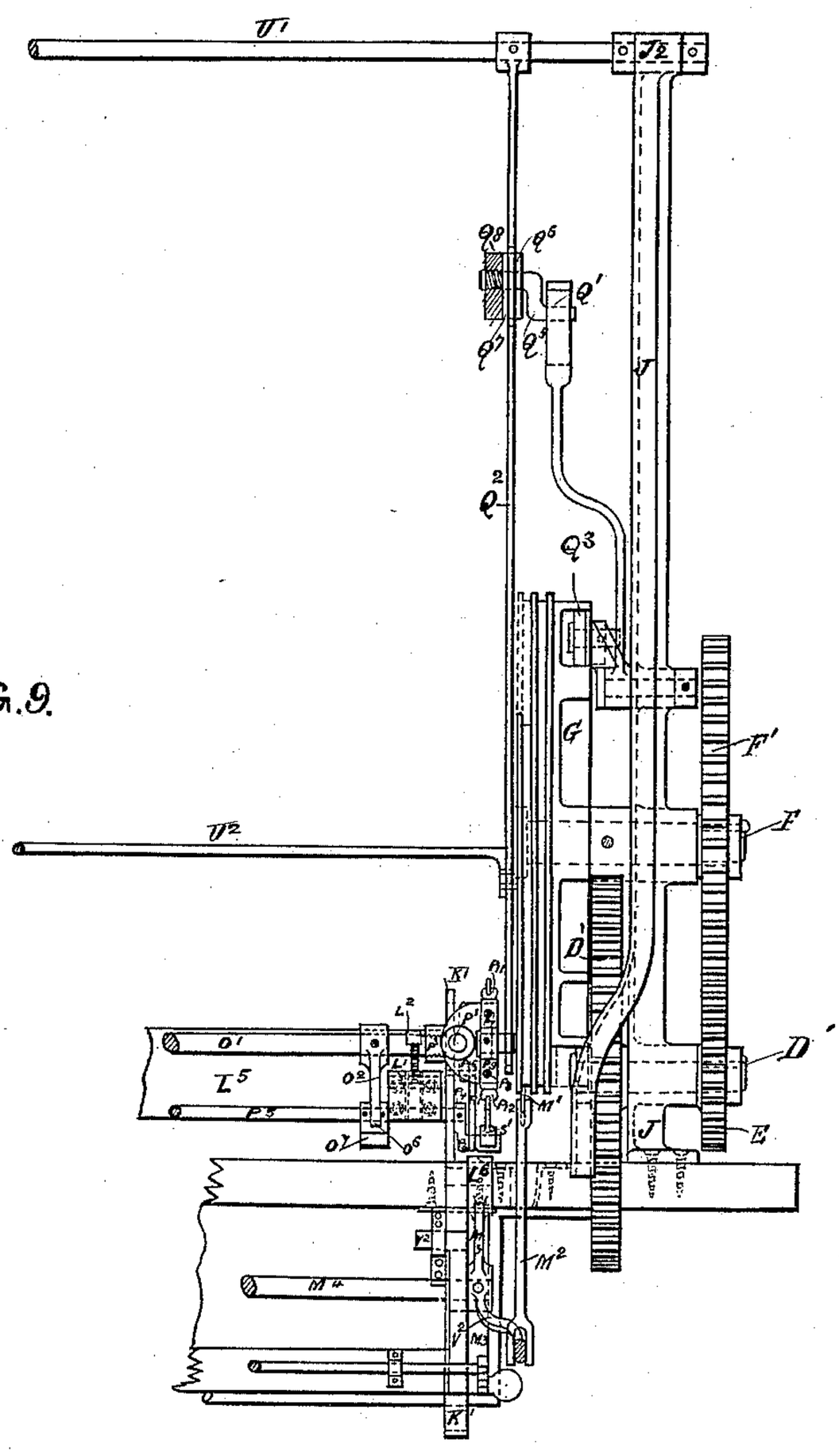


FIG. 9.

FIG. 2



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(No Model.) 11 Sheets—Sheet 3.

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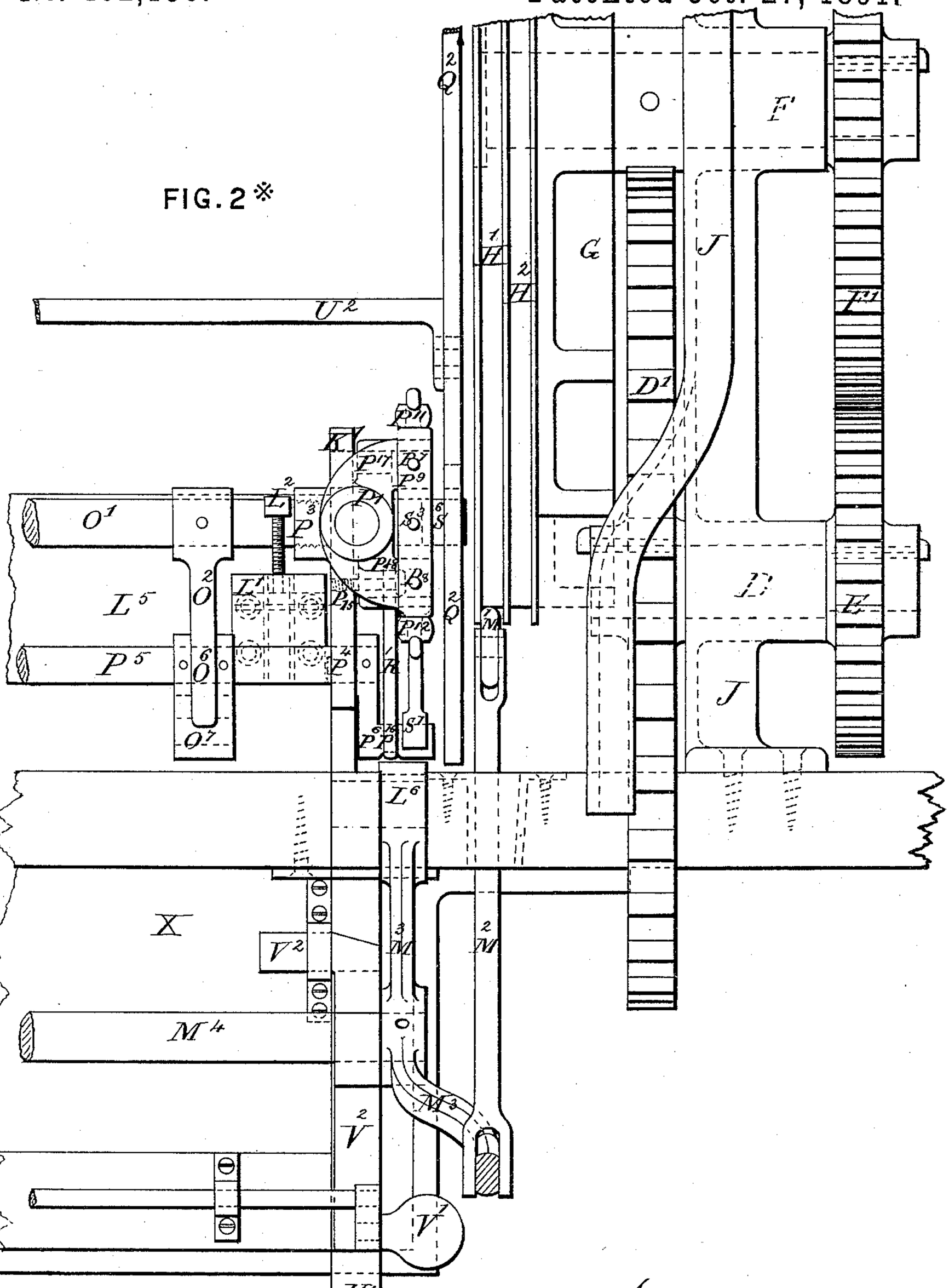
FIG. 2*



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11 Sheets—Sheet 4.

