No. 625,094. Patented May 16, 1899.

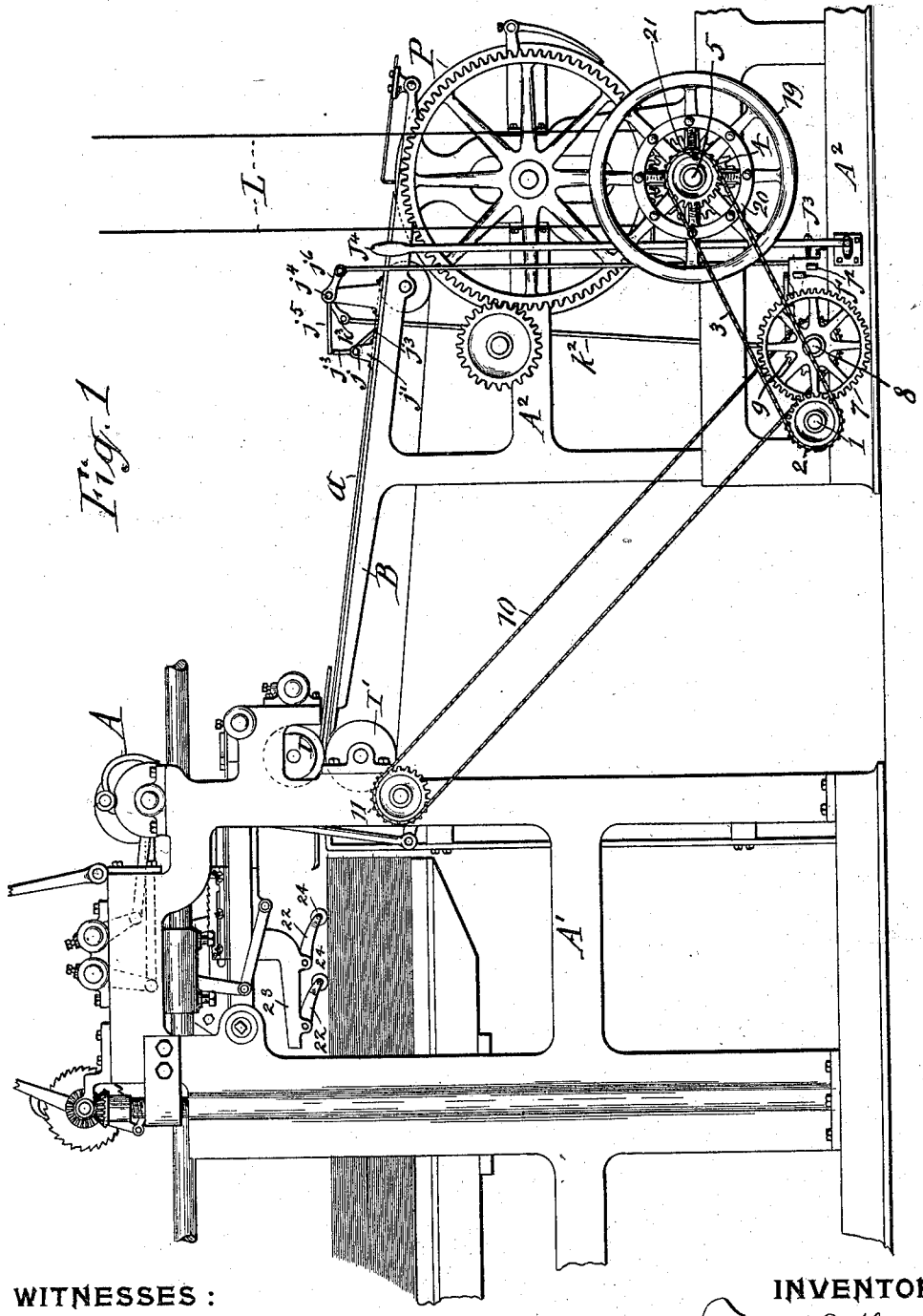
T. C. DEXTER.

DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(Application filed July 25, 1898.)

(No Model.) 17 Sheets—Sheet 1.

Fig. 1



WITNESSES:

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(No Model.) 17 Sheets—Sheet 2.

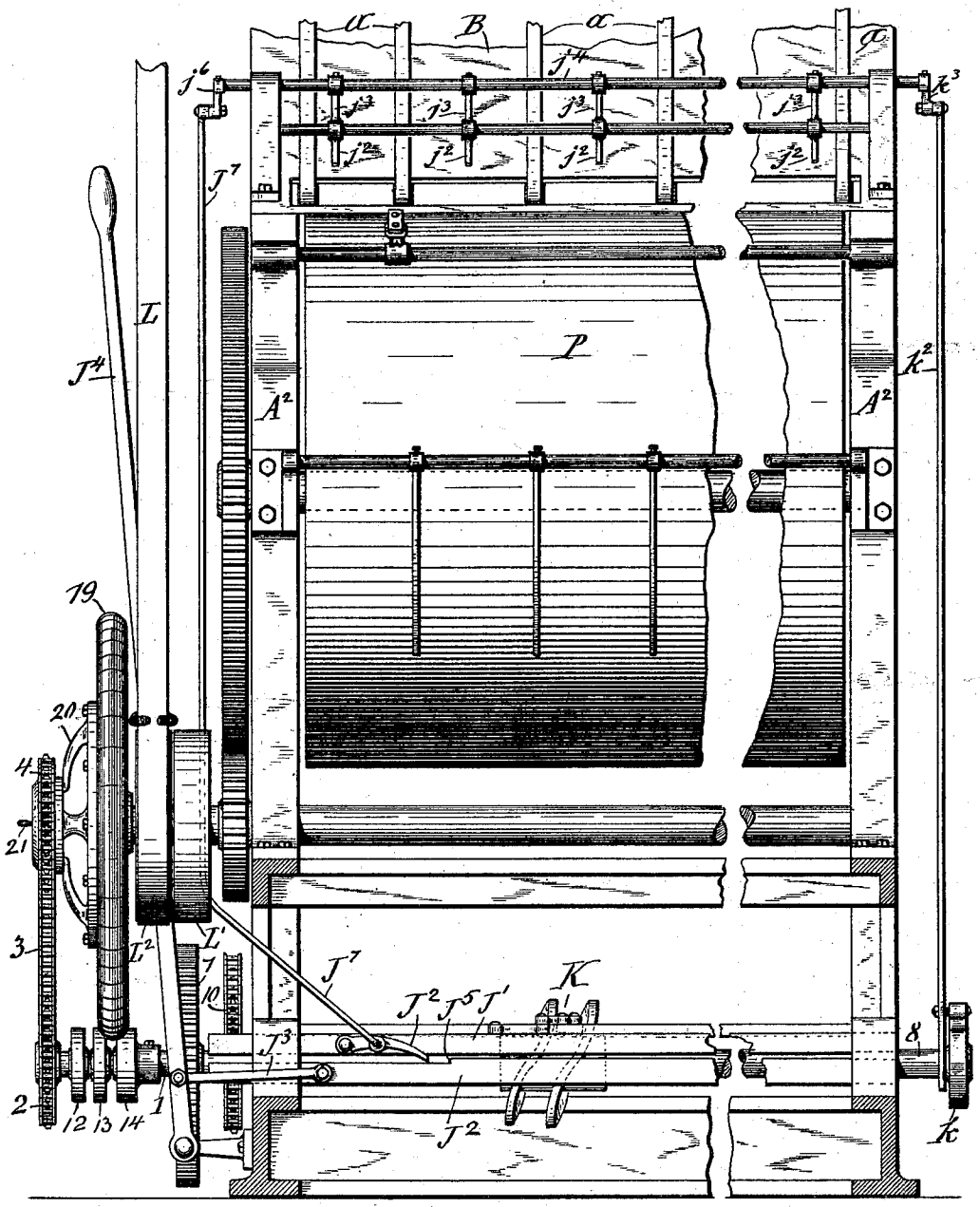


Fig. 2.

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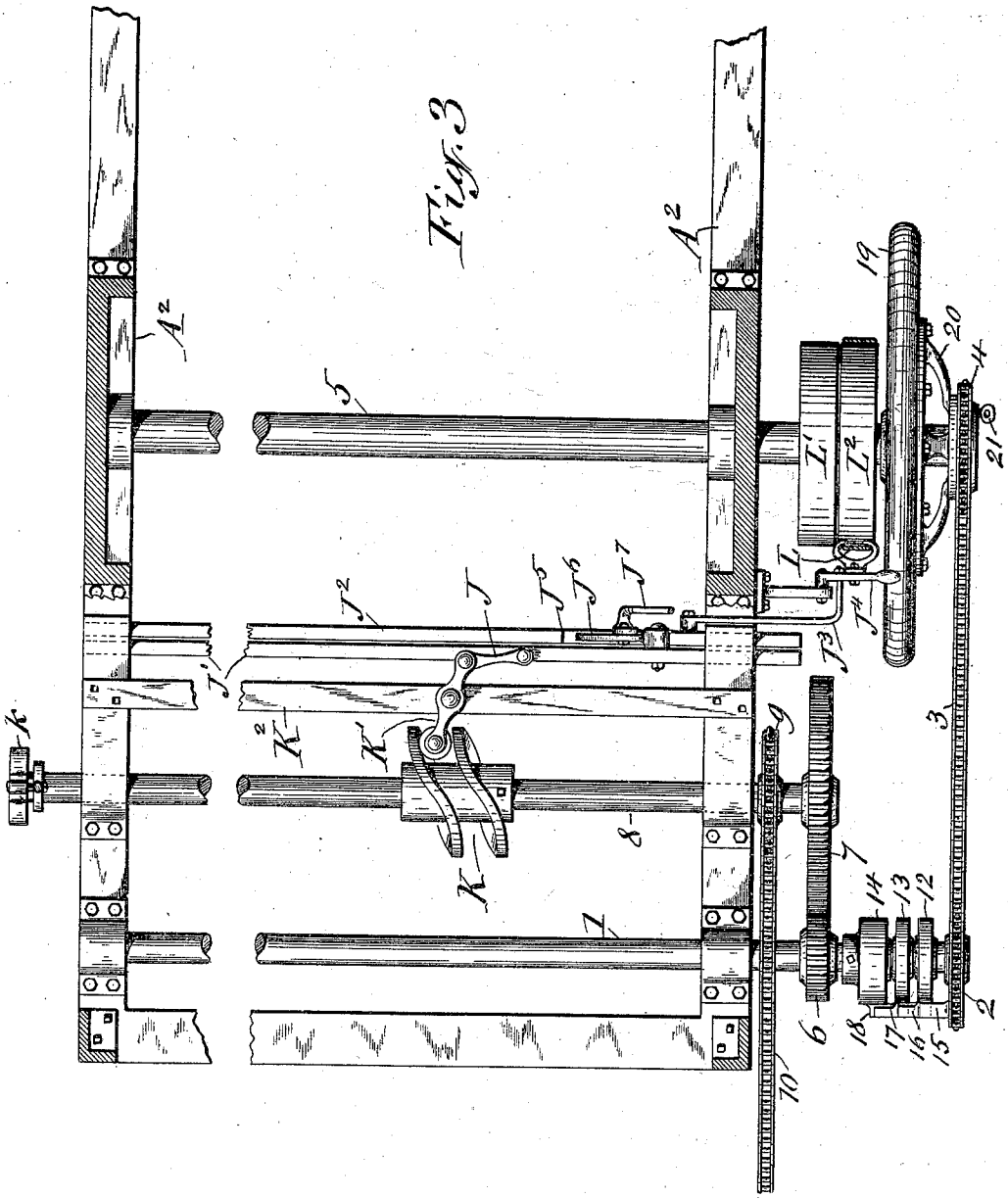
T. C. DEXTER.

DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.)

17 Sheets—Sheet 3.

Fig. 3



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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 4.

