

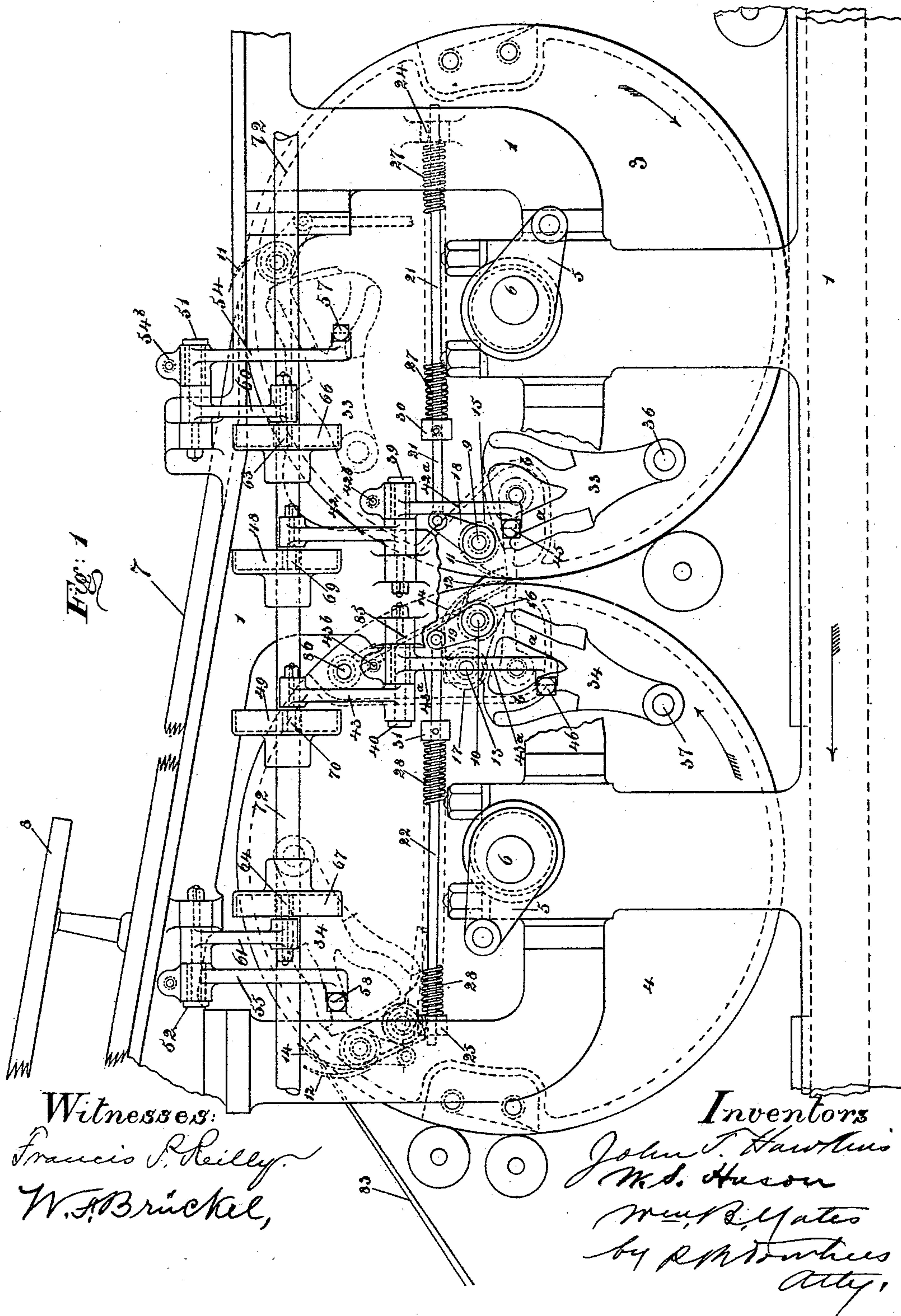
(No Model.)

5 Sheets—Sheet 1.

J. T. HAWKINS, W. S. HUSON & W. B. YATES.  
GRIPPER MECHANISM FOR PRINTING MACHINES.

No. 457,715.

Patented Aug. 11, 1891.



(No Model.)