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FIG. 4

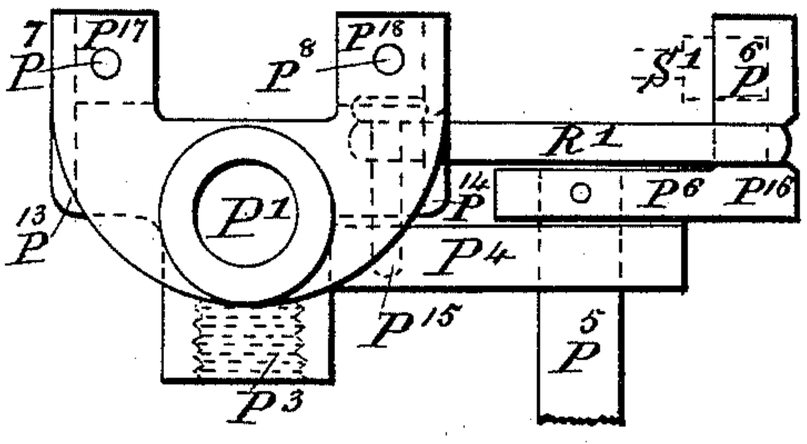

FIG. 5

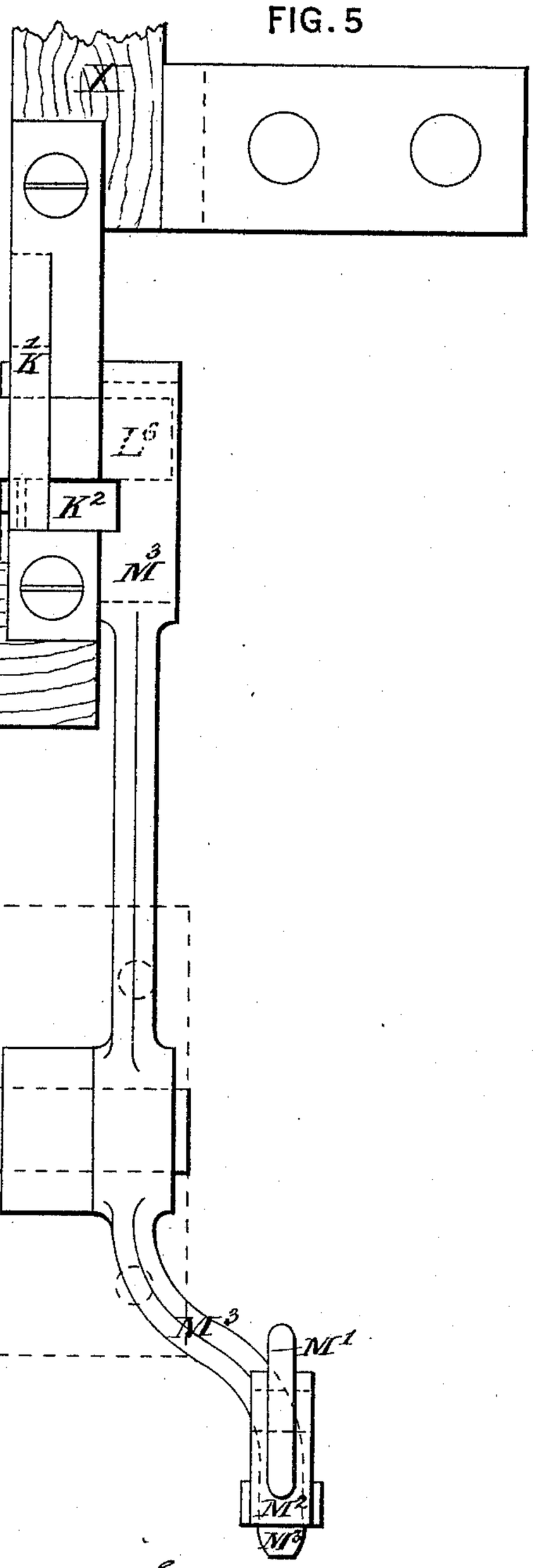

FIG. 3

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T. R. JOHNSTON.