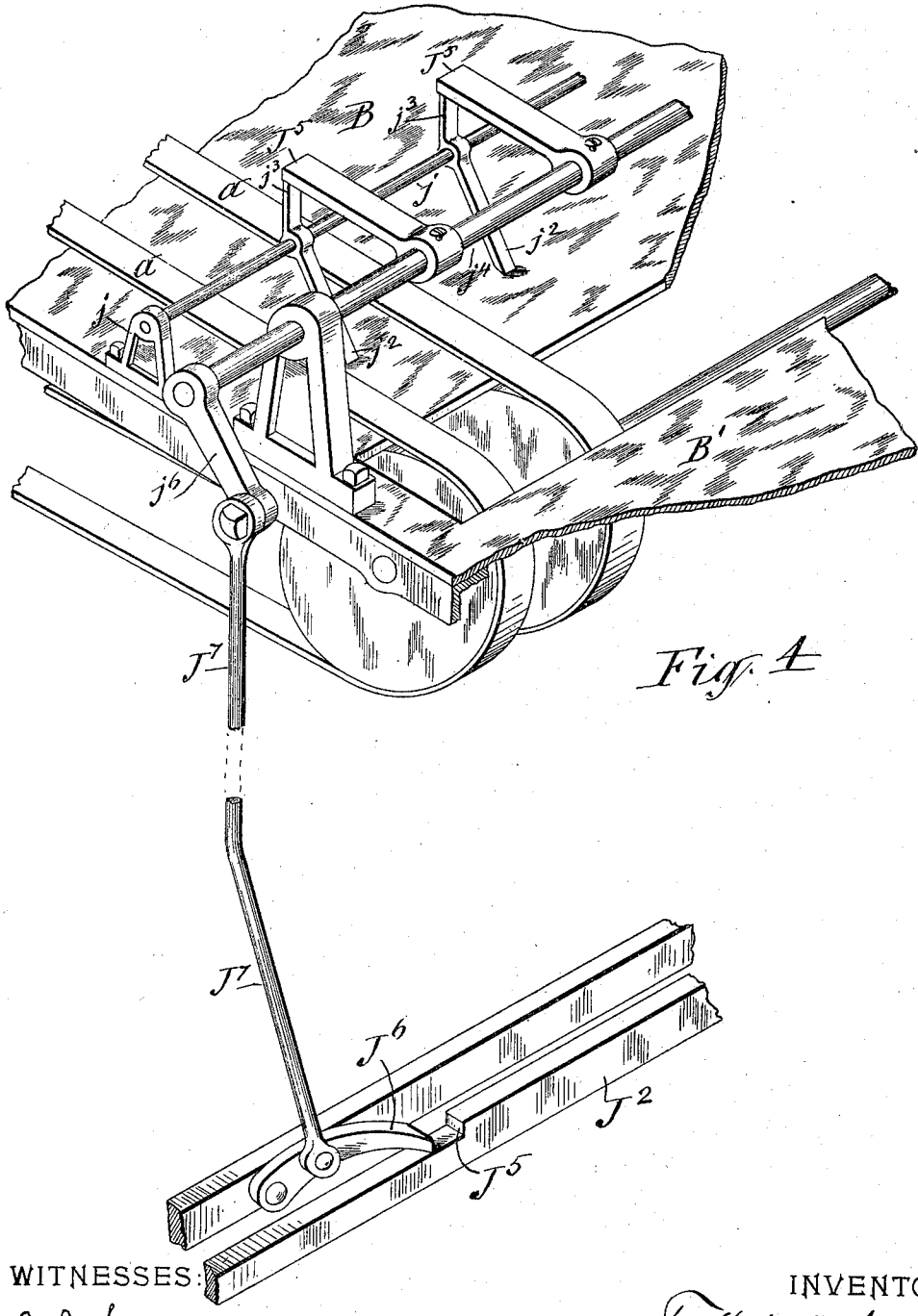


Fig. 4.

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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 5.

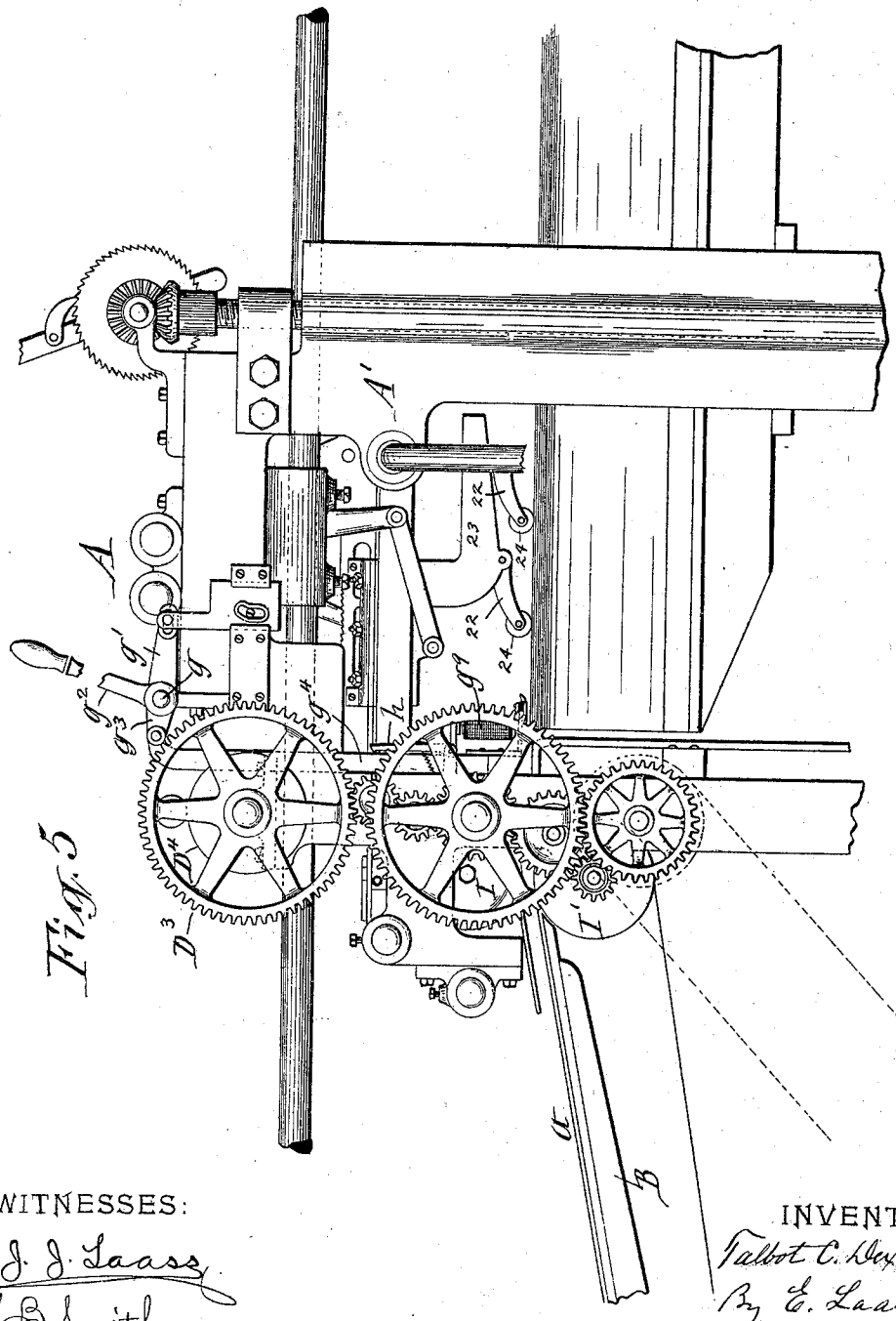


Fig. 5

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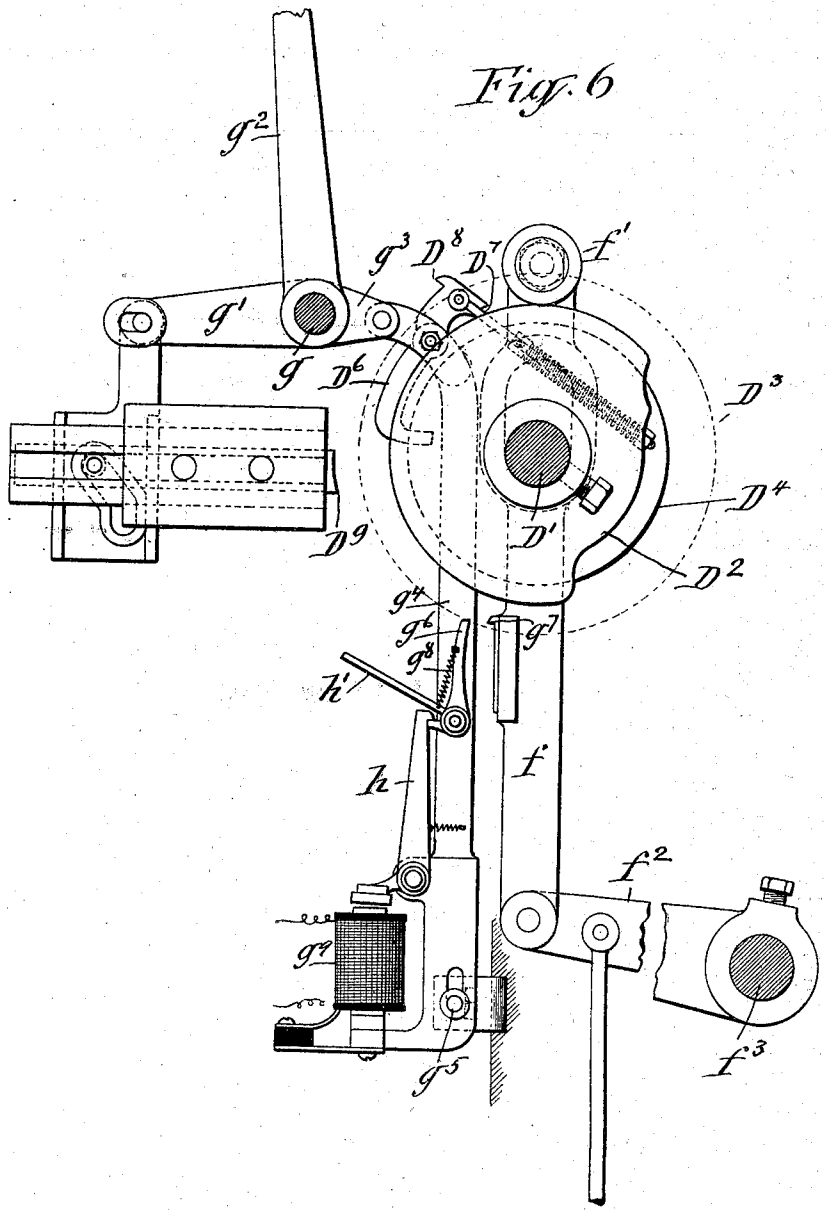
No. 625,094. Patented May 16, 1899.

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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 6.

Fig. 6



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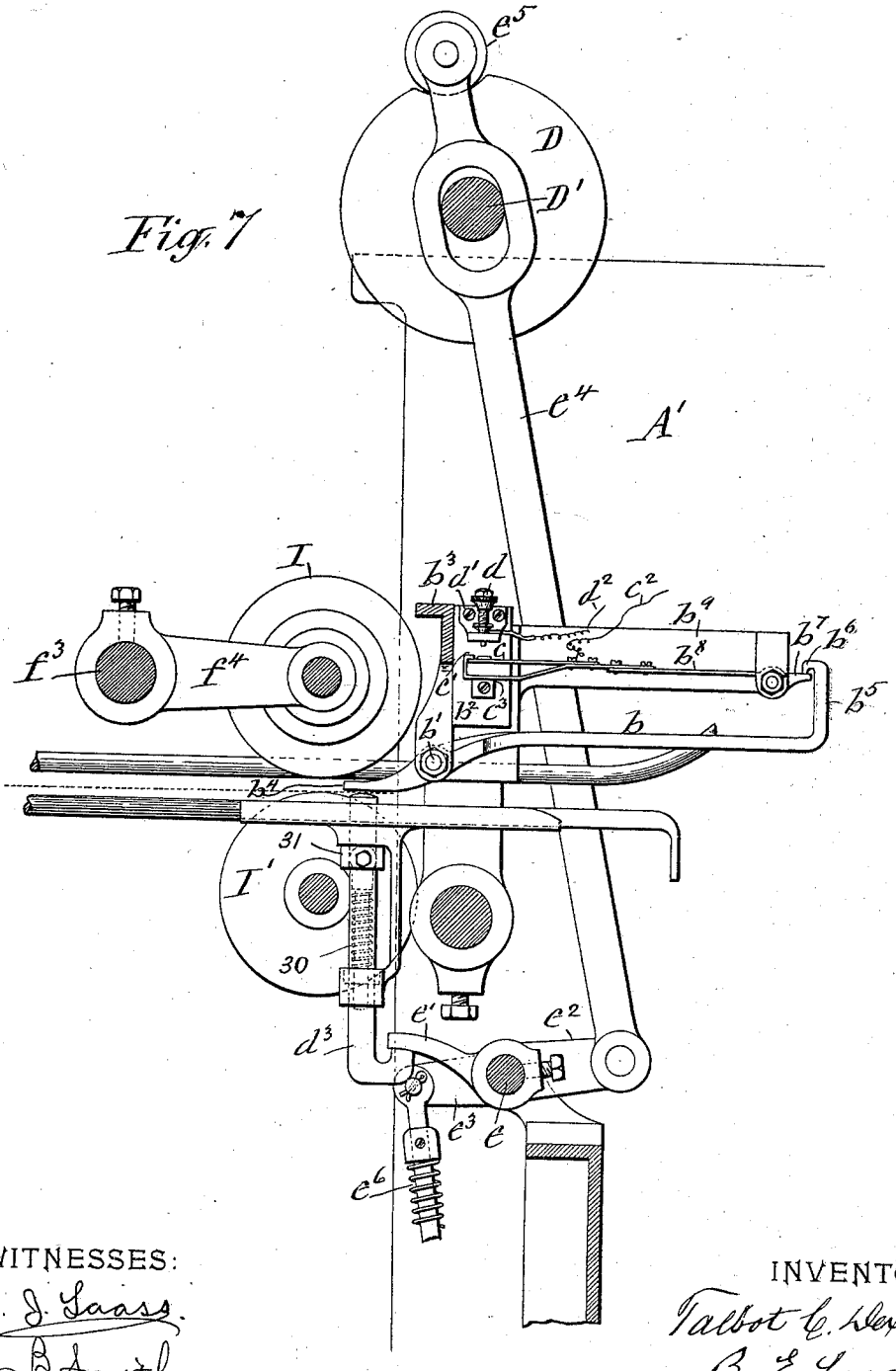
T. C. DEXTER.

DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.)

17 Sheets—Sheet 7.

Fig. 7



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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 8.

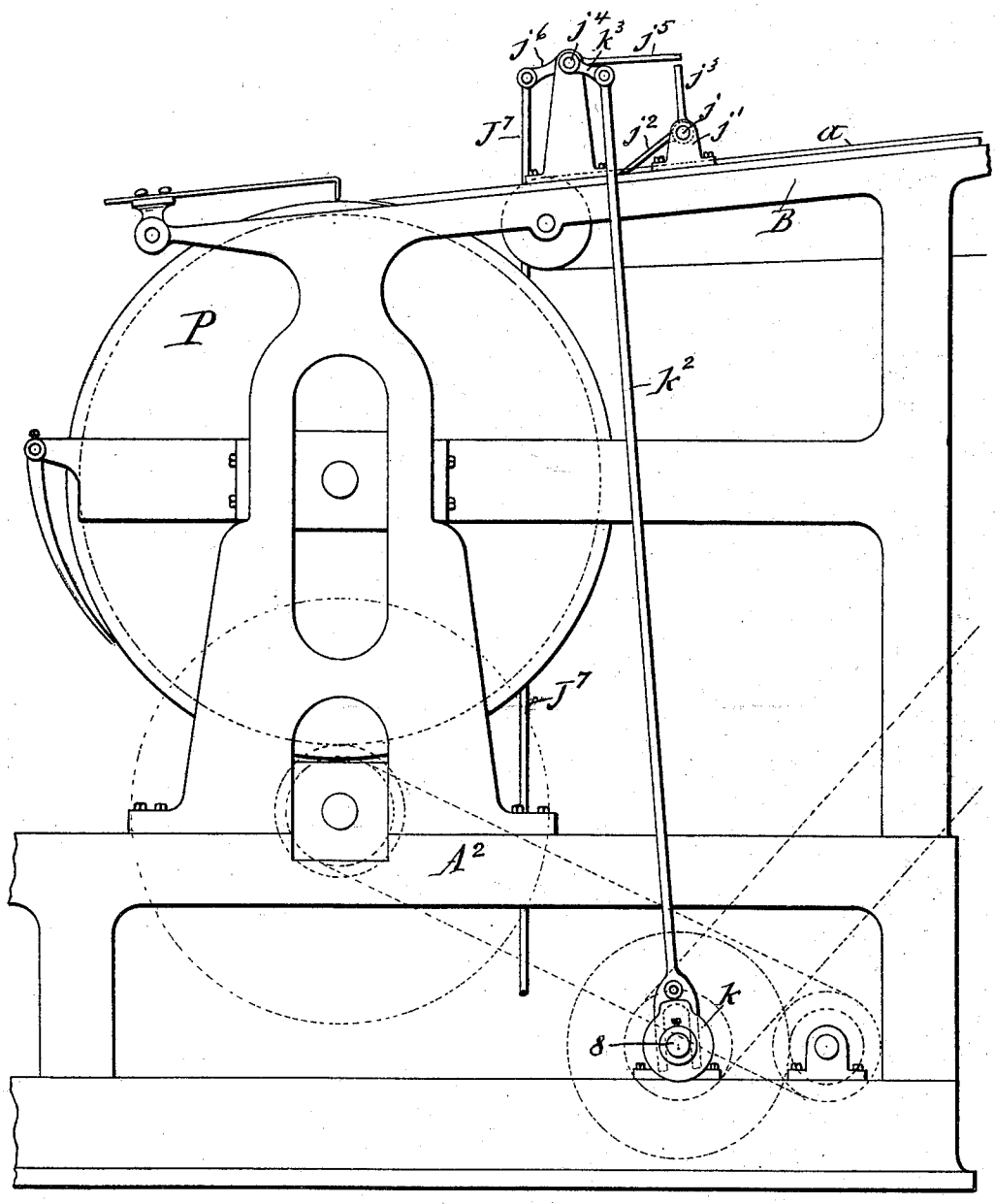


Fig. 8

WITNESSES:

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(No Model.) 17 Sheets—Sheet 9.

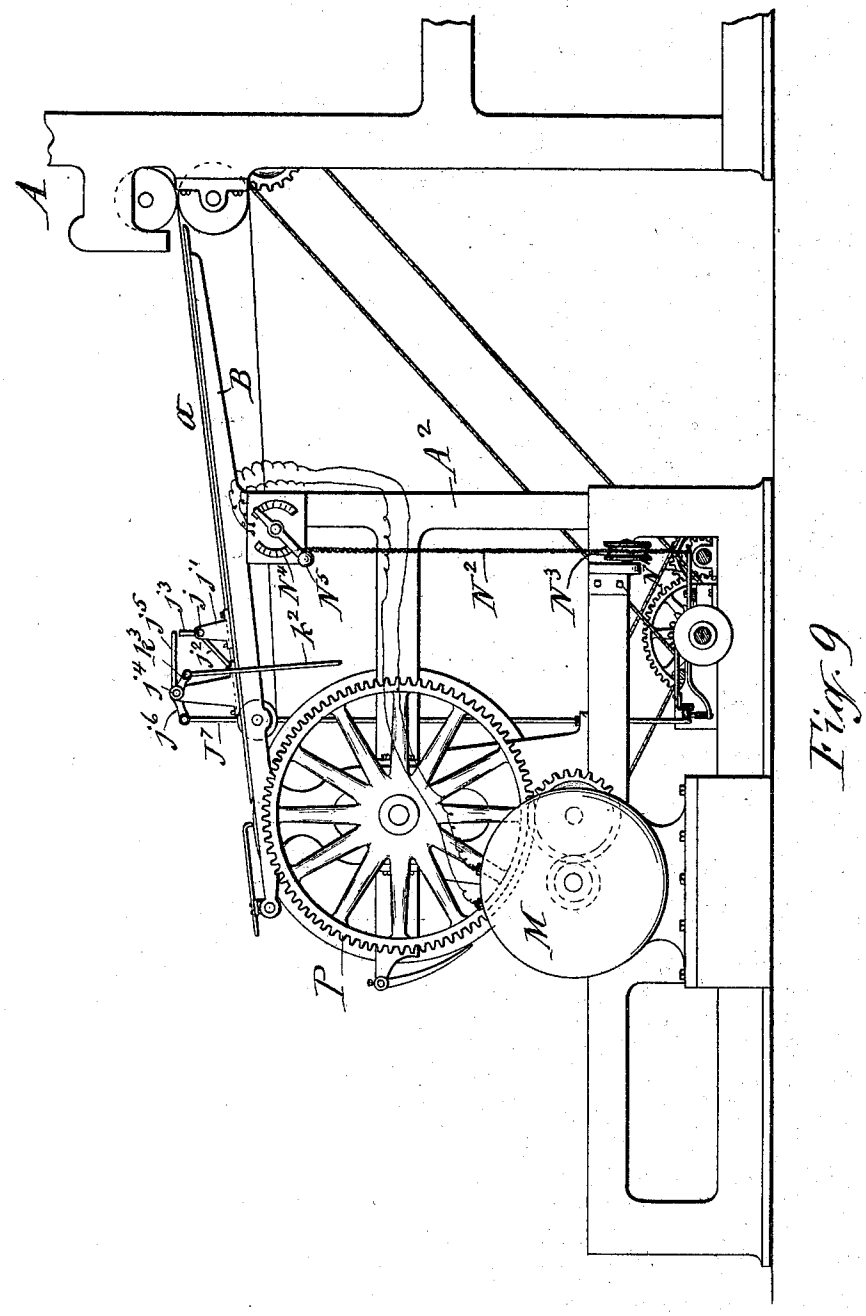


Fig. 9.

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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 10.

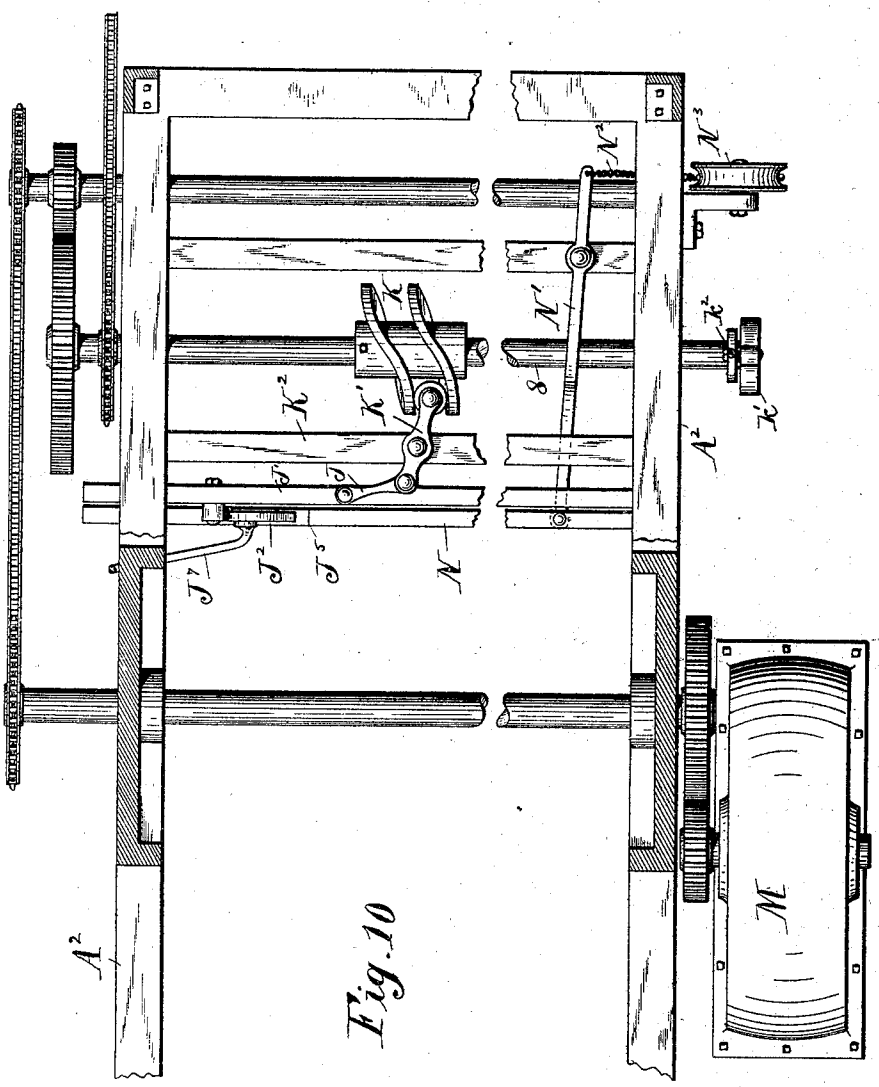


Fig. 10

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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 11.

