E. J. F. REA & C. E. CLARK.

CONTROLLING MECHANISM.

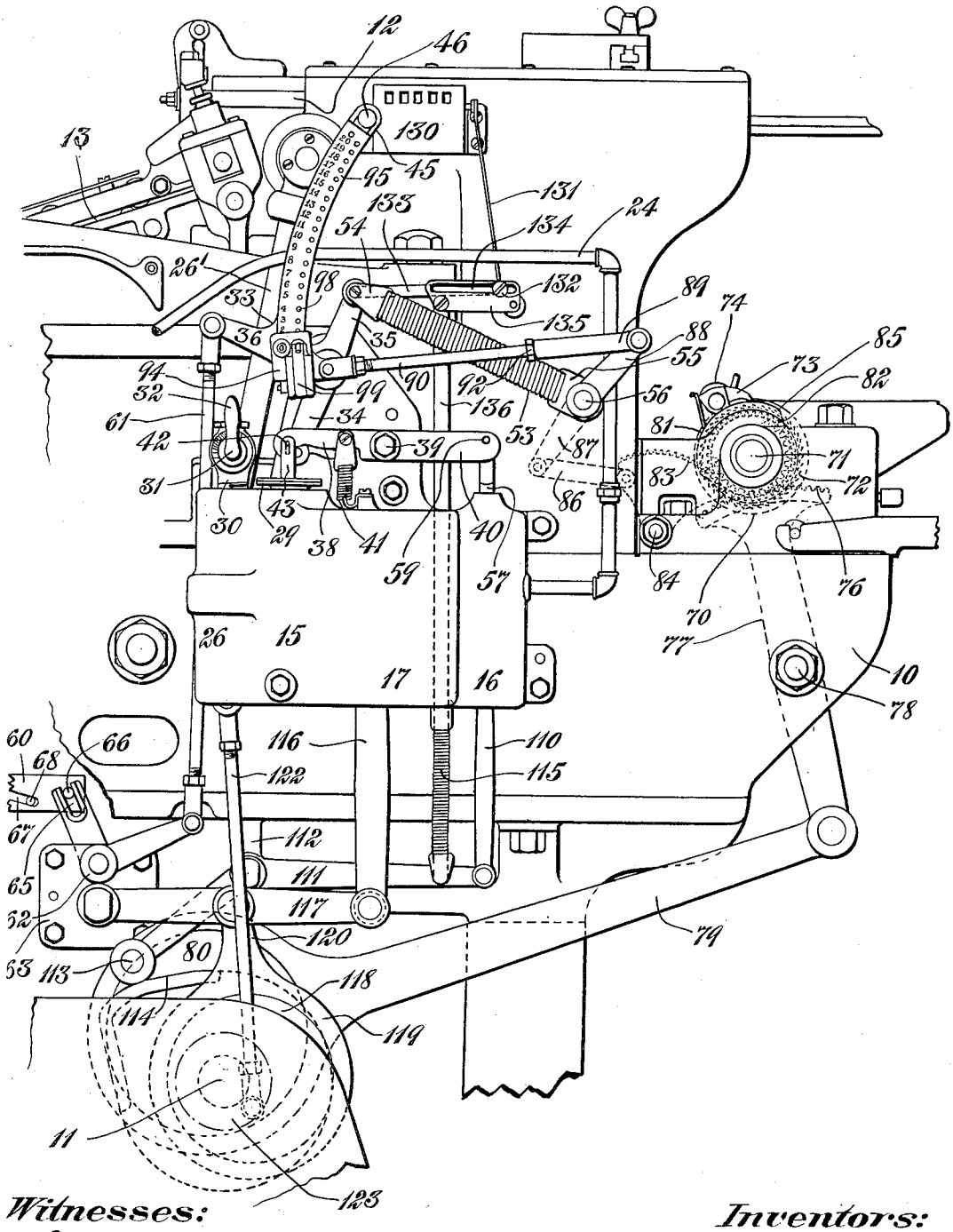
APPLICATION FILED MAY 25, 1912.

1,084,295.