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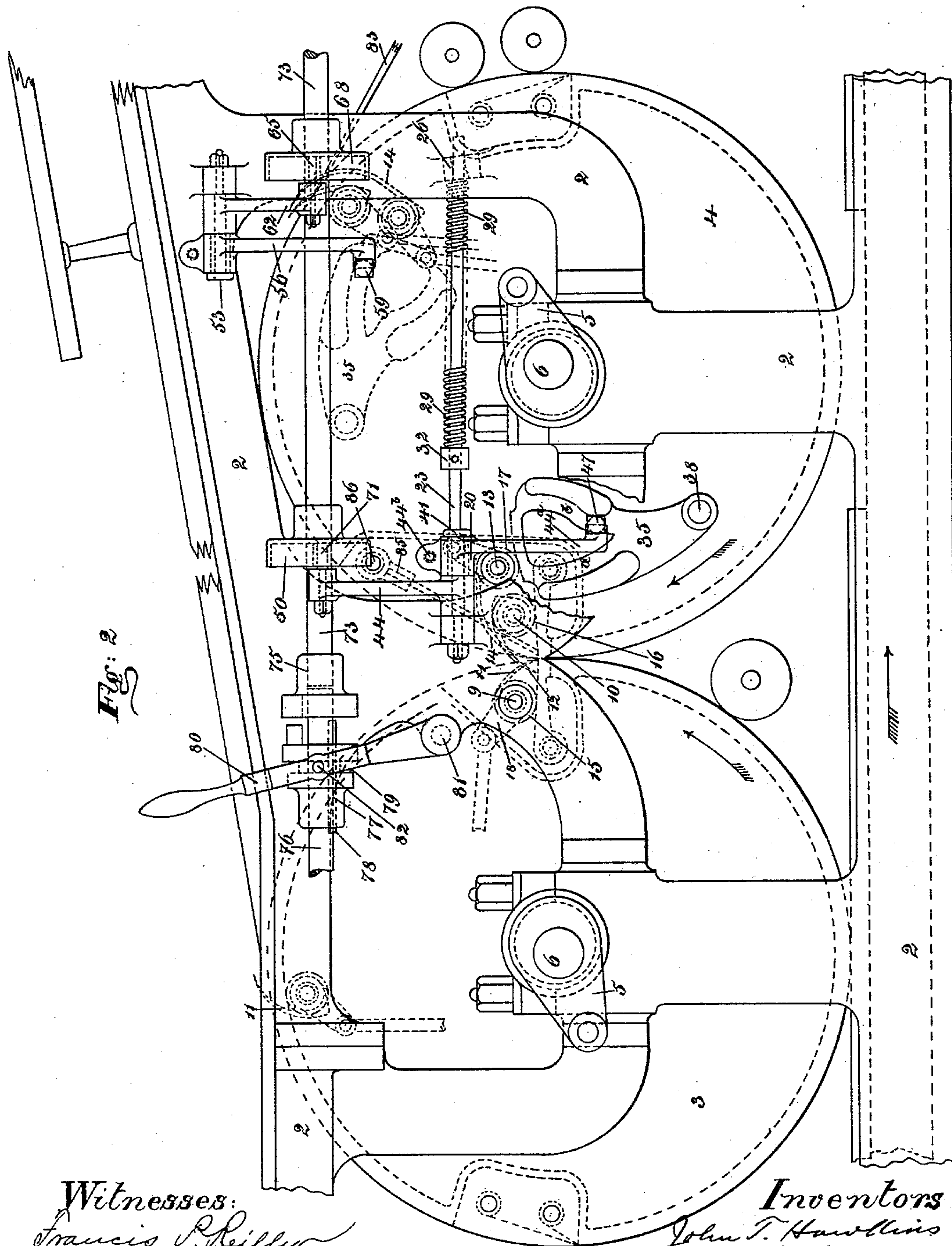