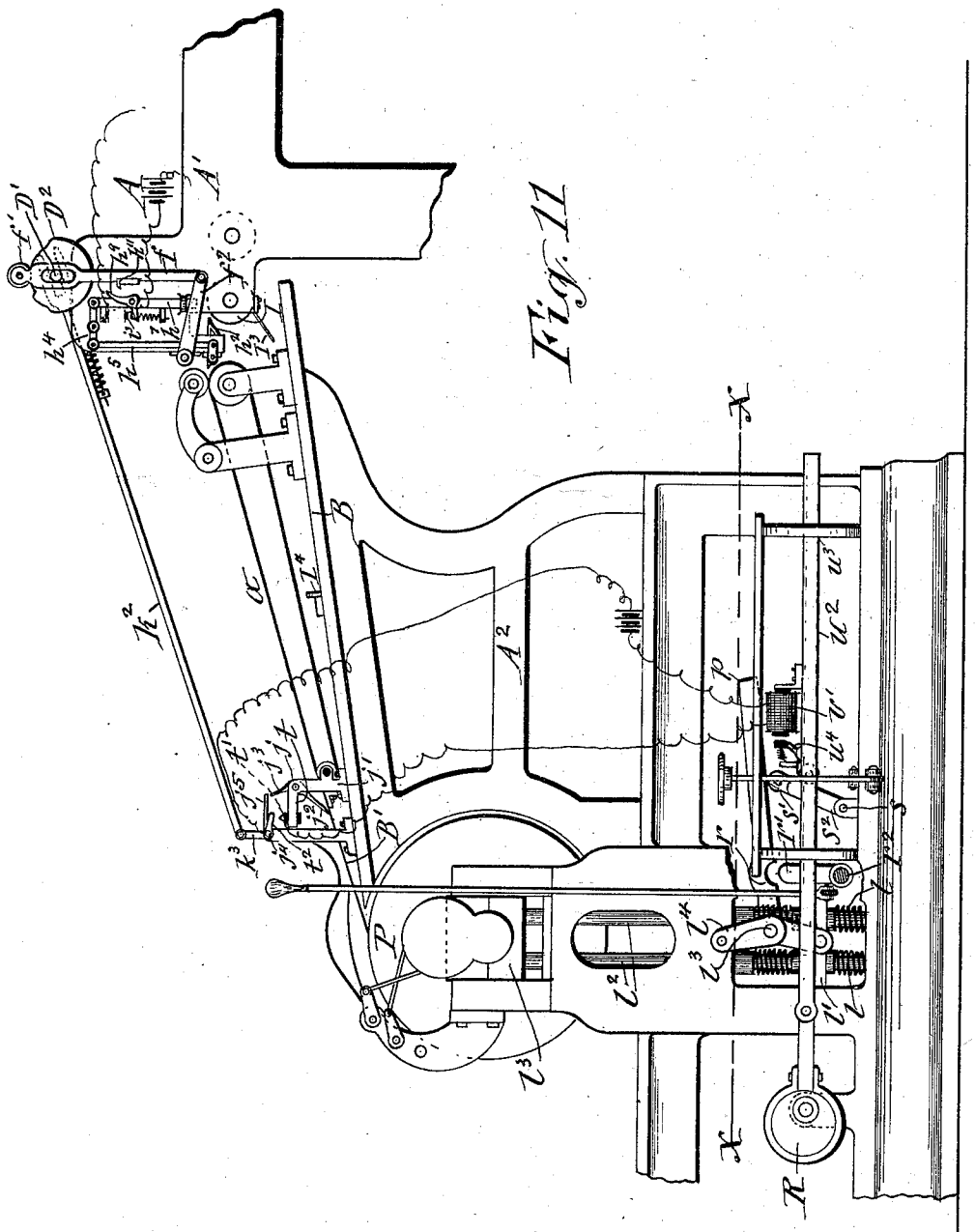


Fig. 11.

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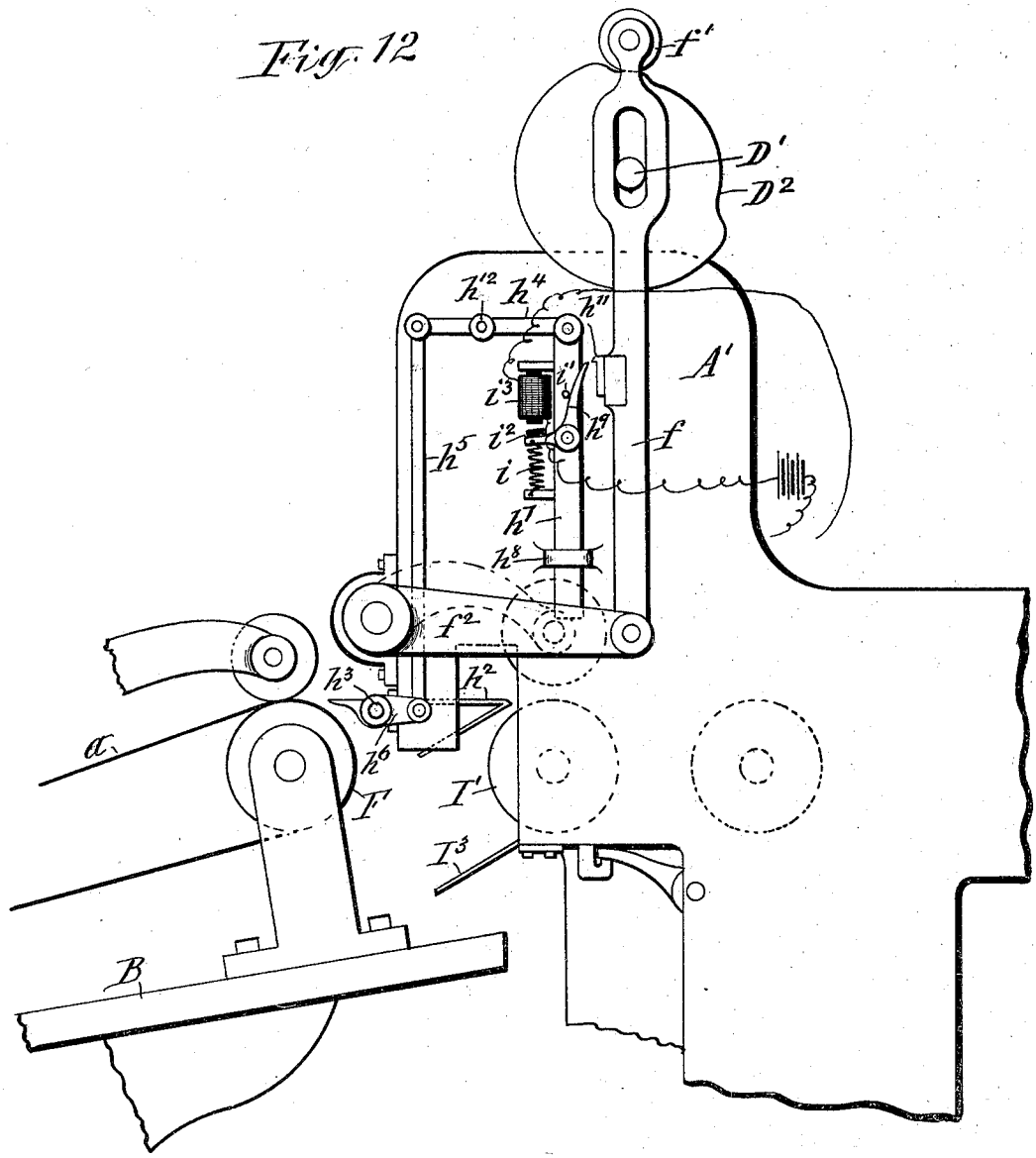
No. 625,094. Patented May 16, 1899.

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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 12.

Fig. 12



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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(Application filed July 25, 1898.)

(No Model.) 17 Sheets—Sheet 13.

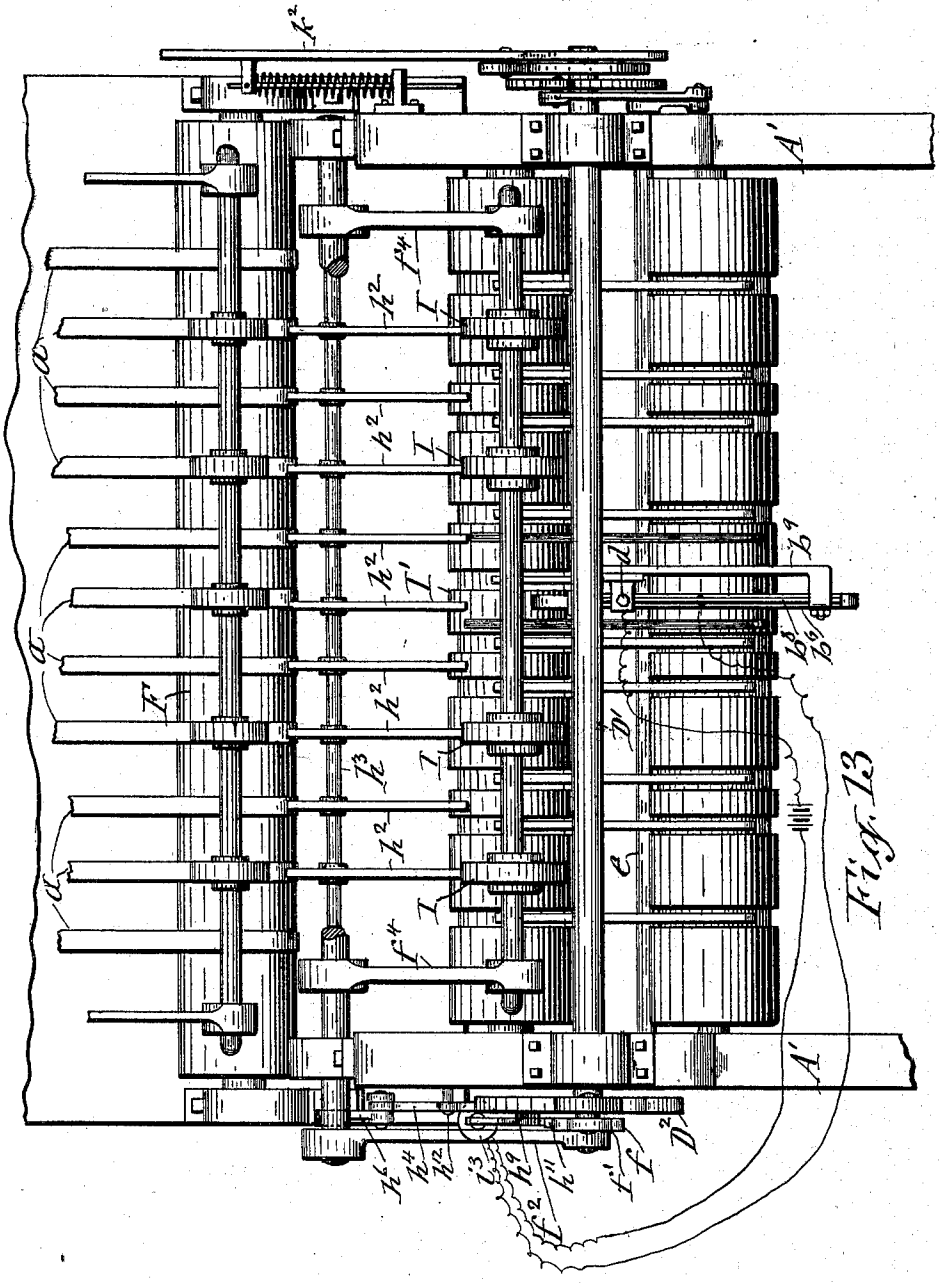


Fig. 13.

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No. 625,094. Patented May 16, 1899.