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FIG. 6

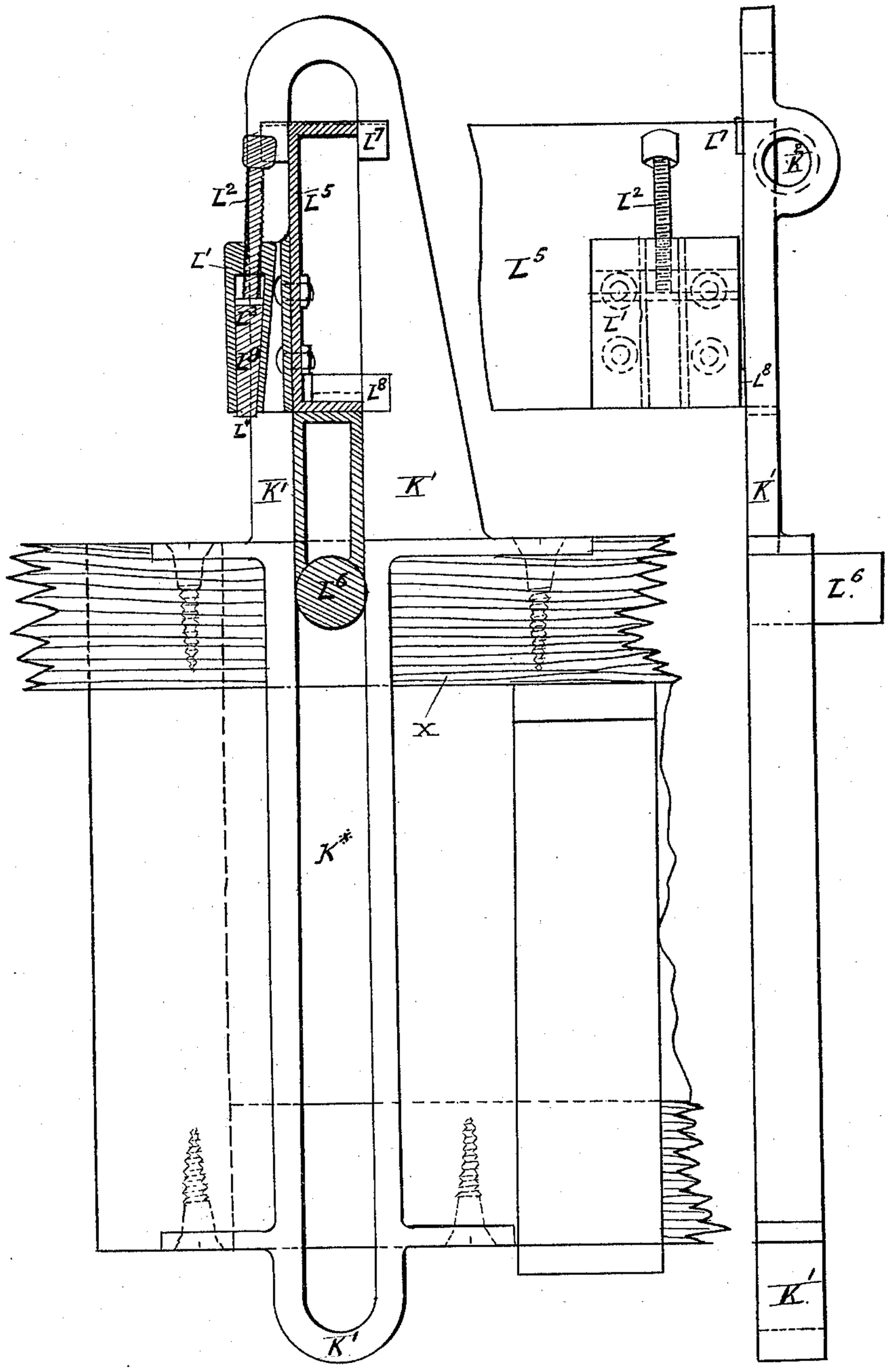

FIG. 7

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FIG. 18

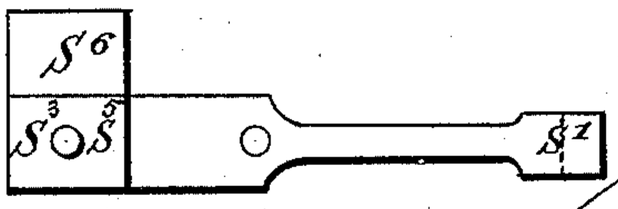


FIG. 10

FIG. 19 FIG. 17

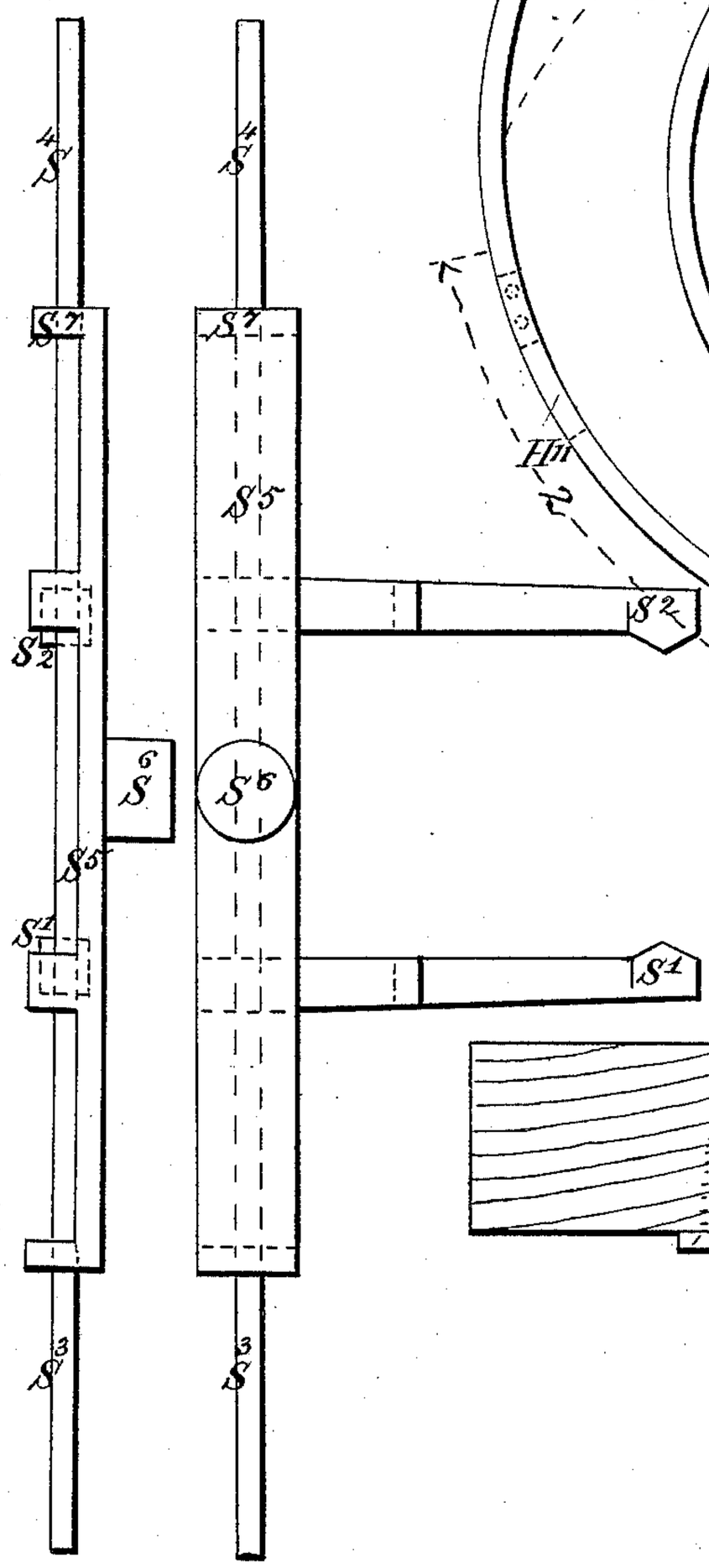
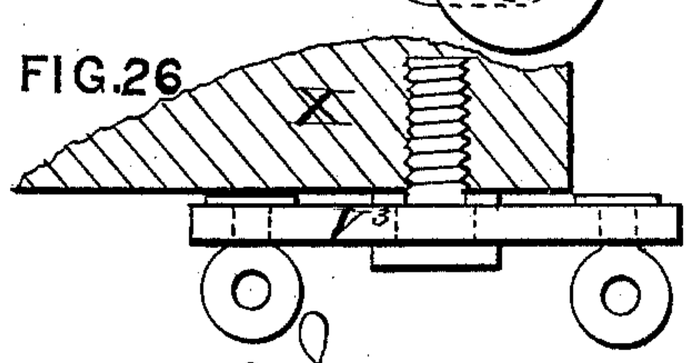


FIG. 27

FIG. 26



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(No Model.)

11 Sheets—Sheet 7.

T. R. JOHNSTON.

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No. 462,136. Patented Oct. 27, 1891.

Fig. 11.

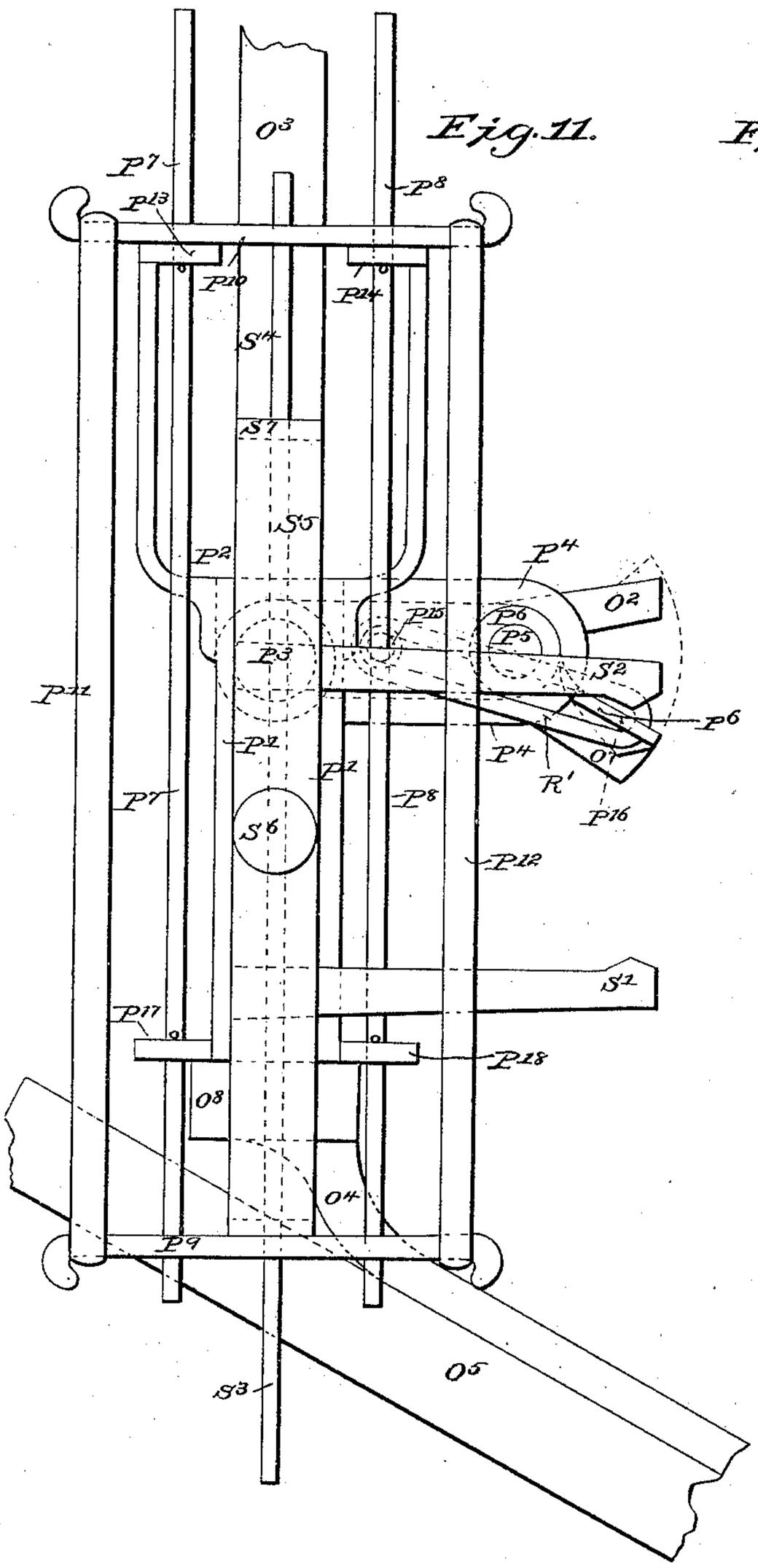
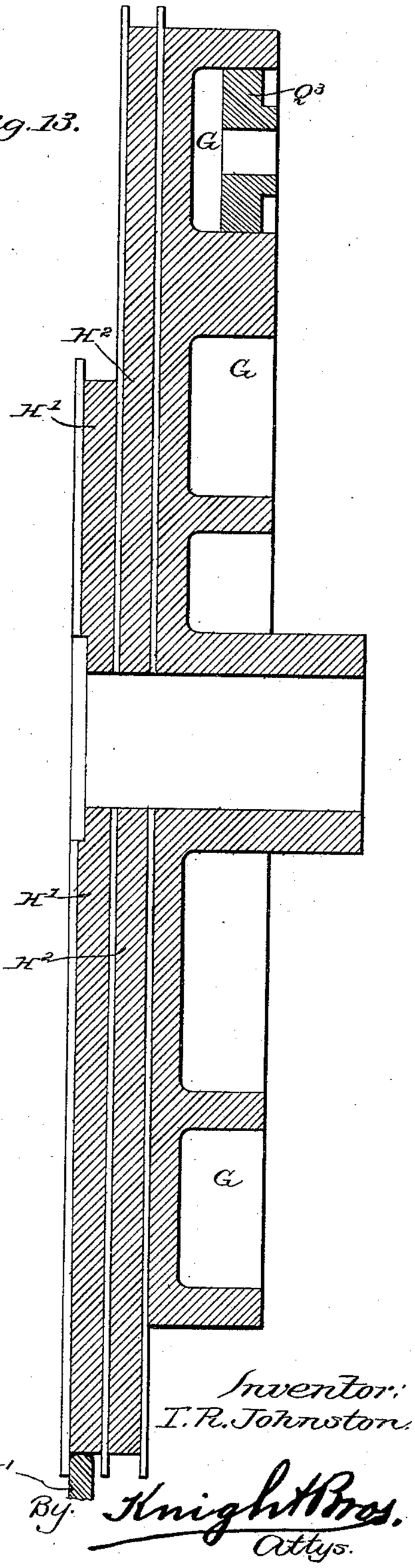