Fig. 2

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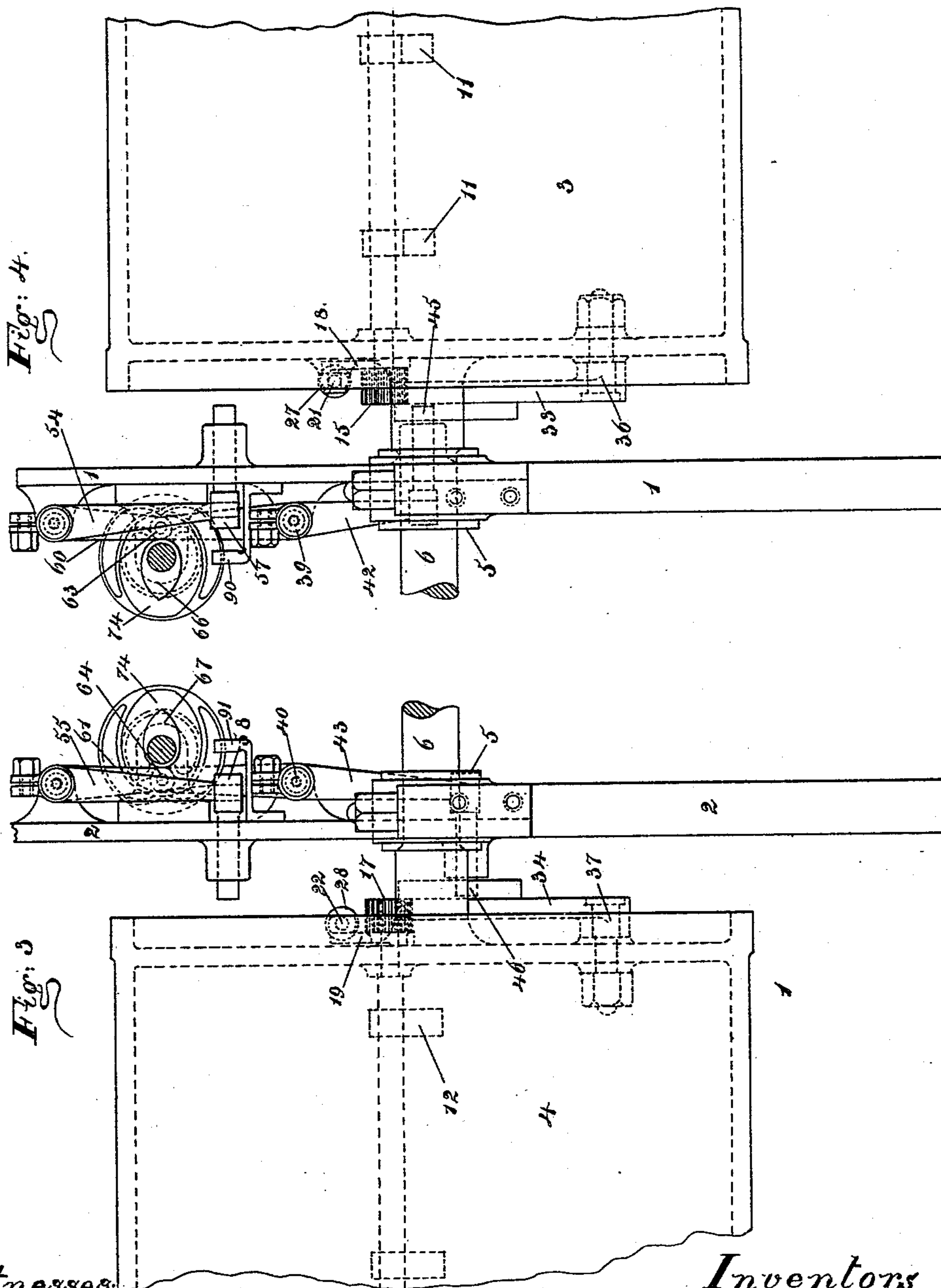
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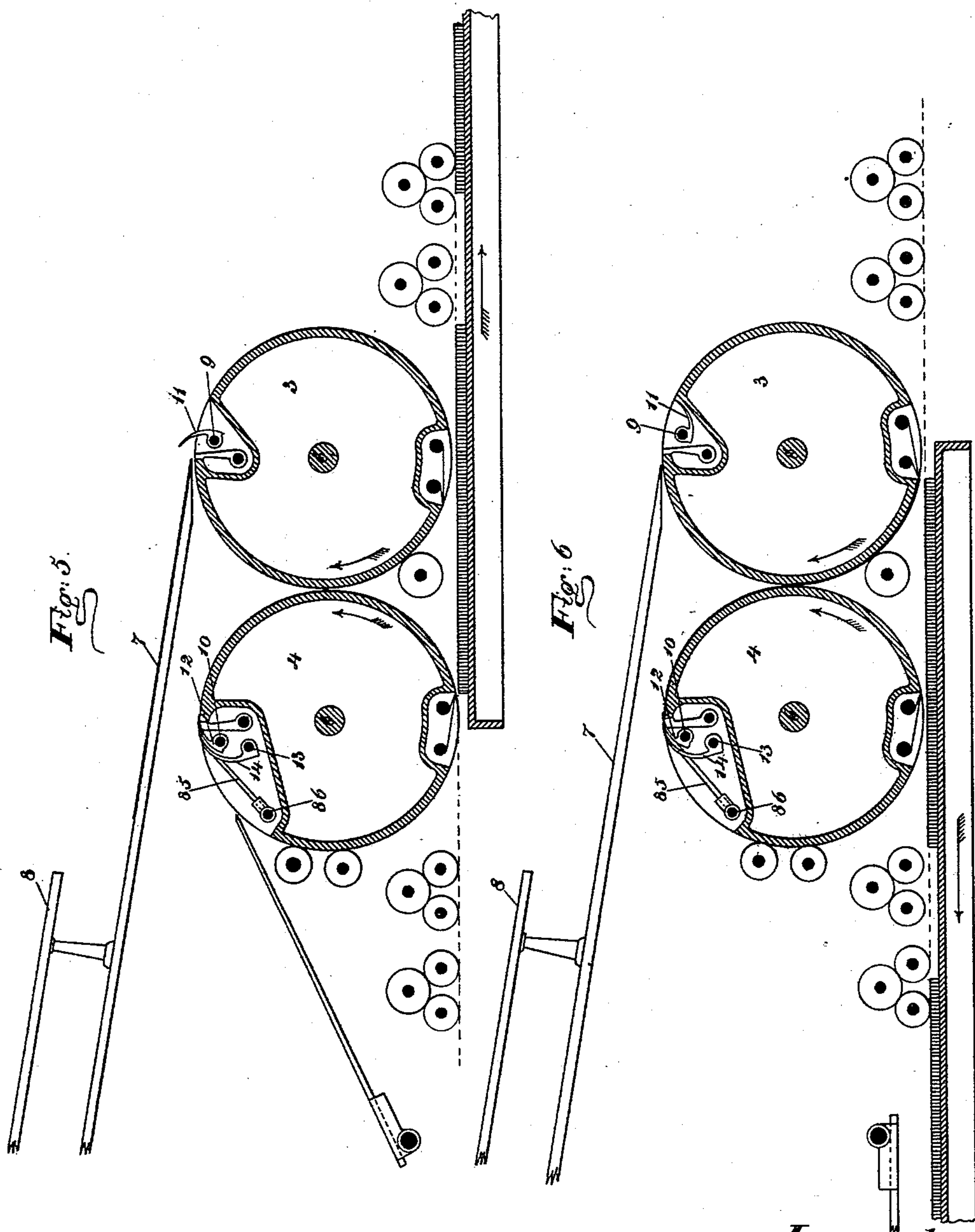
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5 Sheets—Sheet 4.