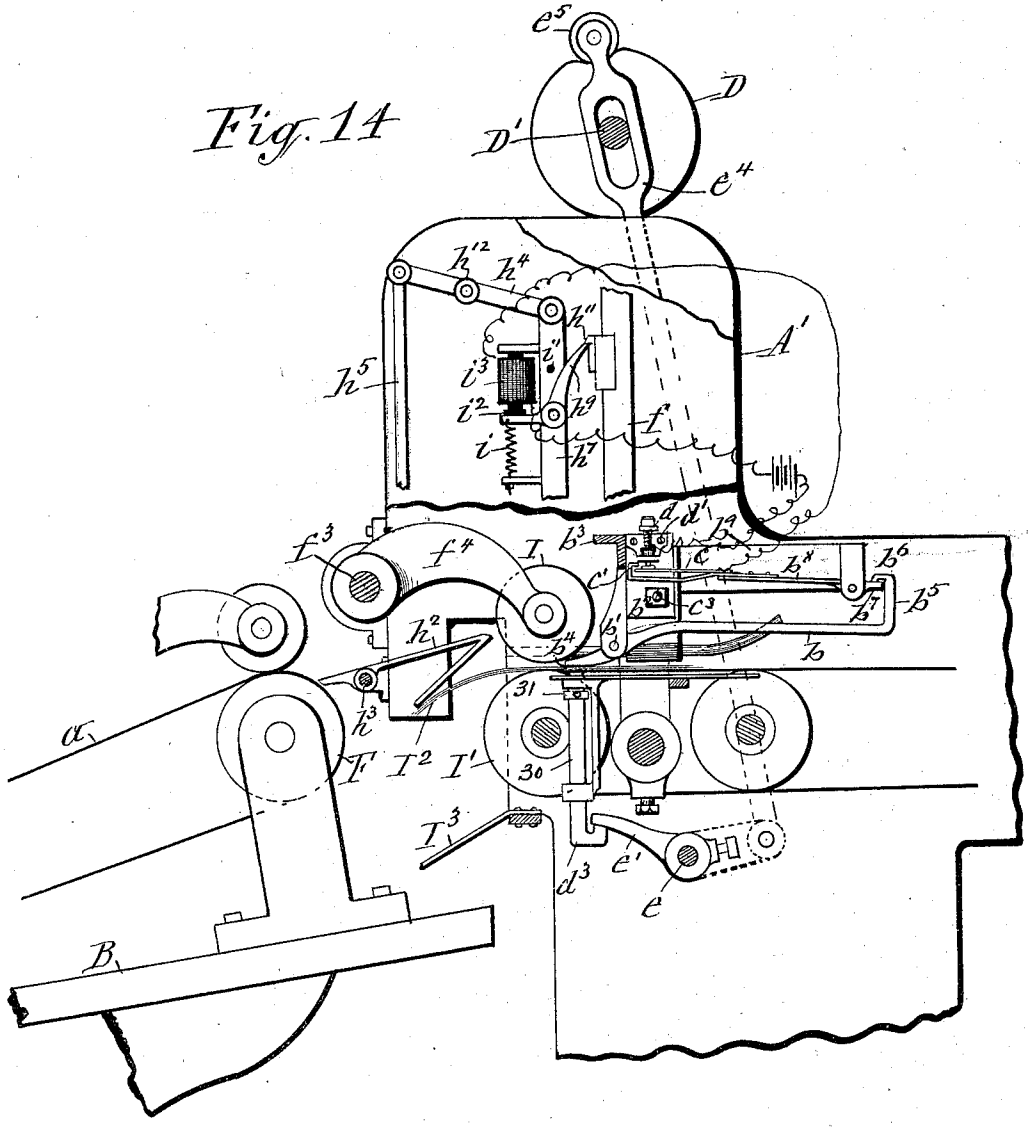
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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(Application filed July 25, 1898.)

(No Model.) 17 Sheets—Sheet 14.

Fig. 14



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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 15.

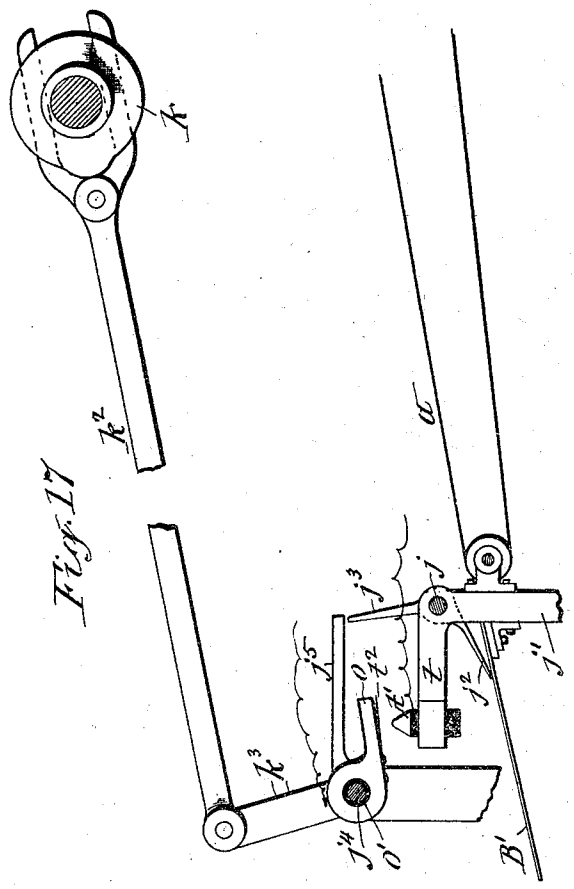


Fig. 17

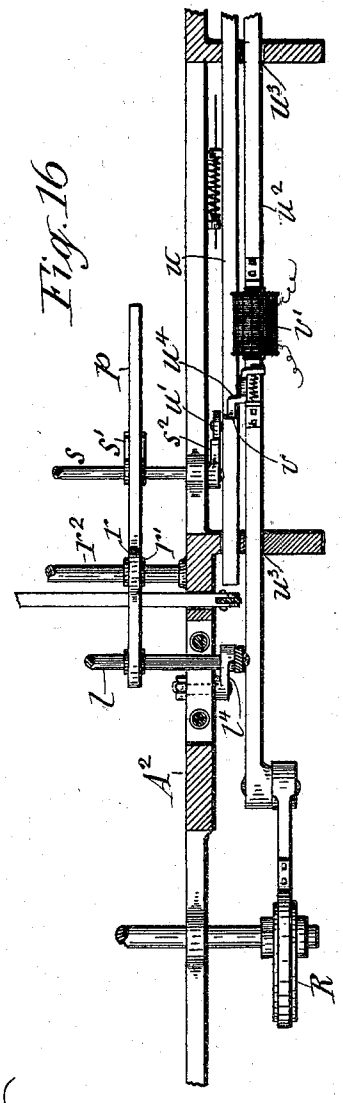


Fig. 16

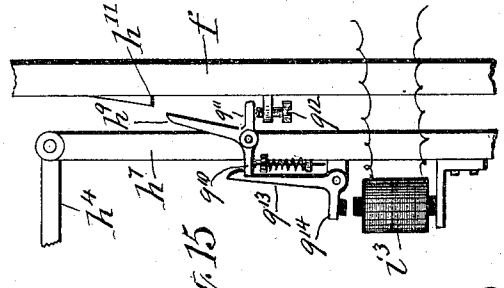


Fig. 15

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No. 625,094. Patented May 16, 1899.

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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 16.

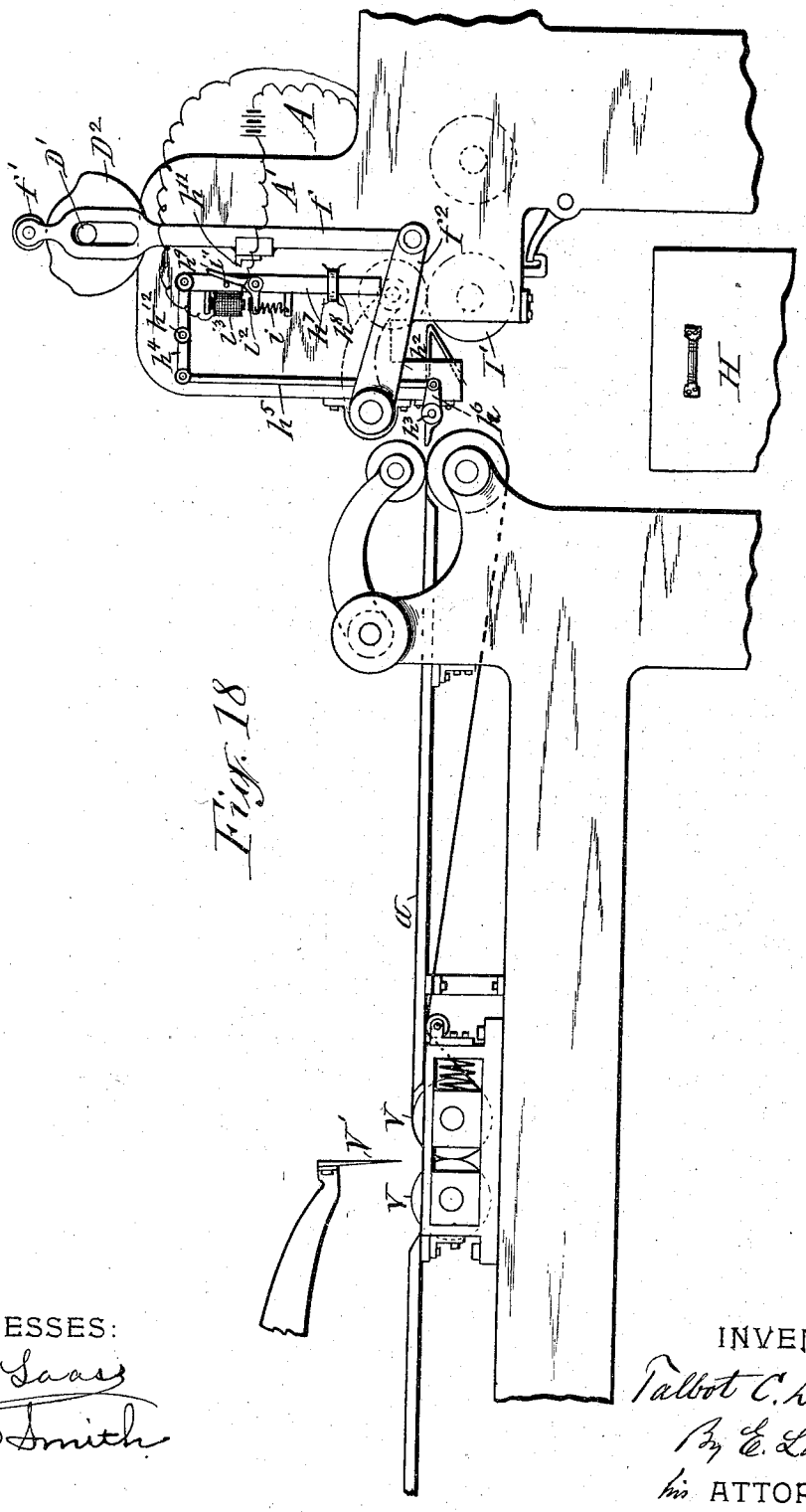


Fig. 18.

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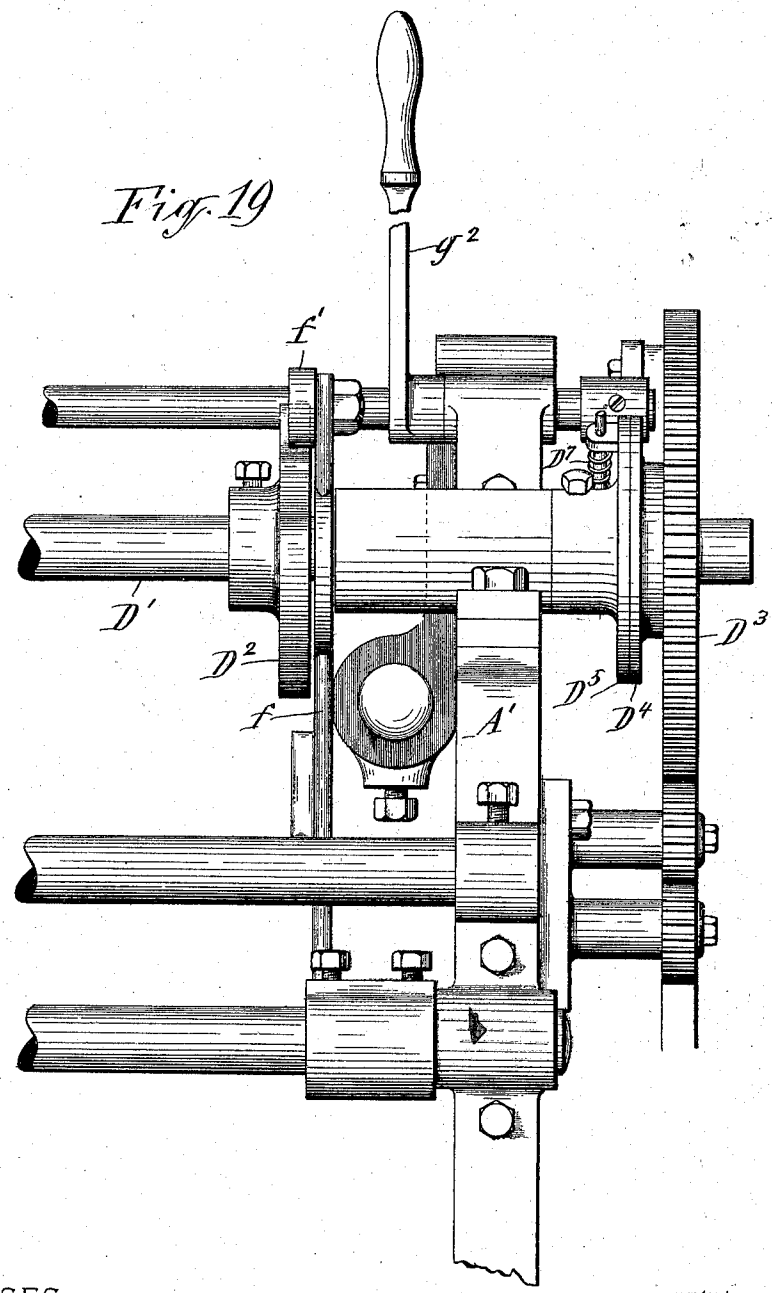
No. 625,094. Patented May 16, 1899.