Fig. 13.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

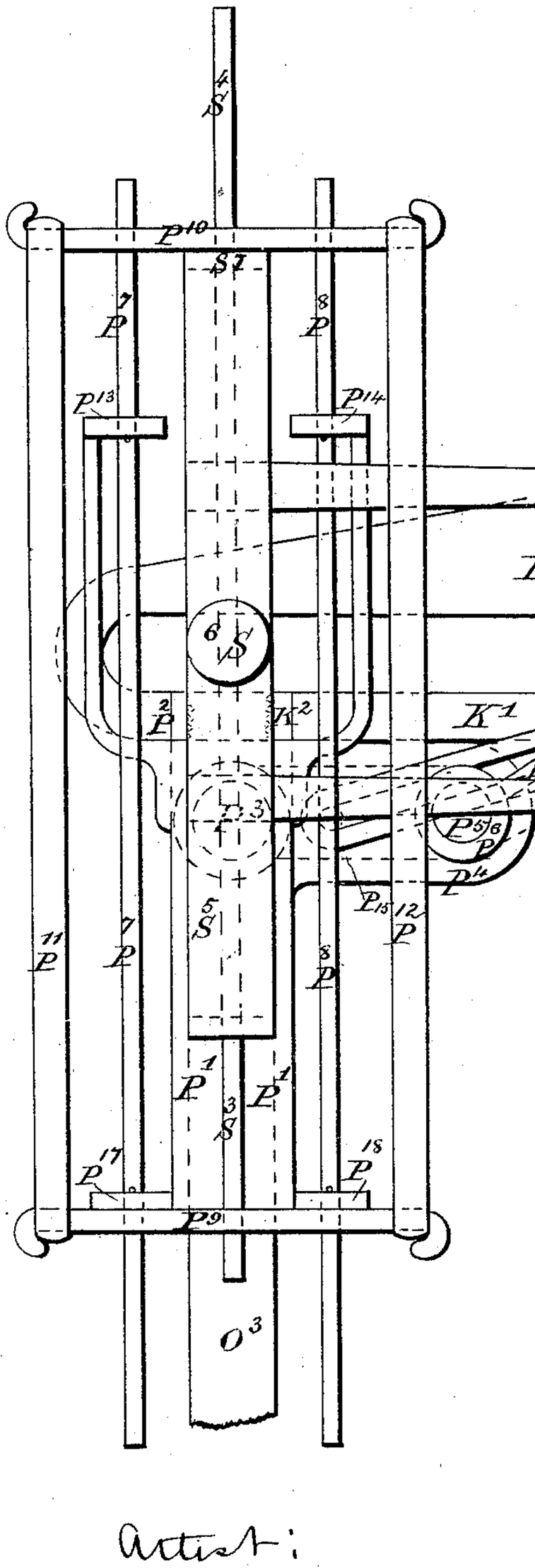
(No Model.) 11 Sheets—Sheet 8.

T. R. JOHNSTON.

PRINTING PRESS FEEDER.

No. 462,136. Patented Oct. 27, 1891.

FIG. 12



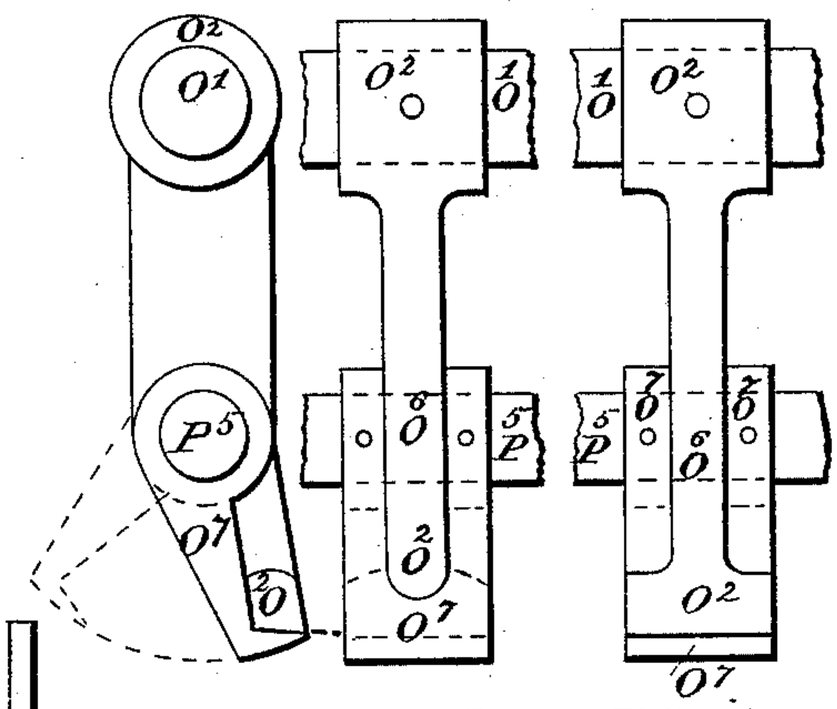


FIG. 14 FIG. 15 FIG. 16

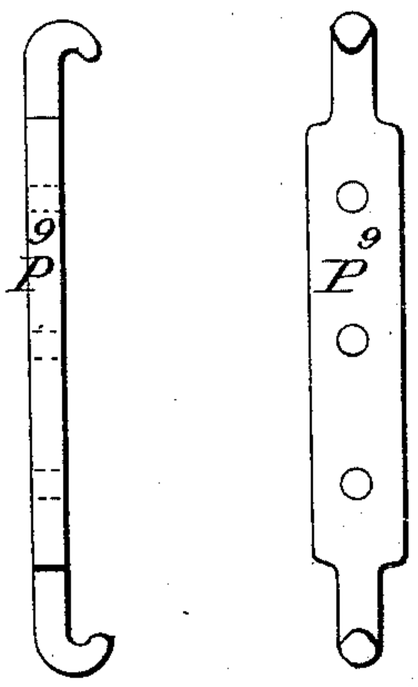


FIG. 20 FIG. 21

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(No Model.) 11 Sheets—Sheet 9.

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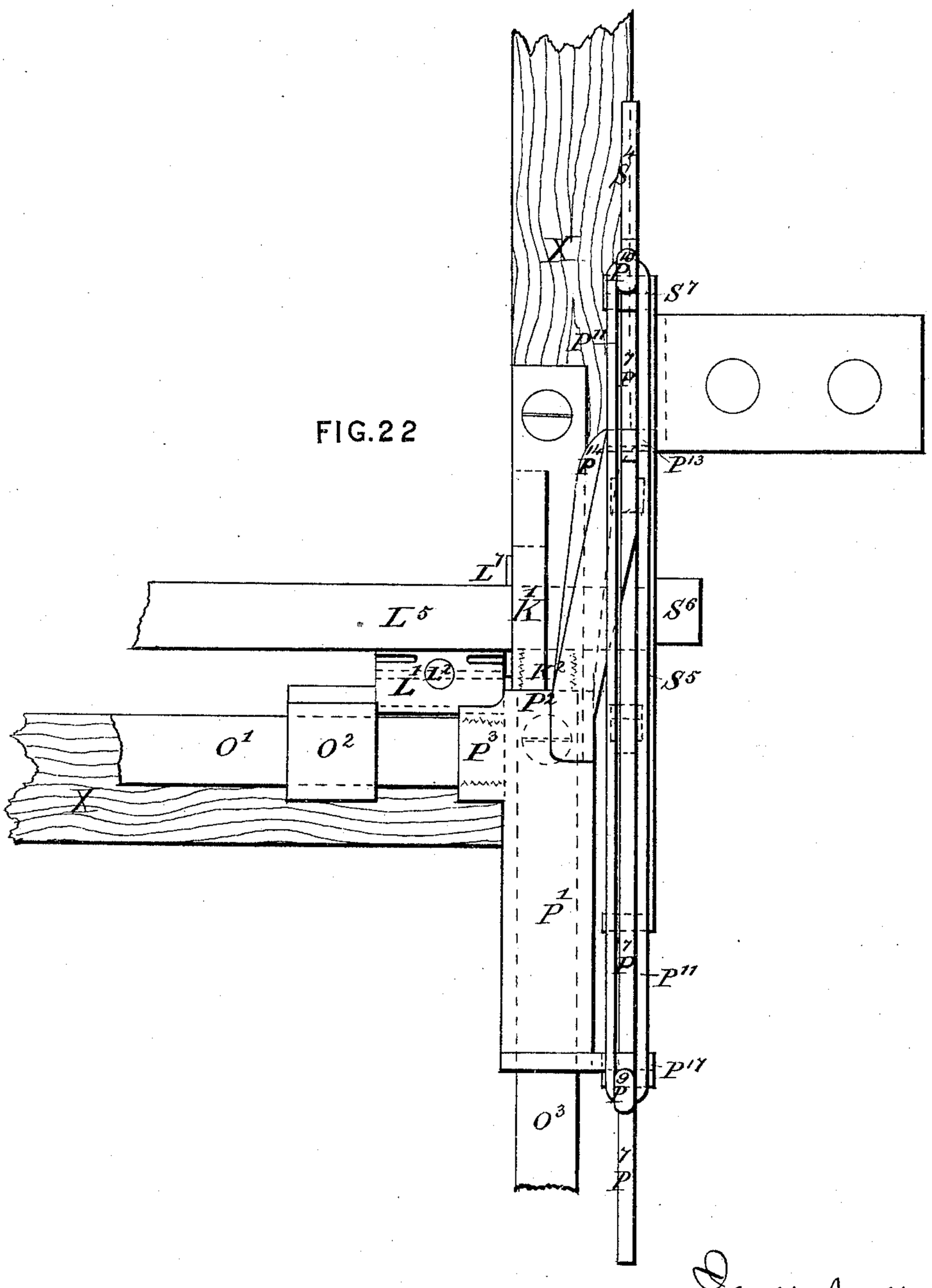
FIG. 22



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(No Model.) 11 Sheets—Sheet 10.