No. 457,715.

Patented Aug. 11, 1891.



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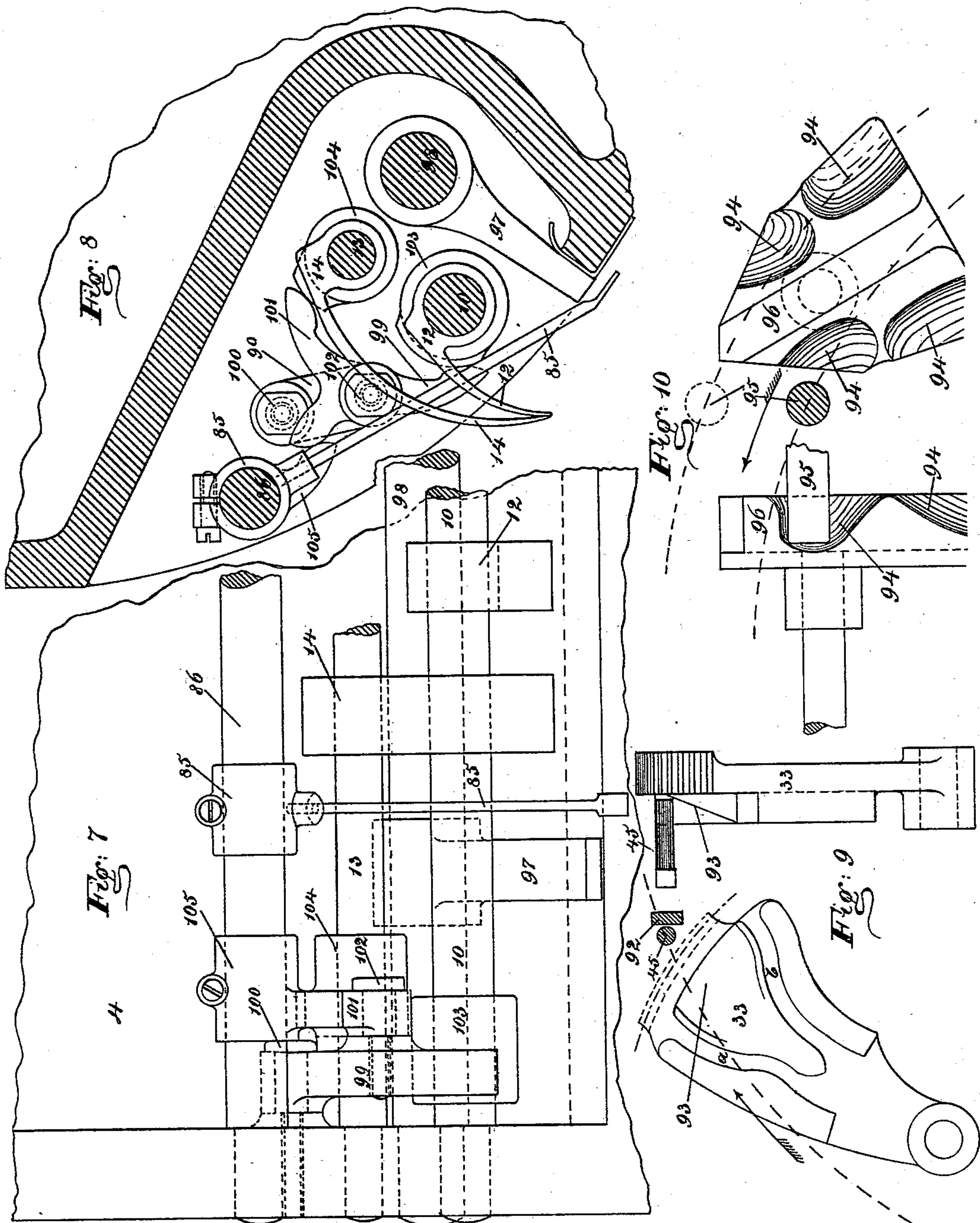
5 Sheets—Sheet 5.