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DELIVERY GUARD FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed July 25, 1898.) 17 Sheets—Sheet 17.

Fig. 19



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UNITED STATES PATENT OFFICE.

TALBOT C. DEXTER, OF PEARL RIVER, NEW YORK.

DELIVERY-GUARD FOR PAPER-FEEDING MACHINES.

SPECIFICATION forming part of Letters Patent No. 625,094, dated May 16, 1899.

Application filed July 25, 1898. Serial No. 686,817. (No model.)

To all whom it may concern:

Be it known that I, TALBOT C. DEXTER, of Pearl River, in the county of Rockland, in the State of New York, have invented new and useful Improvements in Delivery-Guards for Paper-Feeding Machines, &c., of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the automatic transmission of paper from a feeding-machine to either a printing-press, paper-folding machine, or other machine designed to operate on one sheet of paper at a time.

The object of the invention is to protect from injury the paper-receiving machine in case the feeding-machine either feeds two or more sheets simultaneously or fails to deliver a sheet therefrom; and to that end the invention consists, essentially, of paper-calipering mechanism on the feeding-machine actuated automatically by the excessive thickness of a plurality of sheets entering simultaneously between the calipering devices, and thereby preventing the delivery of said sheets to the paper-receiving machine, in combination with mechanical feelers disposed between said feeding-machine and receiving-machine to be actuated by the sheet in transit and arrest the action of said receiving-machine in case of failure in the delivery of the paper from the feeding-machine, all as hereinafter more fully described.

I have in the annexed drawings shown my present invention chiefly in connection with a printing-press, in which it is especially essential to prevent the bare tympan or face of the impression-cylinder from coming in contact with the inked form carried on the press-bed in case the feeding-machine fails to supply the required sheet of paper to be printed and to also prevent entrance of a plurality of sheets simultaneously between the impression-cylinder and the form on the press-bed, and thus obviate strain and injury to the press and type.

In said drawings, Figure 1 is a side elevation of my invention employed for automatically shifting the belt and arresting the motion of a drum-cylinder press. Fig. 2 is an enlarged front elevation of the same. Fig. 3 is an enlarged horizontal section taken under the impression-cylinder and showing more clearly the belt-shifting mechanism. Fig. 4 is a still further enlarged perspective view of the tripping mechanism which controls the aforesaid belt-shifting mechanism. Fig. 5 is a side elevation of the paper-feeding machine, showing the arrangement of the clutch mechanism, which is controlled by the paper-calipering devices. Fig. 6 is an enlarged detail view of the said clutch mechanism. Fig. 7 is an enlarged deail view of the paper-calipering device. Fig. 8 is a diagrammatic side view of the drum-cylinder press, showing the means for restoring to their normal position the devices which control the operation of the printing-press. Fig. 9 is a side elvation of a drum-cylinder press operated by an electric motor and showing my invention employed for controlling said motor. Fig. 10 is an enlarged horizontal section taken immediately below the impression-cylinder of the aforesaid electrically-operated press. Fig. 11 is a side elevation of a "two-revolution" press and its connection with a paper-feeding machine, showing my invention employed for automatically tripping the impression-cylinder case in the feeding-machine fails to supply the paper. Fig. 12 is an enlarged side view of the automatic sheet-switching devices shown in their normal position. Fig. 13 is a plan view of the same. Fig. 14 is an enlarged side view of the aforesaid sheet-switching devices in their operative position. Fig. 15 is a side view of a modification of the mechanism for transmitting motion to the sheet-switching devices. Fig. 16 is an enlarged horizontal section on line X X in Fig. 11, showing the portion of the printing-press to which the cylinder-tripping devices are connected. Fig. 17 is an enlarged detail side view of the mechanical feeler which electrically controls the aforesaid cylinder-tripping devices. Fig. 18 is a side view of my improved sheet-switching devices applied to the receiving end of a paper-folding machine; and Fig. 19 is an enlarged detail plan view of the automatic throw-out mechanism employed for arresting the motion of a feeding-machine, as shown in Fig. 6.

Similar letters and numerals of reference indicate corresponding parts.

A represents a paper-feeding machine, which

may be of any suitable construction. In the present case the feeding devices proper are represented in the form of arms 22 22, pivoted to a reciprocating carriage 23 and equipped on their free ends with rubber pads 24, by means of which they push the top sheet from the pile to the delivery end of the machine during the forward movement of said carriage. The machine designed to receive the paper from said feeding-machine may be either a printing-press (represented at P in the drawings) or a paper-folding machine, as shown in Fig. 19 of the drawings, or other machine designed to operate on paper supplied thereto one sheet at a time.

When my invention is to be used in connection with a printing-press, the paper-feeding machine is to be placed at the elevated or rear end of the feed-board B, and the paper is to be conveyed from the feeding-machine to the printing-press by means of traveling tapes *a*, extending lengthwise over the feed-board.

The first object of the invention is to prevent two or more sheets of paper from passing simultaneously from the feeding-machine A to either the printing-press P or a paper-folding machine C or other machine. To attain said object, I employ at the delivery end of the feeding-machine automatic paper-calipering devices, which are actuated by the excessive thickness of a plurality of sheets passing through said devices, which action may be utilized to arrest further delivery of paper from said machine. I prefer, however, to employ said calipering devices for switching said plurality of sheets out of the path leading to the paper-conveying tapes *a*, as hereinafter described. Said calipering devices consist, mainly, of a calipering-lever *b*, disposed longitudinally over the passage of the paper from the feeding-machine and fulcrumed at b' on a bracket b^2, mounted on a cross-bar b^3, secured to the sides of the main frame A′ of the feeding-machine. Said lever *b* is formed with a forwardly-extending calipering-nose b^4, and the rear end of said lever is formed with an upward extension b^5, terminating with a forwardly-projecting hook b^6, which engages a rearwardly-extending heel b^7 of a contact-lever b^8, pivoted to an arm b^9, projecting rearward from the bracket b^2, as more clearly shown in Figs. 7 and 14 of the drawings. The forward end portion of the said contact-lever is formed with a depression terminating with an upward and rearward projection, and over said depression is a spring-tongue *c*, attached at one end to the contact-lever, back of the depression thereof, and having its free end bearing normally on the under side of the rearward projection c' of the lever. Said spring-tongue is electrically connected to one of the circuit-wires c^2. The lever b^8 rests normally on a stop c^3, attached to the bracket b^2. Over the free end of the spring-tongue *c* is an adjustable contact-screw *d*, connected to a bracket *d′*, attached to the bracket b^2. Said screw is electrically connected with the other circuit-wire d^2.

The described spring-tongue *c* and contact-screw *d*, in connection with the calipering-lever *b*, constitute a circuit maker and breaker which is employed for automatically controlling the delivery of paper from the feeding-machine, as hereinafter described.

Directly under the calipering-nose b^4 of the lever *b* is the vertically-movable calipering-bolt d^3, which is forced upward by a spring 30 and has attached to it a stop-collar 31, which limits the upward movement of said bolt, so as to carry the top thereof even with the plane of feed of the sheets.

e represents a rock-shaft to which are fastened three arms e', e^2, and e^3. The arm e' bears on top of a heel projecting from the foot of a calipering-bolt d^3. The free end of the arm e^2 has connected to it the lower end of a rod e^4, to the upper end of which is pivoted a roller e^5, riding on a cam D, fastened to a rotary shaft D′. This cam is so shaped and timed in its movement as to impart a properly-timed intermittent reciprocating motion to the rod e^4 and a corresponding rocking motion to the shaft *e*. The arm e^3 is connected to an upwardly-forced spring-actuated rod e^6, which serves to hold the roller e^5 in working relation with the cam D. This causes the arm e' to intermittently depress the calipering-bolt d^3 to allow the paper-feeding devices to introduce the paper between the top of said bolt and the nose b^4 of the registering-lever *b*.

In the operation of the feeding-machine the bolt d^3 is allowed to rise before the paper advanced from the pile reaches the sheet-delivering drop-rollers I and while the paper is for a moment at rest, and in case two or more sheets have accidentally entered simultaneously between the top of the bolt d^3 and nose b^4 the excessive thickness of paper causes the calipering-lever to be tilted so as to close the electric circuit by throwing the spring-tongue *c* into contact with the terminal or contact screw *d*. This automatic circuit maker and breaker I utilize to control the delivery of paper from the feeding-machine, so as to prevent a plurality of sheets from being delivered simultaneously to the paper-conveying tapes *a*, which carry the paper to the printing-press or other machine designed to receive one sheet at a time. This control of the delivery of paper may be effected in the manner described in my prior application for Letters Patent, in which the aforesaid closing of the electric circuit is utilized to prevent the sheet-delivering drop-rollers I from engaging the plurality of sheets that may have accidentally become interposed between the calipering devices.

To the shaft D′ is fastened the cam D^2, which actuates the drop-rollers I I, by means of a rod *f*, having pivoted to one end a roller f', by which it rides on said cam. The opposite

end of said rod is connected to an arm f^2, rigidly secured to the shaft f^3, to which are fastened the arms f^4, carrying on their free ends the aforesaid drop-rollers, which connections were heretofore made as shown in Figs. 6 and 7 of the drawings; but when the duplicate sheets are to be switched from the conveying-tapes a said connections are preferably made as represented in Figs. 12 and 14 of the drawings.

To prevent the drop-rollers I I from descending and engaging or bearing on the plurality of sheets advanced accidentally at the same time on the feeding-machine, as hereinbefore stated, the drop-roller-actuating cam D^2 receives its motion through clutch mechanism engaging the driving-gear D^3, (indicated by dotted line,) mounted loosely on the shaft of said cam, as described in my prior application for Letters Patent aforesaid. Said clutch mechanism and the means for controlling the same automatically by the paper-calipering devices, briefly stated, are constructed mainly as follows:

A gear-wheel D^3, receiving rotary motion from the actuating-gears of the feeding-machine, is mounted loosely on the shaft D', to which the drop-roller-actuating cam D^2 is fastened. Said gear-wheel has rigidly attached to its side a clutch-disk D^4, at the side of which is a corresponding disk D^5, fastened to the shaft D'. Said disks are provided in their peripheries with notches which register with each other once during the revolution of the disk D^4, driven by the gear-wheel D^3.

To the fixed disk D^5 is pivoted a clutch-dog D^6, extending in opposite directions from its pivot and shaped at one end to engage the two notches of the disks D^5 and D^4 when said notches are in registering positions. The opposite end or heel of said dog is connected by a spring-actuated rod D^7, which rod serves to normally force the dog to a position to engage the clutch-disks, as aforesaid. The heel of said dog is provided with a lug D^8, which during the rotation of the disk D^5 traverses a sliding bolt D^9, sustained on the frame of the feeding-machine. The contact of said bolt with the lug D^8, traversing the bolt, causes the dog D^6 to be thrown out of engagement with the notches of the clutch-disks, and thus arrest the motion of the cam D^2, which actuates the drop-roller.

A shaft g has projecting from it an arm g', which is suitably connected with the bolt D^9 to cause the said bolt to be moved to and from the path of the dog D^6 by the rocking of said shaft, which may be effected by a hand-lever g^2, attached to the shaft and operated by the person in charge of the machine.