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FIG. 24

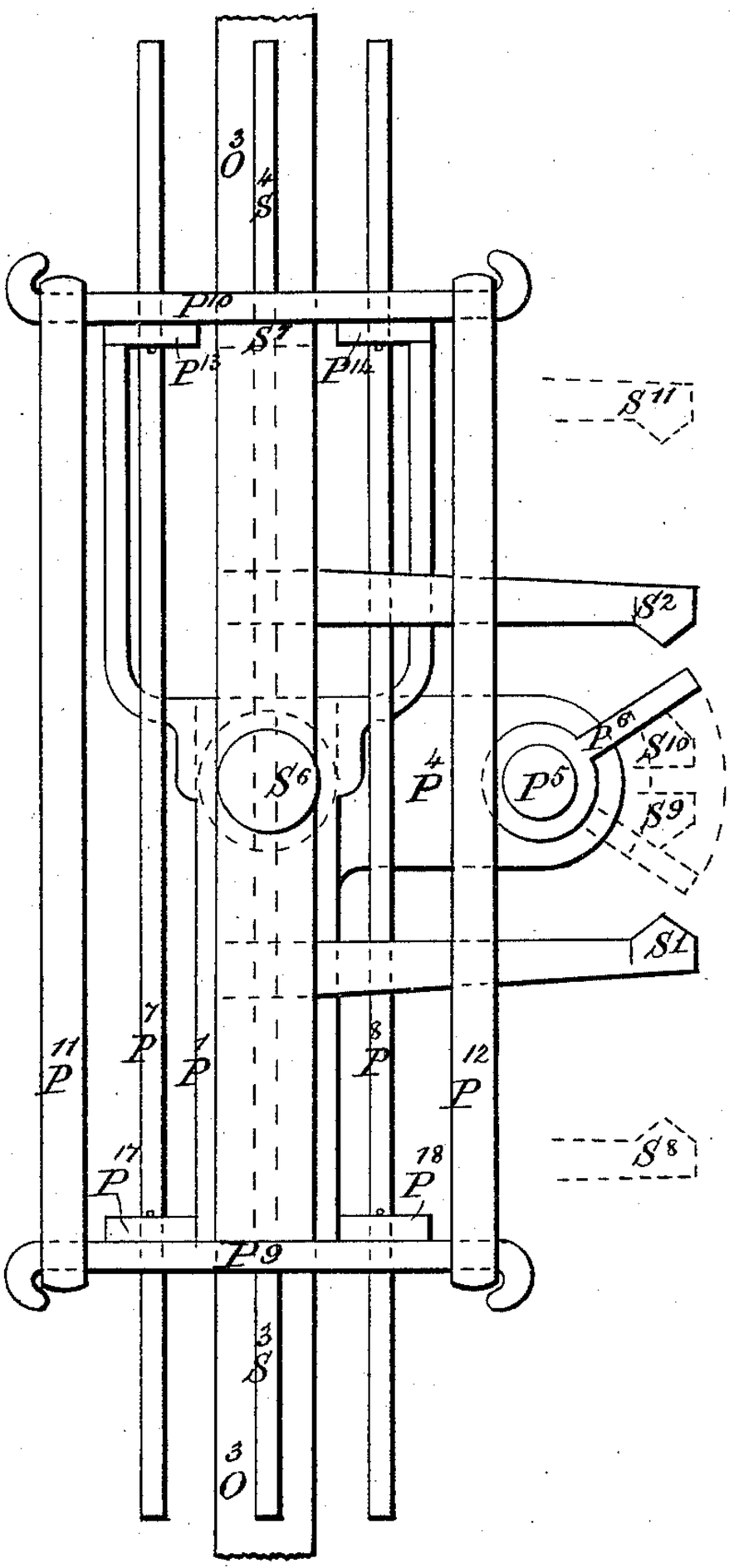
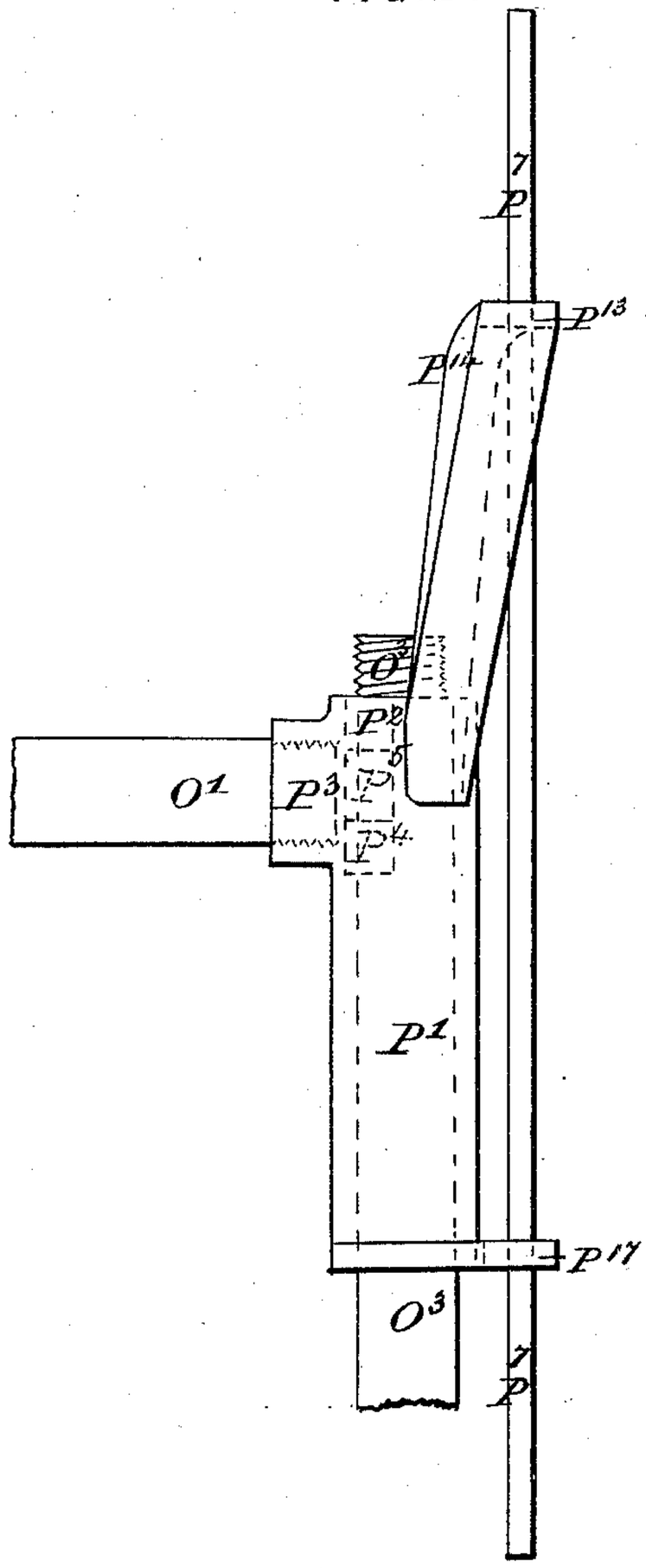