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# UNITED STATES PATENT OFFICE.

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## GRIPPER MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 457,715, dated August 11, 1891.

Application filed November 12, 1890. Serial No. 371,197. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN T. HAWKINS, WINFIELD S. HUSON, and WILLIAM BURTON YATES, all of Taunton, in the county of Bristol and State of Massachusetts, have jointly invented certain new and useful Improvements in Gripper Mechanism for Printing-Machines, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide a gripper and sheet-lifter mechanism for printing-machines which will permit of several sets of grippers and lifter-fingers being carried in the same cylinder or cylinders and operated through the required arcs without interference from the opening and closing cams, commonly called "tumbler cams," such as are generally attached to the gripper rock-shafts, to insure that the pressure of the spring which holds the grippers closed shall always be exerted upon one side of the gripper rock-shaft bearing, so as to avoid loss of register from wear of said bearing, and to perform the operation of opening and closing the grippers and lifter-fingers noiselessly.

It is also the object to provide against inadvertent replacing of the parts when misplaced, and thus avoid breakage. The mechanism, while applicable to a cylinder carrying but one set of grippers in the ordinary one, two, or three revolution single-cylinder printing-machine as a noiseless and safety mechanism, is particularly adapted to cases where transfer of one or more kinds of sheets from one to another cylinder is to be effected, as described in the pending joint applications, Serial Nos. 312,897, 312,898, 312,899, 312,900, 312,901, filed June 1, 1889.

The invention will first be described in detail, and then particularly set forth in the claims.

In the accompanying drawings, Figure 1 is a side elevation of so much of what may be called the "gear side" of a perfecting-machine of the type represented in said application, Serial No. 312,897, as is necessary to the illustration of this invention; and Fig. 2 is a similar partial side elevation of the opposite or "feeder" side of the machine. Fig.

3 is a front elevation seen from the left hand of Fig. 1; and Fig. 4 is a similar elevation seen from the right hand of Fig. 1. Fig. 3 also answers for a similar elevation seen from the left hand of Fig. 2 in its main construction. Figs. 5 and 6 are diagrammatic longitudinal vertical sections, on a smaller scale, of the parts of the machine involving the gripper-motion, with the actuating mechanism omitted, and showing the parts in two different positions. Fig. 7 is a partial front elevation of the mechanism for operating the sheet-lifter, and Fig. 8 a side view of the same, partly in section, both enlarged and shown separately from the remainder of the gripper mechanism for clearness. Fig. 9 constitutes two views, enlarged, of one of the oscillating or tumbling cams with its engaging stud, showing separately the operation of an inclined surface on the cam for correcting misplacement of the grippers by restoring the sliding stud to its correct position when the grippers are misplaced. Fig. 10 constitutes two similar views of the ordinary single-grooved tumbler-cam well known as attached directly to the gripper rock-shaft, but here arranged with the safety-inclines.

In said figures the several parts are respectively indicated by reference-numbers, as follows: The main frames of the machine 1 and 2 are shown partly broken away to show the mechanism behind them, the number 3 indicating the first impression-cylinder. The eccentric-boxes 5, in which the cylinder-axes 6 are journaled, are made eccentric for the purpose of raising the cylinders from and lowering them to the impression, which is accomplished by suitable mechanism connected thereto, not necessary to be shown in the illustration of this invention. The feed-board 7 leads to the first impression-cylinder 3, and an auxiliary feed-board 8 is provided upon which to lay offset-sheets, which are at intervals to be fed to the first impression-cylinder 3, thence transferred to the second impression-cylinder 4, retained thereon at the will of the attendant, thence delivered upon the fly, and a new offset-sheet taken. The gripper rock-shaft 9 is journaled in the cylinder 3, and a similar rock-shaft 10 is journaled in