When the feeding-machine is set in motion, the operator moves the lever g^2 so as to set the bolt D^9 out of the path of the dog D^6 to leave the same interlocked with the clutch-disks and cause the drop-rollers to operate in their required order. To automatically trip said dog to release the clutch-disks and retain the drop-rollers in their elevated position in case two or more sheets are advanced simultaneously on the feeding-machine, the hereinbefore-described calipering devices, with the circuit maker and breaker, is employed. For this purpose the shaft g is provided with an arm g^3, from which depends a bar g^4, the main portion of which is parallel with and in proximity to the rod f, which receives reciprocating motion from the cam D^2 and actuates the drop-rollers. The lower end of the bar g^4 slides in a vertical guide g^5, attached to the frame of the machine. To the bar g^4 is pivoted a dog g^6, facing a shoulder g^7 on the rod f. A spring g^8 pushes said dog toward the shoulder. The pivoted end of said dog is formed with a laterally-projecting heel, opposite to which is the hook-shaped end of a latch h, pivoted to the lower portion of the bar g^4 and formed with a lateral projection, to which is attached the armature of an electromagnet g^9, disposed under said latch and carried on the bar g^4. Said magnet is in circuit with the hereinbefore-described circuit maker and breaker, and the result is that in case the circuit is closed by two or more sheets of paper entering simultaneously between the calipering devices the said magnet is energized and by attracting its armature it tilts the latch h, so as to cause it to release the dog g^6, which is then forced by the action of the spring g^8 into a position to engage the shoulder g^7 on the rod f, the downward movement of which pushes down with it the bar g^4, which latter turns the shaft g, so as to cause its arm g' to push the bolt D^9 into a position to engage the lug D^8 of the clutch-dog D^6 during the rotation of said clutch-disks. Said dog is thus caused to release said disks and arrest the motion of the cam D^2, which actuates the drop-rollers. Hence the delivery of paper from the feeding-machine is automatically arrested. h denotes a hand-lever connected to the dog g^6 for resetting said dog after the machine has been tripped. However, I have found in practice that it is preferable to automatically prevent the delivery of a plurality of sheets simultaneously from the feeding-machine to the paper-conveying tapes a a without arresting or interfering with the movement of the feeding-machine. To accomplish this, I have devised novel paper-switching devices which cast the misfed or duplicate sheets out of the path leading from the delivery end of the feeding-machine to the aforesaid tapes, which switching devices are controlled in their action by the hereinbefore-described automatic paper-calipering devices. To accommodate the said paper-switching device, I place the rear tape-carrying roller F a sufficient distance from the paper-delivering roller I' to leave between them a space for the downward escape of the misfed paper. This space is bridged by a series of longitudinal switch-fingers h^2, fastened to a transverse shaft h^3, journaled in bearings on the sides of the frame A'. The

said switch-fingers are normally in position to bridge the aforesaid space and guide the paper from the feeding-machine to the conveying-tapes *a a*, and when actuated to switch the paper out of the path leading to said tapes the shaft h^3 is rocked sufficiently to lift the end portions of the switch-fingers adjacent to the feeding-machine up from their normal position and cause the paper to pass under said fingers, as shown in Fig. 14 of the drawings.

To actuate the described switch automatically, I employ the hereinbefore-described paper-calipering devices and substitute for the clutch mechanism which controls the drop-rollers mechanism for transmitting motion from the reciprocating rod *f* to the shaft h^3 of the aforesaid switch, as illustrated in Figs. 12 and 14 of the drawings. This latter mechanism consists of a lever h^4, pivoted intermediate its ends, as shown at h^{12}, to the side of the frame A′, and connected at one end by a rod h^5 to an arm h^6, fastened to the end of the switch-shaft h^3. The opposite end of the lever h^4 has connected to it the depending bar h^7, which is guided at its lower end, as shown at h^8. To this bar is pivoted a dog h^9, arranged to be traversed by a catch h^{11} on the bar h^7. A suitable spring *i* draws the dog from engagement with said catch and a stop *i′* limits said movement of the dog. To a heel projecting from the pivoted end of the dog is attached the armature i^2 of the electromagnet i^3, which is in circuit with the hereinbefore-described circuit maker and breaker which is actuated by the automatic paper-calipering devices.

Fig. 14 of the drawings illustrates the operation of the aforesaid combination when two or more sheets are advanced simultaneously from the feeding-machine. I^3 represents the paper switched out of the path leading toward the conveying-tapes *a* and directed from said path toward the feed-board B, which in this case is a sufficient distance beneath the lower run of the tapes *a* to form a receptacle for the switched paper. A chute I^3 may be arranged near the head of the feed-board to insure the delivery of the paper to said board. To limit the forward movement of the switched paper on the feed-board, a stop I^4 is placed on top of the feed-board at a proper distance from the head thereof, as shown in Fig. 11.

I wish it to be understood that I do not limit my present invention to the specific construction of the calipering devices herein described, as the same result may be attained by variously-constructed calipering devices controlling the electric circuit employed in this invention. A modification of said calipering devices is shown in my Letters Patent No. 567,303, dated September 8, 1896.

When the feeding-machine is connected to a printing-press, as represented in Figs. 1, 8, 9, and 11, it is, in addition to the aforesaid devices for preventing a plurality of sheets from passing simultaneously to the press, also very essential to provide means for preventing the impression-cylinder from coming in contact with the inked type on the press-bed in case no paper is supplied to the press. I have prior to my present invention devised means for accomplishing said result; but in such cases I have resorted to electromagnetically-controlled mechanism for that purpose, as shown in my Letters Patent No. 567,303, dated September 8, 1896.

The object of my present invention is to attain the aforesaid result by mere simple mechanical means, which consist of mechanisms constructed and combined as follows:

Transversely over the feed-board B is a stationary shaft *j*, secured to posts *j′*, mounted on the feed-board. On said shaft are pivotally mounted a plurality of mechanical feelers j^2, which are inclined toward the press and rest with their free ends normally on the feed-board, as shown in Figs. 4 and 9 of the drawings, or on a paper-guiding plate B′, extending from the delivery ends of the tapes *a a* toward the press, as represented in Figs. 11 and 17 of the drawings. Each of said feelers is formed with an upwardly-projecting prop j^3. Parallel with the shaft *j* is a rock-shaft j^4, provided with laterally-extending fingers j^5, which barely reach with their free ends over the tops of the props j^3 when the feelers j^2 are in their normal position. Said rock-shaft is actuated by means of a rod k^2, connected to an arm k^3 on the end of the rock-shaft and receiving intermittent reciprocating motion from a cam *k*, which may be either connected and operated by the actuating mechanism of the feeding-machine, as represented in Fig. 11 of the drawings, or attached to one of the rotary shafts 8 of the printing-press, as shown in Figs. 8 and 16 of the drawings. By these means the free ends of the fingers j^5 are lifted at regular intervals one thirty-second of an inch above the tops of the props j^3, so as to not interfere with the free movement of the feelers, and yet cause the props to arrest the downward movement of said fingers in case the feelers remain in their normal position.

To the end of the rock-shaft j^4 is fastened an arm j^6, the rocking motion of which is utilized for controlling the action of the printing-press. When said printing-press is of the class termed "drum-press," in which the axis of the impression-cylinder is maintained in a uniform plane, I employ the rock-arm j^6 in connection with mechanism for shifting the driving-belt L from the tight pulley L′ onto the loose pulley L^2. This belt-shifting mechanism is more clearly shown in Fig. 3 of the drawings, and consists of a rotary cam K, engaging one end of and imparting oscillatory motion to a lever K′, which is pivoted intermediate its end to a cross-bar K^2, fastened to the press-frame A^2. The opposite end of said lever is connected by a strap J to a longitudinally-sliding cross-bar J′, moving in suitable guides in the sides of the frame, said bar thus receiving reciprocating motion from the cam K. Parallel with and contiguous to the bar

J′ is the longitudinally-movable belt-shifting bar J^2, which also slides in guides on the sides of the frame A^2 and is connected by a rod J^3 to the usual belt-shifting hand-lever J^4. The bar J^2 is provided with a shoulder J^5, and to the bar J′ is pivoted a dog J^6, which is shaped and disposed to engage the shoulder J^5 during the movement of the bar J in one direction. The action of the dog J^6 is controlled directly by a rod J^7, connecting said dog to the hereinbefore-described rock-arm j^6, as shown in Figs. 1 and 2 of the drawings. The operation of said automatic belt-shifting mechanism is as follows, to wit: When the paper-feeding machine A is in proper working condition to deliver successively one sheet at a time to the conveying-tapes a a, which carry the paper to the printing-press, the free ends of the feelers j^2 are lifted by the paper passing under them. This movement of the feelers tilts the props j^3, and thereby allows the fingers j^5 to descend and the rock-shaft j^4 to resume its motion and cause the arm j^6 thereof to draw up the rod J^7, and thereby lift the dog J and prevent the same from engaging the shoulder J^5 on the belt-shifting bar J^2. The belt L is thus retained on the driving-pulley. Should, however, the feeding-machine fail to deliver paper to the conveying-tapes a a, the feelers j^2 will remain dormant in their depressed normal position and the props j^3 will be retained in position to prevent the fingers j^5 from descending, and thus restrain the rock-shaft j^4 from action and allow the dog J to engage the shoulder J^5 of the belt-shifting bar J^2 during a movement of the reciprocating bar J′ in one direction, which causes the bar J^2 to shift the belt L from the tight pulley onto the loose pulley, and consequently the motion of the press is arrested in time to prevent the form on the press-bed from traversing the impression-cylinder of the press. It will be observed that in this case the automatic shifting of the belt is effected by very simple mechanism without the aid of electromagnetically-controlled devices.

The object of employing a plurality of feelers j^2, disposed in a straight line across the feed-board, is to prevent a mutilated sheet from passing to the press. It will be observed that the rock-shaft j^4 cannot turn until all the feelers are lifted simultaneously and retained lifted by paper passing under them. Hence the sheet must be intact to pass with its entire front edge and with a complete and uniform length of the sheet under the feelers. In case the sheet in transit has a portion torn away the want of said portion will cause the feeler or feelers that may be in the path of the mutilated part of the sheet to remain in their normal position and prevent the rock-shaft j^4 to act in time to lift the dog j^6 from its operative position in relation to the shoulder on the belt-shifting bar, which latter is thus caused to shift the belt onto the loose pulley.

In case the printing-press is driven by an electric motor M, as represented in Fig. 9 of the drawings, I employ in place of the hereinbefore-described belt-shifting bar a similar bar N, operated in substantially the same manner and by substantially the same means—*i. e.*, by the reciprocating bar J, which is provided with the dog J^6 for engaging the shoulder J^5 on the bar N, which latter bar receives its motion from the lever K′, engaging the cam K. In the present case, however, the bar N is connected to one end of a lever N′, to the opposite end of which is attached a chain N^2, which runs under a pulley N^3 and thence extends to the switchboard N^4, where said chain is connected to the switch-lever N^5, by which the current is shut off and turned on to control the action of the motor M. This mechanism is illustrated in Figs. 9 and 10 of the drawings. The operation of this automatic press-controlling system is thus: When no paper is delivered on the tapes a and the feelers j^2 are in their normal position, the rod J^7 is caused to remain depressed, and thus hold the dog J^2 in position to engage the shoulder J^5 of the bar N, which is thereby caused to partake motion from the reciprocating bar J′, and by said motion the lever N′ is actuated to draw down the chain N^2, which is thereby caused to turn the switch-lever N^5 to a position which shuts off the current, and consequently arrests the motion of the printing-press.

When my invention is to be used in connection with the type of printing-presses designated as "two-revolution" presses, as represented in Fig. 11 of the drawings, in which the impression-cylinder is moved alternately to and from the form on the press-bed, I prefer to dispense with the automatic belt-shifting mechanism hereinbefore described, and instead thereof I employ electrically-controlled means for tripping the impression-cylinder in connection with my improved automatic circuit maker and breaker, which latter is more clearly shown in Fig. 17 of the drawings and consists of the feelers j^2, a plurality of which are distributed across the feed-board and each of which feelers has projecting from it the prop j^3, over which is the finger j^5 of the rock-shaft j^4, as hereinbefore described. In the present case, however, I utilize said feelers and parts coöperating therewith for operating a very simple and efficient circuit maker and breaker consisting of a stationary arm t, projecting from one of the posts j', which supports the shaft j, carrying the feelers j^2. To the free end of the arm t is secured one of the electric terminals, t', facing upward from the arm. The other terminal, t^2, is over the terminal t' and attached to an arm o, fastened to the end of the rock-shaft j^4 and insulated therefrom, as shown at o'.