FIG. 23



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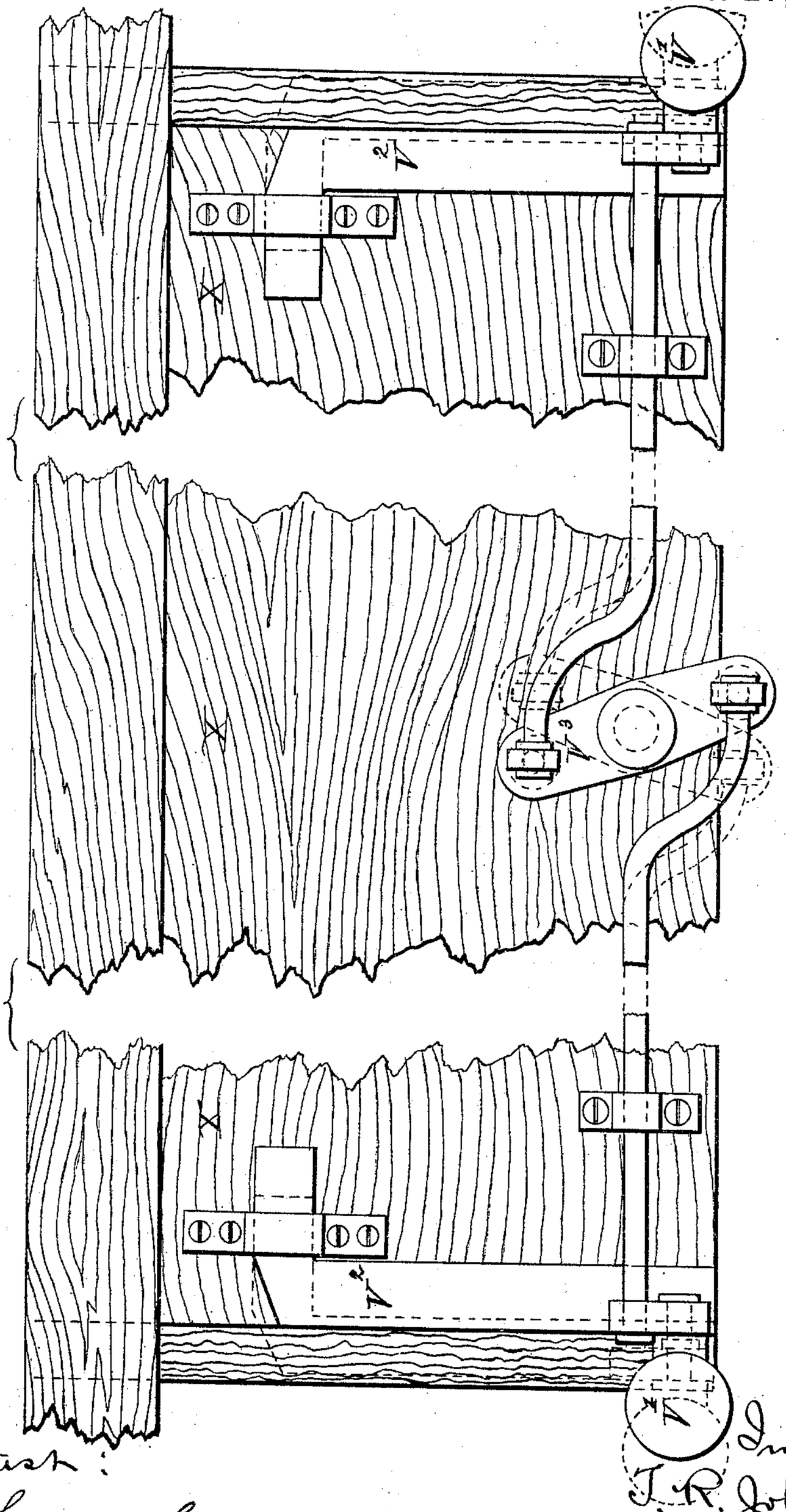

FIG. 25

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UNITED STATES PATENT OFFICE.

THOMAS RUDDIMAN JOHNSTON, OF LONDON, ENGLAND.

PRINTING-PRESS FEEDER.

SPECIFICATION forming part of Letters Patent No. 462,136, dated October 27, 1891.

Application filed May 2, 1889. Serial No. 309,368. (No model.) Patented in France May 10, 1889, No. 198,129; in Belgium May 10, 1889, No. 86,192; in Germany May 10, 1889, No. 50,509; in Victoria August 9, 1889, No. 6,989; in New South Wales August 12, 1889, No. 1,622; in Austria-Hungary September 5, 1889, No. 20,920, and in England April 15, 1890, No. 4,461.

To all whom it may concern:

Be it known that I, THOMAS RUDDIMAN JOHNSTON, map-publisher, a subject of the Queen of Great Britain, residing at 26 Charterhouse Square, in the county of Middlesex, England, have invented certain new and useful Improvements in Printing-Press Feeders, part of which improvements is also applicable to separating sheets of paper from a pile or piles for other purposes, of which the following is a specification.

This invention is embodied in the following patents: in Great Britain, No. 4,461, of 1889, sealed April 15, 1890; in France, No. 198,129, dated May 10, 1889; in Belgium, No. 86,192, dated May 10, 1889; in Germany, No. 50,509, dated May 10, 1889; in Austria-Hungary, No. 20,920, dated September 5, 1889; in New South Wales, No. 1,622, dated August 12, 1889, and in Victoria, No. 6,989, dated August 9, 1889.

In separating sheets of paper from a pile and feeding them to various machines pneumatic lifters or separators have been employed, which have been caused to descend onto the pile, and then by suction separate and lift the top sheet, and in some cases the said pneumatic lifter or separator has been also the conveyer or feeder, while in other cases the pneumatic lifter has raised the top sheet a short distance and traveling grippers have then seized such sheet and carried and delivered it to the desired position. These pneumatic lifters or separators and feeders are troublesome and expensive and are found frequently to fail in action; and it is the object of my invention to provide a cheap and reliable substitute for such pneumatic apparatus. For this purpose I construct a lifter, separator, or feeder with one or more holders or receptacles, in which I fix blocks of what is known as "printer's roller composition," or other like slightly-adhesive preparation, which, while being sufficiently adhesive to insure the seizing and lifting of a sheet of paper, is not moist enough to leave any trace of it on the paper. These blocks of slightly-adhesive material slightly project from the face of the holders, and the latter are provided with means for effecting this adjustment.

In applying my invention to power-driven over-fed printing-machines my object is to do mechanically, and by power transmitted through the printing-machine itself, what is at present manually done by the feeder—viz., to bring down from a heap single sheets of paper and feed each one at the proper time into the grippers of the printing-cylinder, every sheet occupying when gripped exactly the same position in relation to the printing-cylinder.

The apparatus and parts connected with it are constructed and operated somewhat as follows: The upper part of the sloping portion of the feeding-board is removed and a box is inserted for holding the paper, the upper edges of which are flush with the face of the lower portion of the feeding-board. The inner face of the lower side of this box is parallel with the printing-cylinder gripper, and the inner face of one of the sides of the box is not only at right angles with the lower side, but corresponds in position to that of a fixed "side lay." The paper being placed in the box, the edge of every sheet resting against the lower side of it, and that at right angles to it, the sheet-lifters fixed on a bar come down and lift the uppermost sheet. These sheet-lifters, when they have lifted the sheet about a quarter of an inch clear of the box, stop for a short time, and the grippers of a sheet-carrier then resting above take the sheet from the sheet-lifters, and the sheet-carrier subsequently conveys it down to the gripper of the printing-cylinder, which latter shortly afterward revolves and prints it, the sheet-carrier returning for another sheet, and so on.

In order that my said invention may be more clearly understood and readily carried into effect, I will proceed, aided by the accompanying drawings, more fully to describe the same.

In the drawings, Figure 1 is a side elevation representing my invention applied to a power-driven lithographic machine, parts of which latter are shown by the dotted lines. Fig. 2 is an end elevation of the same. Fig. 2* is a detail view of portions shown in Fig. 2, but drawn to a larger scale. Fig. 3 is a side view, and Fig. 4 is an end elevation, of that part of

the sheet-carrier which transmits the necessary motions to it. Fig. 5 is a detail plan, on an enlarged scale, Fig. 6 a sectional side view, and Fig. 7 a front view, of one of the sheet-lifters and parts connected with it. Figs. 8 and 9 are respectively edge views of parts 1 2, Fig. 10, of the cam H′ H², showing the arrangement of the parts for causing the friction-wheel of the lever of the sheet-lifter bar to move from one path of its cam to the other. Fig. 10 shows the cams which move the sheet-carrier and the sheet-lifter bar drawn to half-full size. Figs. 11 and 12 represent the sheet-carrier in two different positions of its grippers and drawn full size. Fig. 13 is a cross-section of the cams which move the sheet-carrier and sheet-lifter bar. Fig. 14 is a side elevation. Fig. 15 is a back view, and Fig. 16 is a front view, of the sheet-carrier grippers. Fig. 17 is a side elevation. Fig. 18 is an end elevation, and Fig. 19 is a plan, of the carrier-bar and the sheet-carrier-lever movers fixed thereto. Fig. 20 is a side elevation, and Fig. 21 is a front elevation, of the flat bars with hooked ends of the sheet-carrier, which are acted on by the rubber bands. Fig. 22 is a plan of the sheet-carrying apparatus, having just received a sheet of paper at the paper-box and its grippers having closed upon it for taking it down to the cylinder. This figure also shows the sheet-carrying apparatus returning to the paper-box when the lever P⁶ is lying in the contrary direction. Fig. 23 is a plan of parts of the sheet-carrier. Fig. 24 is a side elevation of the mechanism which moves the sheet-carrier, as seen when taking a sheet of paper from the box to the printing-cylinder. Fig. 25 is a front elevation, with parts broken away, of the stop pieces and connections, which, when desired, prevent paper from being lifted from the box. Fig. 26 is a section showing an edge view of the oscillating central piece or lever which connects those stop-pieces, and Fig. 27 is an end elevation showing an edge view of one of the stop-pieces. The sheet-carrier-lever movers are shown in their normal position at S′ and S², in their position when opening the grippers at S⁸ and S⁹, and in their position when closing the grippers at S¹⁰ and S¹¹.