the cylinder 4. These shafts carry the usual form of grippers 11 and 12, respectively. A second gripper rock-shaft 13, journaled in cylinder 4, carries grippers 14. Upon rock-shafts 9 10 13 are mounted, respectively, spur-pinions 15, 16, and 17, indicated in Figs. 1 and 2 by their dotted pitch-circles only. On the rock-shafts 9, 10, and 13, inside of the pinions 15, 16, and 17, are mounted levers 18, 19, and 20, respectively. Articulated to the free ends of levers 18, 19, and 20, respectively, are rods 21 22 23, whose free ends respectively slide in holes enlarged at the ends, as shown in dotted lines, drilled in lugs 24, 25, and 26, formed upon the cylinders 3 and 4. The rods 21 22 23 are operated to keep the respective grippers open or closed, as may be, by springs 27 28 29 reacting against the lugs 24 25 26, and the collars 30 31 32, secured to said rods, the arc described by the levers 18 19 20 being performed about equally upon each side of a line adjoining the centers of the holes in the lugs 24 25 26 and the centers of the rock-shafts 9, 10, and 13. The oscillating or tumbling cams 33 34 35 each carry properly-curved grooves *a* and *b*. The cams 33, 34, and 35 are fulcrumed, respectively, upon studs 36 37 38, secured in the cylinders 3 and 4. The cams 33 34 35 carry on their free ends each a sector and spur-teeth engaging the pinions 15 16 17, said teeth being indicated in Figs. 1, 2, and 9 only by their dotted pitch-lines on the side views of the same. Upon studs 39, 40, and 41, secured in the frames 1 and 2, are fulcrumed levers 42 43 44, respectively. Upon elongated hubs of the levers 42 43 44 are fulcrumed levers 42<sup>a</sup> 43<sup>a</sup> 44<sup>a</sup>, these latter being supplied with split hubs bound together by screws 42<sup>b</sup>, 43<sup>b</sup>, and 44<sup>b</sup>, so that the levers 42, 43, and 44 move the levers 42<sup>a</sup>, 43<sup>a</sup>, and 44<sup>a</sup> by the frictional resistance of the last three upon the hubs of the first three levers. The levers 42<sup>a</sup> 43<sup>a</sup> 44<sup>a</sup> articulate with studs 45 46 47, which slide in proper bearings formed in the frames 1 and 2 and project, when protruded toward the cylinders, so that their ends engage the grooves *a b* of the cams 33 34 35. The levers 42 43 44 carry rollers 69 70 71, which engage cams 48 49 50. On studs 51, 52, and 53, secured in frames 1 and 2, are mounted levers 60 61 62, which have similarly fulcrumed on their hubs other levers 54 55 56. The free ends of levers 54 55 56 are articulated to sliding studs 57 58 59, which slide in suitable bearings in the frames 1 and 2, so that when protruded toward the cylinder they will also engage the grooves *a b* of the tumbling-cams 33 34 35. Levers 60, 61, and 62 carry on their free ends, respectively, rollers 63 64 65, which engage cams 66 67 68. Cams 66 48 49 67 are secured to shaft 72, Fig. 1, and cams 50 and 68 are secured to a shaft 73, Fig. 2, which shafts are journaled in the frames 1 and 2, and the shaft 72, given a continuous rotary motion from any suitable revolving part of the machine, so as to make one revolution to

each impression or to each two revolutions of the cylinders. The cams 48, 49, 50, 66, 67, and 68 have elliptical grooves 74, engaging the rollers of the several levers, as shown, and are so placed upon the shafts as to operate to protrude or withdraw the sliding studs 45 46 47 57 58 59 at the proper time to engage the cams 33 34 35 and open and close the several grippers at the time required on one revolution and escape them on the other revolution of the cylinders. Upon shaft 73, Fig. 2, is secured a coupling 75, and upon another shaft 76, carried in suitable bearings in the frame 2, is a sliding companion coupling 77, sliding upon a feather 78. Coupling 77 is grooved, as at 79, for a clutch-lever 80, fulcrumed on a stud 81, secured in the frame 2. Said clutch-lever 80 carries two pins 82, which engage the groove 79 of coupling 77. By means of the last-described mechanism the shaft 73 may be placed in rotation and stopped at the will of the attendant, shaft 76 being continuously rotated by suitable mechanism from some rotating part of the machine in the same manner and at the same rate of rotation as shaft 72, Fig. 1. Stops 90 and 91, Figs. 3 and 4, are secured to frames 1 and 2 to limit the outward position of studs 58 and 57, and similarly for studs 45 46 47 stops are placed on the frames, but not shown, the frames being broken away to show the other parts. The stop for stud 45 is shown in section at 92, Fig. 9.

Referring now to Fig. 9, an inclined surface 93 is formed on cams 33 34 35 for the purpose of throwing the studs outward in case of the erroneous placing of the grippers open when they should be shut, or vice versa. The studs 45 46 47 57 58 59 may either of them be protruded at the wrong time to meet the grooves *a* or *b* of the cams 33 34 35, the levers 56 44<sup>a</sup> 54 55 42<sup>a</sup> 43<sup>a</sup> being respectively frictionally held upon the hubs of the levers 62, 44, 60, 61, 42, and 43, permitting the inclines 93 to so act upon the studs when so misplaced. The stops 90 and 91 limiting the outward motion of the studs, the relative positions of each pair of levers will be restored upon the next revolution of the cylinders and the whole be brought into place again. Fig. 10 shows similar inclines 94 formed upon an ordinary single straight-slotted tumbler-cam, as generally secured to the gripper rock-shaft direct to operate upon the stud 95 when similarly misplaced.