The mechanism for tripping the impression-cylinder is similar to that shown in my Letters Patent No. 567,303, dated September 3, 1896. In the two-revolution press the impression-cylinder is usually lifted from the

form on the press-bed by means of springs *l l*, interposed between the base of the press and the yokes *l'*, which, by means of rods l^2, support the journal-boxes of the impression-cylinder. The depression of the impression-cylinder is effected by means of a reciprocating pitman *p*, attached at one end to a transverse bar or shaft l^3, the ends of which are pivoted to and form the couplings of the toggle-levers l^4 at opposite sides of the press, which toggle-levers connect the yokes *l'* to the press-frame A^2. The pitman *p* is provided in the under side of its free end portion with a notch *r*, by which it normally rides upon the end of a rock-arm *r'*, projecting from a transverse rock-shaft r^2. Parallel with this rock-shaft is a shaft *s*, pivoted to the frame A' and provided with an arm or lever *s'*. By turning the shaft *s* the lever *s'* is swung to a position to lift the pitman *p* out of engagement with the rock-arm *r'*, when desired to trip the impression-cylinder. To effect this tripping automatically, a second lever or arm s^3 is attached to the shaft *s*, and at the side of the free end of this arm is a longitudinal slide *u*, which is provided with a roller-bearing *u'* or other suitable means by which to push the arm s^2 in erect position during the movement of said slide in one direction. Said position of the arm serves to lift the pitman *p* out of engagement with the rock-arm r^2. At the side of and parallel with the slide *u* is a reciprocating rod u^2, sliding in guides u^3 and actuated by an eccentric R or other suitable means. To the rod u^2 is pivoted a bell-crank u^4, one arm of which is adapted to engage a shoulder *v* on the slide *u*. The other arm of the bell-crank has attached to it the armature of a magnet *v'*, which is in circuit with the terminals l' and l^2 of the circuit maker and breaker actuated by the feelers j^2, as hereinbefore described. The operation of this combination is as follows: So long as the paper-feeding machine continues to deliver paper the feelers j^2 are lifted by the sheets in transit, and thus the fingers j^5 are allowed to move downward and the rock-shaft j^4 to turn and bring the terminal l^2 in contact with the terminal l'. The circuit thus closed causes the magnet to turn by its armature the bell-crank u^4 into a position to prevent it from engaging the shoulder *v* on the slide *u*, which is thereby caused to remain dormant during the reciprocating motion of the rod u^2. When the slide is thus released, it is in position to allow the arm s^2 to yield to the weight of the pitman *p*, which is thereby retained in engagement with the rock-arm *r'*, which lifts the impression-cylinder at regular intervals, as required in the proper operation of the press. The fingers j^5 are lifted to their normal position over the props j^3 by the reciprocating rod k^2, connected to an arm k^3, attached to the end of a rock-shaft j^4, as hereinbefore described. The fingers j^5 remain over the tops of the props whenever the feeding-machine fails to deliver paper, and when the fingers are in said position the circuit is broken, as represented in Fig. 17 of the drawings. The broken circuit causes the magnet *v'* to release its armature, and thereby allows the bell-crank u^4 to turn into a position to engage the shoulder *v* on the slide *u* during the movement of the rod u^2. Said engagement moves the slide and causes the same to turn the arm s^2 toward an erect position, and thereby lifts the pitman out of engagement with the rock-arm *r'*. The release of said pitman allows the springs *l l* to retain the impression-cylinder in its elevated position and out of contact with the form on the press-bed.

When my invention is applied to a paper-folding machine, as represented in Fig. 18 of the drawings, the feelers j^2 or means for automatically arresting the motion of said machine are preferably dispensed with. In such machines, however, it is essential to guard against the delivery of a plurality of sheets simultaneously to the machine, and I therefore place between the delivery end of the feeding-machine and receiving end of the folding-machine, the paper-shifting switch h^2 and arrange on the feeding-machine the automatic paper-calipering device, which actuates said switch to cast the misfed or duplicate sheets out of the path leading to the tapes *a a*, which during a proper working of the feeding-machine carry the paper successively one sheet at a time to its requisite position over the folding-rollers V V, into the bite of which the sheet is subsequently introduced by the blade V' in the usual and well-known manner.

H denotes a box for the reception of the paper thrown down from the plane of the feeding-machine by means of the aforesaid switch. The means of operating the switch are substantially like those hereinbefore described.

To insure coöperation of the feeding-machine with the printing-press, it is preferred to provide suitable means for transmitting motion from said press to the feeding-machine, as represented in Figs. 1 and 3 of the drawings, in which 1 represents a counter-shaft mounted in bearings on the frame of the printing-press and having attached to it a sprocket-wheel 2, which is connected by a sprocket-chain 3 with a sprocket-wheel 4, driven by the main shaft 5 of the press. To the said counter-shaft is also attached a pinion 6, which meshes with a gear-wheel 7, attached to the shaft 8, to which is fastened the cam K, hereinbefore described. To the shaft 8 is also fastened a sprocket-wheel 9, which is connected by a sprocket-chain 10 with a sprocket-wheel 11 on one of the shafts of the feeding-machine. Suitable means, not necessary to be shown, transmit motion from the latter shaft to the various mechanisms of the feeding-machine.

It sometimes becomes necessary to "back-up" the press—*i. e.*, to run the press to some degree reverse from its ordinary working—and in order to permit this without imparting motion to the feeding-machine I mount on the

counter-shaft 1 a plurality of collars 12, 13, and 14, by means of which motion is transmitted from the sprocket-wheel 2 to the shaft 1 in the following manner: The innermost collar 14 is fastened to the aforesaid counter-shaft, while the sprocket-wheel 2 and the collars 12 and 13 are mounted loosely on the shaft. A pin or lug 15 projects from the side of the sprocket-wheel 2 and bears on a lug 16 attached to the loose collar 12, the lug 16 bears in a similar manner on a similar lug 17 on the collar 13, and the lug 17 bears in the same manner on a lug 18, projecting from the fastened collar 14, as illustrated in Fig. 3 of the drawings.

In backing up the press, as hereinbefore stated, the sprocket-wheel 2 and the collars 12 and 13 are permitted to turn in consecutive order without imparting motion to the counter-shaft 1 until the pin of the sprocket-wheel and lugs of the collars are brought to bearings reverse from those before described.

To permit the feeding-machine to be thrown out of gear with the printing-press when desired, I detachably connect the sprocket-wheel 4 to the balance-wheel 19 or other main wheel of the printing-press, preferably by means of a spider 20, secured rigidly and in concentric position to the balance-wheel 19, and having detachably fastened to it the sprocket-wheel 4, by means of a thumb-screw 21, clamping it on the spider.

What I claim as my invention is—

1. The combination with a paper-receiving machine designed to operate on a single sheet of paper at a time, a paper-feeding machine and conveyers delivering the paper from said feeding-machine to the receiving-machine, of paper-calipering mechanism actuated by a plurality of sheets entering simultaneously between the calipering devices and thereby preventing the delivery of said sheets to the conveyers and mechanical feelers disposed in the path of said conveyers to be actuated by the sheet in transit and controlling the action of the receiving-machine in case of failure in the delivery of paper from the feeding-machine as set forth.

2. The combination with a paper-feeding machine, conveyers carrying the paper from said machine and a machine receiving the paper from said conveyers, of paper-calipering devices at the delivery end of the feeding-machine and actuated by a plurality of sheets passing simultaneously through said calipering devices and controlling the delivery of paper from said machine, mechanical feelers over the conveyers and normally in the path of the paper, a rock-shaft actuated by said feelers when thrown out of their normal position and mechanism controlling the action of the paper-receiving machine and controlled by the aforesaid rock-shaft as set forth.

3. The combination with a paper-feeding machine, a printing-press and conveyers carrying the paper to said press, of a movable bar controlling the action of the press, a continuously-moving mechanism provided with a dog for engaging and releasing said movable bar, mechanical feelers normally in the path of the sheet carried on the aforesaid conveyers, a rock-shaft actuated by said feelers when thrown out of their normal position, an arm on said rock-shaft and a rod connecting said arm with the aforesaid dog as set forth.

4. The combination with a paper-feeding machine, a printing-press and conveyers carrying the paper to said press, of paper-calipering devices at the delivery end of said feeding-machine and actuated by a plurality of sheets passing simultaneously through said calipering devices, mechanisms actuated by said calipering devices and preventing the delivery of said plurality of sheets to the conveyers, mechanical feelers over said conveyers and normally in the path of the paper carried on said conveyers, a rock-shaft controlled by and released from said feelers when thrown out of normal position, a movable bar controlling the action of the press, a continuously-moving mechanism provided with a dog for engaging and releasing said movable bar, an arm on the aforesaid rock-shaft and a rod connecting said arm with the aforesaid dog as set forth.

5. In combination with paper-conveyers and a machine disposed to receive the paper from said conveyers, a stationary shaft disposed transversely over said conveyers, feelers mounted loosely independent of each other on said shaft and normally in the path of the paper, upwardly-projecting props affixed to said feelers, a rock-shaft parallel with the aforesaid stationary shaft and having fixed to it fingers and extending to the tops of the aforesaid props when in normal position, an arm attached to said rock-shaft, and mechanisms controlling the action of the paper-receiving machine and controlled by the action of the arm on the rock-shaft as set forth.

6. In combination with paper-conveyers and a machine receiving the paper from said conveyers, a stationary shaft disposed transversely over the conveyers, feelers mounted loosely independent of each other on said shaft and normally in the path of the paper, upwardly-projecting props formed integral with the feelers, a rock-shaft parallel with said stationary shaft, fingers fixed to said rock-shaft and extending over the props when in normal position, mechanisms controlling the action of the paper-receiving machine and controlled by the action of the aforesaid rock-shaft, a lever attached to said rock-shaft, a pitman connected to said lever, and mechanism imparting intermittent reciprocating motion to said pitman and thereby restoring the aforesaid fingers to their normal position over the props as set forth.

7. The combination with a paper-feeding machine, a printing-press having a vertically-movable impression-cylinder, conveyers delivering the paper to said press, a tripping

mechanism retaining the impression-cylinder in its elevated position, of feelers over the conveyers and normally in the path of the paper and moved independently of each other from said position by the paper in transit, props projecting upwardly from said feelers, a rock-shaft disposed transversely over the conveyers, fingers fastened to said rock-shaft and extending with their free ends normally over the props, a limb fastened to the rock-shaft and carrying an electric contactor, an electric terminal under said contactor, and an electromagnetically-controlled mechanism actuating the aforesaid tripping mechanism as set forth.

8. In a paper-feeding machine the combination of paper-calipering devices disposed in the path of the paper from said machine and adjusted to be actuated by the passage of a plurality of sheets simultaneously, and an automatic sheet-switcher actuated to divert said plurality of sheets from their normal delivering path and controlled in its action by the calipering devices as set forth.

9. In a paper-feeding machine the combination of paper-calipering devices disposed in the path of the paper from said machine and adjusted to remain dormant during the passage of a single sheet and to be actuated by the passage of a plurality of sheets simultaneously, and an automatic paper-shifting switch normally in position to guide the paper in its designed direction and actuated by the aforesaid calipering devices to divert the sheet from said direction as set forth.

10. The combination with a paper-feeding machine, conveyers carrying the paper from said machine and automatic paper-calipering devices disposed at the delivery end of said feeding-machine and actuated by the passage of a plurality of sheets simultaneously, of a switch normally bridging the space between the feeding-machine and the aforesaid conveyers and pivoted to turn with the portion adjacent to the feeding-machine upward from its normal position and controlled in said movement by the action of the aforesaid calipering devices as set forth.

11. The combination with a paper-feeding machine, and conveyers carrying the paper from said machine, of a switch normally bridging the space between said machine and conveyers and pivoted to turn with the portion adjacent to the feeding-machine upward from its normal position, a lever pivoted intermediate its ends to the feeding-machine frame and suitably connected at one end to the aforesaid switch to operate the same, a bar connected to the opposite end of said lever, a dog pivoted to said bar, a pitman provided with a catch traversing the aforesaid dog, a spring forcing the dog from engagement with said catch, an electromagnet throwing said dog into position to engage the catch, calipering devices at the delivery end of the feeding-machine and actuated by a plurality of sheets passing simultaneously from said machine and a circuit maker and breaker in circuit with the aforesaid magnet and actuated by the calipering devices to close the circuit as set forth.

12. The combination with a printing-press and paper-feeding machine connected thereto, a counter-shaft on the printing-press, a wheel mounted loosely on said shaft and receiving rotary motion from the main shaft of the press, a wheel fastened to said counter-shaft, mechanism transmitting motion from said wheel to the feeding-machine, collars mounted loosely on the counter-shaft between said wheels, and lugs on the wheels and intermediate collars and bearing in consecutive order one upon the other in corresponding direction as set forth and shown.

13. The combination with paper-conveying tapes, a machine receiving the paper from said tapes and means for tripping the actuating mechanism of said machine, of a plurality of mechanical feelers distributed in a straight line across said tapes to be actuated by the sheet in transit and movable independent of each other to control by their synchronous action the aforesaid tripping means and insure the action of the tripping means by mutilated sheets traversing the said feelers as set forth.

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