The arrow A points the direction in which the cylinder revolves when a sheet is being printed, the cylinder remaining fixed when the stone is returning and the racks of the stone-box are revolving the geared wheels B C in the opposite direction.

The dotted lines B and C indicate, respectively, the tops and bottoms of the teeth of the wheels which revolve the cylinder and are mounted on its shaft, and which also entirely give motion to the feeding apparatus.

D′ is a toothed wheel fixed on the shaft D and geared with one of the above-mentioned cylinder-wheels B C, and E is a toothed pinion, also fixed on the shaft D and giving motion to the toothed wheel F′, on the shaft F of which the cams G and H are fixed. The cam G gives motion to the levers which move the sheet-carrier up and down the feeding board, and the double cam H works the levers which move the sheet-lifter bar. The axles of these wheels, cams, and levers are supported in a suitable frame J.

L′ is a holder or sheet-lifter containing a piece of the slightly-adhesive composition L⁹ of which letter-press inking-rollers are made, or other like preparation, and by means of the screw L² and plate L³ this composition can at all times be arranged so as to very slightly project from the edge of the holder at L⁴. This holder L′ is fastened to a bar L⁵, which stretches across the feeding-board, and has several such holders secured at intervals to it. The ends of this bar L⁵ are mounted in iron supports K′, having downward-extending slot K×, fixed to the box X, containing the sheets of paper, and are prolonged downward where they are provided with circular projecting parts L⁶, on which the levers M³ for raising and lowering the sheet-lifter bar L⁵ are mounted. Projections L⁷ and L⁸ at both ends of the sheet-lifter bar fit against the iron supports K′, and thereby prevent any lateral movement on the part of this bar. The iron supports K′ are secured to the paper-box in such a position that their inner faces are flush with the inner face of the side of the box X.

The mechanism for raising and lowering the sheet-lifter bar L⁵ with its sheet-lifters consists of the double cam H′ and H², which, when it revolves in the direction of the arrow H³, allows its portion H² only to act on the wheel M′, and which, when it revolves in the direction of the arrow H⁴, has only its portion H′ in contact with the same wheel, the cam G, which moves the levers of the sheet-carrier, and also the paths of the above-mentioned double cam H′ H², being shown in Fig. 10. The friction-wheel M′ is mounted in the end of the rod M², and this at its lower end is in contact with the lever M³, which oscillates on the rod M⁴, and is moved up and down in correspondence with the outline of the cam H′ H². The sheet-lifter bar L⁵ being, either by its own weight or by means of a spring (not shown in the drawings,) inclined to descend into the box, the cam H′ H² will more or less lift it, according as it acts on the wheel M′. The cam-path H′ is so made that the levers M³, attached to the end L⁶ of the sheet-lifter bar, permit the latter to descend with its sheet-lifters L′, when the previous sheet of paper taken down to the cylinder is being printed, and allow the sheet-lifters to fix themselves to the next sheet, and the hollow in the cam-path H′ is such, as shown in H⁵, Fig. 10, that the sheet-lifter L′ can lift the last sheet in the box. The cam then continuing to revolve brings the sheet-lifter up again from the box until the sheet of paper comes to the position N′, the portion of the cam-path marked H⁶ being then acting on the friction-wheel M′. The grippers of the sheet-carrier

then secure the sheet, as will be afterward described, and when this takes place the sheet-lifter rises still farther by means of the portion of the cam marked H^7 to detach itself from the paper, and then remains in this position while the sheet-carrier is taking the sheet down to the cylinder-gripper. To cause the sheet-lifter bar to remain in its highest position and not come down on the sheet of paper when it is being withdrawn from the box just before the cam commences its reverse movement, the wheel M′ leaves the path H′ it has been following, as shown in Fig. 8, the spring H^9 preventing its return, and takes the other path H^2 when the cam revolves in the contrary direction. This cam-path H^2 is of the full circumference of the cam, and the wheel follows it until it comes to the spring H^{11}, Figs. 9 and 10, when it again changes to the path it first followed, the spring H^{11} again preventing its return. As will be seen on reference to Fig. 8, when the wheel M′ in traveling on the path H′ in the direction of the arrow on that path comes to the spring H^9 the latter gives way and allows it to pass, but immediately afterward resumes the position shown in the drawings, thus compelling the wheel M′, when the cam commences to revolve in the opposite direction, to follow the path H^2. As shown in Fig. 9, it again returns to the path H′ in a similar manner. The wheel M′ will pass more or less into the hollow of the cam-path H′, according to the amount of paper in the box; but the paper-lifters will always reach the paper and then be lifted up exactly to the grippers of the sheet-carrier. Thus should the box be full of paper and the sheet-lifters L′ be resting on the topmost sheet, the lifter-bar L^5 to which they are attached will only permit its portion L^6 to descend a very small distance. The lever M^3 will consequently act in a similar manner and allow the rod M^2, with its friction-wheel M′, to only partly ascend, and M′ will thus only slightly enter the hollow H^5 of the cam H′, and the smaller the quantity of paper in the box the farther will M′ enter the hollow H^5.

The sheet-carrier, which takes the sheet of paper from the sheet-lifters L′ and conveys and delivers it at Y to the gripper (not shown) of the printing-cylinder, consists, chiefly, of a rod O′, Figs. 2, 2*, 5, 14, 15, 16, 22, and 23, stretching across the feeding-board and having on it grippers O^2. This rod is fixed to short brass tubes P′, sliding on rods O^3, fixed at its upper end at K^2 to the iron supports K′ of the sheet-lifter bar, and at its lower end to brackets O^4, fixed to the cross-bar O^5 of the frame of the machine. The movements of the sheet-carrier correspond with the movements of the printing-cylinder and its gripper. It is carried up and down the feeding-board by the action of the cam G and levers Q′ and Q^2, as follows: The path of the friction-wheel Q^3 of the L-lever Q′ is shown chiefly in Fig. 10, and this path is so designed that shortly after the printing-cylinder begins to revolve the lever Q′ makes the lever Q^2 move the sheet-carrier, with its open grippers, up the feeding-board with a gradually-increasing and then gradually-decreasing motion until it brings its part P^2 against the iron supports of the sheet-lifter at K^2. After letting the sheet-carrier rest there for an instant, but sufficiently long to get the sheet of paper, it closes its grippers and then brings the sheet-carrier, with the same movements repeated in reverse order, down to the printing-cylinder gripper, where it again rests, and the arm S^2 opens the carrier-gripper and releases the sheet, as hereinafter described.

The grippers of the sheet-carrier are controlled as follows: The tubes P′ slide on the rods O^3, and the bar of the sheet-carrier is fixed at P^3 to the tube P′. Through descending arms P^4, attached to the tubes P′, passes a rod P^5, and this rod also passes freely through the sheet-carrier grippers O^2 at O^6, and to it are fixed the parts O^7 of the grippers, so that when this rod is slightly turned in one direction or the other the grippers are opened or closed. On the end of this rod P^5 are fixed levers P^6, acted on by the lever-movers S′ and S^2 as the sheet-carrier grippers are receiving or delivering their sheet. On the wires P^7 and P^8 of the tubes P′ are placed flat bars P^9 and P^{10} with hooked ends, these pieces being held in position by the strong rubber bands P^{11} and P^{12}. Passing through the center of each of these flat pieces are wires S^3 and S^4, fixed to a bar S^5, and to which the lever-movers S′ and S^2 are fixed, and which has motion communicated to it through its projecting lever pins or studs S^6 by the lever Q^2, which is forked at its lower end Q^4. After the tube P′ is carried to its highest position against the sheet-lifter-bar support at K^2 or its lowest position against the bracket O^4 at O^8 the lever Q^2 continues to move and carries the bar S^5 still farther upward or downward, and so brings the lever-movers S′ and S^2 against the levers P^6; but as soon as the lever Q^2 begins to reverse its action the rubber bands P^{11} and P^{12}, acting on the flat bars P^9 and P^{10}, bring the bar S^5 back to its central position, in which the lever-movers S′ and S^2 do not come in contact with the lever P^6, and S^5 continues in this position during the upward and downward movement of the sheet-carrier, being only moved from it when the tubes P′ of the carrier are arrested either above or below.