Referring to Figs. 7 and 8, the usual tympan-nippers 97 are secured to a shaft 98. A lever 99 is fulcrumed at one end upon a stud 100 in the cylinder 4. A two-armed lever 101 is fulcrumed on lever 99 by a stud 102. A cam 103 is secured to gripper rock-shaft 10, and a similar cam 104 is secured to gripper rock-shaft 13. A lever 105 is secured to the lifter-finger shaft 86. The free end of lever 105 engages one arm of lever 101. The free end of lever 99 engages cam 103 on shaft 10, and the second arm of lever 101 engages the



cam 104 on shaft 13. By the operation of these parts the grippers 12 may be operated alone, with grippers 14 remaining closed, without operating the lifter-fingers; but when both gripper-shafts 10 and 13 are operated to open the parts will, as shown in position, Fig. 8, cause the lifter-fingers 85 to rise by the cam 103 throwing the free end of the lever 99 far enough to cause one arm of lever 101 to operate upon the end of lever 105 when cam 104 is rotated in opening grippers 14; but unless the grippers 14 are opened the cam 104 will not cause lever 101 to operate upon lever 105. In this way the printed sheets will be held by grippers 12 and released by them without disturbing the sheet held by grippers 14 on top of the lifter-fingers 85; but when both sheets are required to be delivered both gripper-shafts are rotated, and then both grippers open and the lifter-fingers are also lifted to raise the under sheet.

The operation of the mechanism is as follows: Assuming that an offset-sheet from feed-board 8 has been previously fed to cylinder 3, then taken by grippers 11, by stud 57, engaging groove *b* of cam 33, carried around to the point of nearest approach of the two cylinders 3 and 4, released at that point by the stud 45, engaging groove *a* of cam 33, and taken by grippers 14 of cylinder 4 by the stud 47, engaging groove *b* of cam 35, Fig. 2, it is now required that this sheet remain upon cylinder 4, to serve as an offset-sheet, and to effect this the coupling 77 is disengaged and shaft 73 allowed to remain at rest until this offset-sheet is required to be rejected and a new one taken on. A sheet to be printed upon is now fed from feed-board 7, and upon the next revolution of cylinder 3 is taken by the grippers 11 of that cylinder by stud 57 again engaging groove *b* of cam 33, stud 57 being protruded to meet the groove *b* of cam 33, as shown in dotted lines on the top of cylinder 3, Fig. 1. The sheet to be printed is now carried down and printed on the first side, and at the point of transfer from cylinder 3 to cylinder 4 a stud 45 is protruded toward the cylinder by cam 48, and the stud 45 being situated at a greater distance from the center of cylinder 3 than stud 57, it will be in position to engage the groove *a* of cam 33 and rotate the rock-shaft 9 to open the grippers 11 to release the sheet. Simultaneously with this the stud 46, being protruded by cam 49, engages groove *b* of cam 34 and rotates rock-shaft 10 to close grippers 12 upon the sheet to be printed. Upon the passage of cam 34 past stud 58 the latter is not protruded to meet groove *a* of cam 34, and the sheet is carried around cylinder 4 and printed on the second form. Upon the arrival of cam 34 again at position shown in full lines, Fig. 1, the stud 46 is not protruded to engage the cam, and similarly the studs 57 and 45 have been withdrawn during the non-printing revolution of cylinder 3 and do not engage cam 33, so that at this point there will be no sheet on cylinder 3, and both offset-sheet

and sheet to be printed remain on cylinder 4. Passing to the position of cam 34, (shown in dotted lines, Fig. 1,) the stud 58 becomes protruded to engage groove *a* of cam 34, opening grippers 12 only and delivering the printed sheet upon the fly 83. At this point, the shaft 73 being at rest, the stud 59 does not engage cam 35 and grippers 14 still retain the offset-sheet upon cylinder 4. When the offset-sheet is required to be renewed as soon as a new one is fed to the grippers of cylinder 3 in place of the sheet to be printed, the usual tripping mechanism operated by the feeder's foot (not shown) keeps the cylinder 3 from descending to make an impression and the offset-sheet passes to the point of transfer without being printed on. At the time of feeding the new offset-sheet to cylinder 3 the operator connects, by means of lever 80, the two shafts 73 and 76 and studs 47 and 59 are put into operation. Upon arrival of cam 35, Fig. 2, at the position shown in dotted lines, the stud 59 will be protruded to engage the cam 35 simultaneously with stud 58, Fig. 1, being protruded to engage cam 34, and both the offset-sheet and the previously-printed sheet will be delivered together upon the fly 83. Upon the arrival of the cam 35, Fig. 2, at position again (shown in full lines) the stud 47 will be protruded to engage its groove *b* and close grippers 14 upon the new offset-sheet as it is released by grippers 11 of cylinder 3, and before the arrival of cam 35, Fig. 2, again at position, (shown in dotted lines,) the operator again disconnects the shafts 73 and 76, and the studs 59 and 47 are left permanently withdrawn until the offset-sheet is again required to be renewed.

Having thus fully described our said invention, we claim—

1. In the gripper-motion of a cylinder printing-machine, the combination of the following-named parts: an oscillating or tumbling cam, as 33, having two suitably-curved grooves, as *a b*, in its face, and a toothed sector upon its free end, sliding studs, as 45 and 57, operated, substantially as described, to engage said grooves, a spur-pinion, as 15, secured to the gripper rock-shaft engaging said toothed sector, a lever, as 18, also secured to the gripper rock-shaft and operated upon by a rod, as 21, and by a spring, as 27, and describing an arc, so as to permit the action of said spring to hold said gripper rock-shaft in either the open or closed positions of the grippers, substantially as and for the purposes set forth.

2. In a printing-machine, a gripper mechanism consisting of an oscillating or tumbling cam, as 33, fulcrumed upon the cylinder at one end, having two suitably-curved grooves, as *a b*, in its face, and a toothed sector upon its free end, sliding studs, as 45 57, a spur-pinion, as 15, secured to the gripper rock-shaft engaging said toothed sector, and a lever, as 18, also secured to said gripper rock-shaft, operated upon by a rod, as 21, and by a spring, as 27, describing an arc, so as to permit the



action of said spring to hold said gripper rock-shaft in either the open or closed position of the grippers, all in combination with means for operating said sliding studs, consisting of a shaft, as 72, rotated by connection with any suitably-rotating part of the machine, so as to make one revolution to each two revolutions of the cylinder, rotating cams, as 66 48, carried by said shaft, and levers, as 42 42<sup>a</sup> 54 60, operated by said cams, said levers being suitably fulcrumed in the frames of the machine and said cams having suitably-formed grooves and so placed on said shaft as to protrude and withdraw said sliding studs at the proper times to engage the grooves of said tumbling cam 33 to open and close the grippers at the proper times and places, substantially as and for the purposes set forth.

3. In the gripper mechanism of a printing-machine, rotating cams, as 66 48, sliding studs, as 45 57, and tumbler-cams provided with inclined surfaces, as 93 94, engaging said studs, in combination with compound levers, as 54 60 and 42 42<sup>a</sup>, one component of said levers being secured to the other by frictional contact, as at 42<sup>b</sup> and 54<sup>b</sup>, the free end of one lever of the compound engaging said sliding studs and the free end of the other lever of said compound engaging by a roller or otherwise said rotating cams, whereby said studs are automatically returned to their correct position when inadvertently placed in the wrong position, substantially as and for the purposes set forth.

4. In a perfecting printing-machine in which an offset-sheet is to be taken and held upon the second impression-cylinder, retained thereon until soiled, and then delivered therefrom without stopping the machine, and the sheet to be printed taken by grippers and held over the said offset-sheet until printed, a gripper and sheet-lifter apparatus for the second cylinder, consisting of the following-named parts in combination: oscillating or tumbling cams, as 34 35, fulcrumed upon the

cylinder, each having two suitably-curved grooves, as *a b*, in its face and a toothed sector upon its free end, sliding studs, as 46 58 47 59, two sets of grippers, as 12 and 14, each carried upon a separate rock-shaft, as 10 13, and each carrying a spur-pinion, as 16 17, upon its end, and a lever also secured thereto, as 19 20, operated upon by rods, as 22 23, and springs, as 28 29, said levers describing such an arc as to permit the action of said springs to hold said grippers in either the open or closed position, and a series of sheet-lifter fingers, as 85, carried upon a rock-shaft, as 86, and means, substantially as described, for operating said sliding studs and sheet-lifter fingers.

5. In a gripper and sheet-lifter mechanism for a printing-machine holding an offset-sheet upon the cylinder by one set of grippers, as 14, the sheet to be printed by a second set of grippers, as 12, and a set of sheet-lifter fingers, as 85, underlying the under or offset sheet, and means for operating said sheet-lifter fingers, consisting of the following-named parts in combination: cams, as 104 103, secured to the two gripper rock-shafts, a lever, as 99, fulcrumed at one end on said cylinder by a stud, as 100, and its free end engaging one of the said cams 103, and a second double-armed lever, as 101, fulcrumed on the said lever 99, with one arm engaging the other of said cams 104 and the other arm engaging a lever, as 105, secured to the sheet-lifter rock-shaft 86, whereby the gripper rock-shaft for the outer sheet may be operated without raising said sheet-lifter fingers and said sheet-lifter fingers be raised only when both gripper rock-shafts are put in operation, substantially as and for the purposes set forth.

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