To describe the complete action of the apparatus. The printing-cylinder having commenced to revolve with a sheet already supplied thereto, the sheet-carrier, with its connections S, P, and O′, being all at their lowest positions, remains thus for a time corresponding with the time given the cylinder-gripper to close, the movements produced by the cam G, moving the levers of the sheet-carrier, being of course repeated in reverse order in the upward movement of the sheet-carrier to what they were in the downward, and then

the lever Q^2, beginning gradually to move, permits the rubber bands P^{11} and P^{12} to bring back the bar S^5 until its part S^7 comes against the flat bar P^{10} and the sheet-carrier-gripper-lever openers and closers S' and S^2 remain at each side of the sheet-carrier-gripper levers P^6 without acting on them when the sheet-carrier is being moved upward. The lever Q^2, continuing to act with a gradually-quicker movement, and the cam H', which acts on the lever M^3, connected to the sheet-lifter bar L^5, coming now into play, the sheet-lifter bar is permitted to lower itself into the paper-box, where its lifters L' receive a sheet of paper, the cam H', continuing to act, raises the sheet-lifter bar to the position N' as the sheet-carrier gradually stops against its highest position K^2; but though the carrier stops, the lever Q^2 continues to act, and by pushing the end S^7 of bar S^5 against the flat bar P^{10}, carrying the latter temporarily away from the stops P^{13} and P^{14} and allowing lever-mover S' to come against the lever P^6 of the sheet-carrier-gripper rod and move it so as to shut these grippers, this movement being assisted by the rubber bands R', fixed to the tube P' at P^{15} and to the levers of the sheet-carrier at P^{16}. The portion H^7 of the cam H of the sheet-lifter then comes into action and raises the sheet-lifter clear from the sheet of paper. The friction-wheel M' having now reached the cam-path H^2, the sheet-lifter remains in this its highest position during the complete downward movement of the sheet-carrier and until it again approaches it; but the movements given the carrier by its cam G through the levers Q' and Q^2 are now reversed, and the carrier brought down with the sheet of paper to the cylinder-gripper, the carrier then gradually stopping as it comes in contact with boss O^8 on the bracket O^4, fixed to the machine-frame, and the lever Q^2 continuing to act until it moves the flat bar P^9 away from stops P^{17} and P^{18}, and so permits the lever-mover S^2 to push the lever P^6 of the sheet-carrier grippers and so move O^7 away from O^2, and so leave the sheet of paper in the gripper of the printing-cylinder, which then closes upon it. The shaft U', to which the levers Q^2 are fixed, oscillates in the frames J at J^2, and the smaller rod U^2 also joins the same levers together and steadies their movement.

The means used to adjust the movements of the lever Q^2 are shown in Figs. 1 and 2, and are as follows: Working within the forked end of the levers Q' are crank-pins Q^5, fixed in certain positions by the plates Q^6 and Q^7, sliding in the levers Q^2 and jam-nuts Q^8. If these bent pieces be moved to the right or left, they will correspondingly make the levers Q^2 move farther in one direction and less in the other than before. If, again, the plates Q^6 and Q^7, to which the crank-pins are joined, be moved farther up or down in the levers Q^2, the total movement of those levers will be increased or decreased accordingly. If it is desired at any time to cease feeding paper to the printing-cylinder, whether the machine is running or not, all that is necessary to accomplish this is to pull out the handles V', Figs. 1, 2, 25, 26, and 27, when the stop-pieces V^2, connected with them, will prevent the levers M^3 from descending, and therefore the sheet-lifters cannot enter the paper-box. The sheet-carrier may, however, continue to move up and down; but as it takes no paper with it this does not matter. The stop-pieces V^2 from their shape can only come under the levers M^3 when the latter are full up, and therefore cannot cause any breakage of parts, which otherwise might be done. The pulling out of handle V' at one side of the machine makes a similar part to V^2 come also out at the other side, the two parts being joined together by a third part or lever V^3, which oscillates on its center, which is fixed to the middle of the lower side of the feeding-box.

In all machines the rod M^4 on which the lever M^3 oscillates is carried across to the other side of the machine, where it moves another similar lever. In the larger machines the geared wheels for giving movement to the cam G and the cam itself would be in duplicate, one set at each side of the machine. All the other parts of the sheet-lifter and sheet-carrier and parts connected with them, though only shown as at one side of the feeding-board, are also at the other side.

The use of slightly-adhesive material, hereinbefore referred to, is also applicable in other cases where it is required to lift or separate single sheets of paper from a pile or piles of the same.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The rising and falling sheet-lifting device for printing-machines, having flat-faced blocks of adhesive composition, independent holders for said blocks, and screws for adjusting the blocks relatively to the holders, substantially as set forth.

2. The rising and falling sheet-lifting device for printing-machines, having flat faced blocks of adhesive composition, and holders for said blocks, said blocks being independently vertically adjustable, substantially as set forth.

3. The combination, with the carrier, of the pivoted lever Q^2 for reciprocating said carrier, the lever Q' for oscillating the lever Q^2, and means, substantially as described, for oscillating said lever Q', substantially as set forth.

4. In a power-driven over-fed printing-machine, the combination, with the feeding-board having a paper-box, of lifters arranged over said paper-box, the fixed rods O^3, the traveling carrier having grippers mounted on said rods, lever-movers movable on the said rods independently of the grippers for operating the latter, stops at both ends of the said rods for arresting the movement of the carrier, the cams G H, and levers having bearing upon and operated by said cams and hav-

ing connection with said carrier and lifters, respectively, substantially as set forth.

5. In a power-driven over-fed printing-machine, the combination, with the feeding-board having a paper-box, of lifters arranged over said paper-box, the fixed rod O^3, the carrier mounted to reciprocate on said rod, grippers carried by said carrier, a lever for opening and closing said grippers, lever-movers for operating said lever, an elastic medium adapted to hold said lever-movers normally out of contact with said lever, a boss or stop at each end of rod O^3 for forcing said lever against said lever-movers, the cams G H, and levers and arms connecting said cams with said carrier, and lifters whereby the latter are operated, substantially as set forth.

6. In an over-fed printing-machine, the combination, with the feeding-board having a paper-box, of lifters arranged over said box, the rod O^3, the carrier mounted to slide on said rod, grippers secured to said carrier, a lever for opening and closing said grippers, a bar S^5, mounted to slide on said carrier, having a lever-mover on both sides of said lever, an elastic medium acting upon said bar S^5 for holding said lever-movers normally out of contact with said lever, a stop or boss at both ends of the bar O^3, adapted to arrest the movement of the carrier, an elastic medium for holding the grippers in the position in which the lever-movers place them, the lever Q^2, connected to said bar S^5, and cams for imparting motion to said lever Q^2 and to said lifters, substantially as set forth.

7. In an over-fed printing-machine, the combination, with the feeding-board having a paper-box, of lifters arranged over said box, the rod O^3, the carrier mounted to slide on said rod, grippers connected to said carrier, a lever for opening and closing said grippers, an elastic band for holding said lever at the extremity of its movement in either direction, the bar S^5, mounted on and having a limited movement independent of said carrier and provided with the lever-movers S' S^2, the cross-bars P^9 P^{10}, the rods S^3 S^4, passing through said cross-bars and the bar S^5, elastic bands connecting said cross-bars, stops for limiting the movement of said cross-bars toward each other, the arm or lever Q^2, connected to said bar S^5, a stop or boss at both ends of the bar O^3 for arresting the movement of the carrier, and cams for imparting motion to said lever Q^2 and to said lifters, substantially as set forth.

8. In an over-fed printing-machine, the combination, with the lifters and carrier having grippers, of the cam G for operating the carrier, the cam H, having a double path, a rod connected with the lifters for operating them and adapted to bear in either of said paths, and spring-switches arranged in said paths for guiding said lever from one to the other, substantially as set forth.

9. The combination of the slotted supports K′, the bar L^5, extending across the machine and having its ends fitting in the slots of said supports vertically adjustable, adhesive blocks L^9, secured at intervals to said bar and adapted to descend upon the paper, and means, substantially as described, for elevating said bar, substantially as set forth.

10. The combination of the slotted supports K′, the bar L^5, having its ends fitting in said slots and provided with the guides L^7 L^8 and journals L^6, the adhesive blocks L^9, secured to said bar, the shaft M^4, levers mounted upon said shaft and engaging said journals, and means, substantially as described, for oscillating said levers, substantially as set forth.

11. The combination of the bar L^5, supports and guides for preventing lateral movement of said bar, the holders secured to said bar, the adhesive blocks arranged in said holders and adapted to rest upon the paper, screws in said holders having bearing on and adjusting said blocks, and means for raising the said bar, substantially as set forth.

12. The combination, with the feeding-board having a paper-box and the paper-lifters mounted to rise and fall in said box, of the levers M^3 for operating said lifters and stops for engaging under said levers and holding said lifters aloof, substantially as set forth.

13. The combination, with the feeding-board having a paper-box and the paper-lifters mounted to rise and fall in said box, of the cam H, having the depression H^5, the lever M^3 for operating the said lifters, the arm M^2, having bearing at one end against said cam and engaging said lever at the other, and a sliding stop adapted to hold the lifters inoperative, substantially as set forth.

THOMAS RUDDIMAN JOHNSTON.

Witnesses:
CLAUDE K. MILLS,
JOHN D. VENN.