Patented Jan. 13, 1914.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

J. M. Griswold

L. A. Sexton.

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By their Attorneys,

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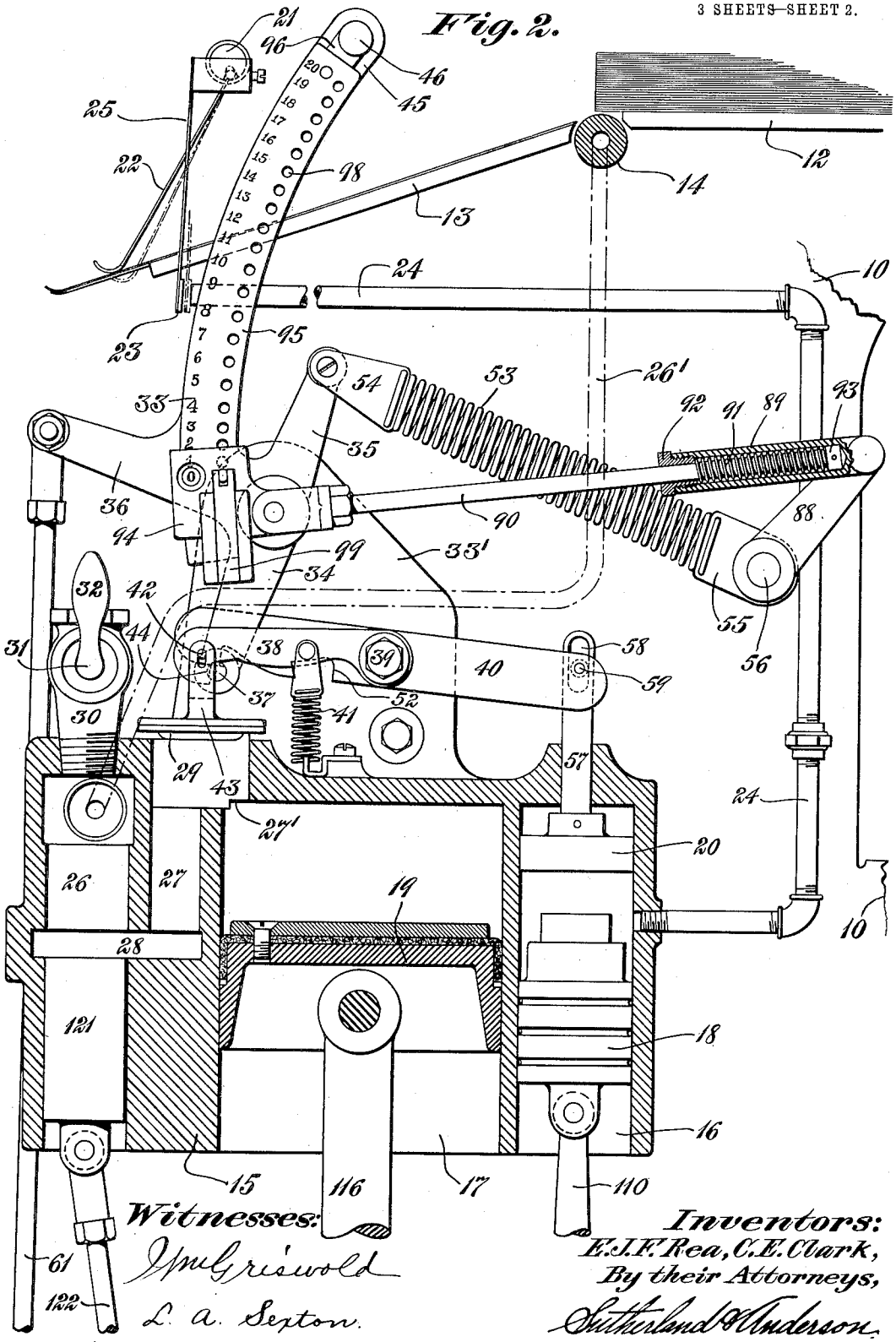
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

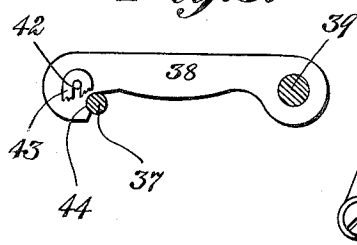


Fig. 4.

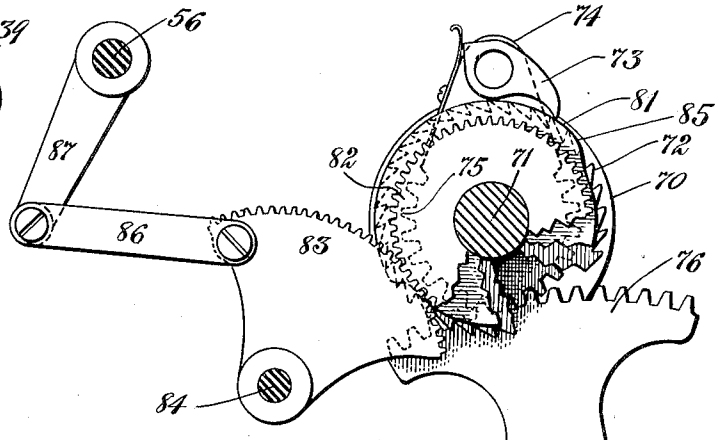


Fig. 5.

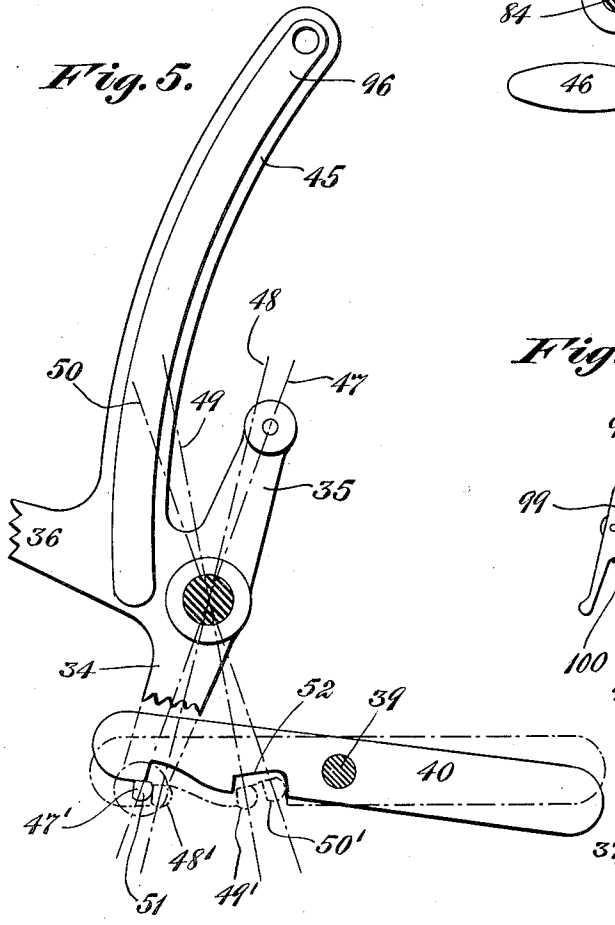
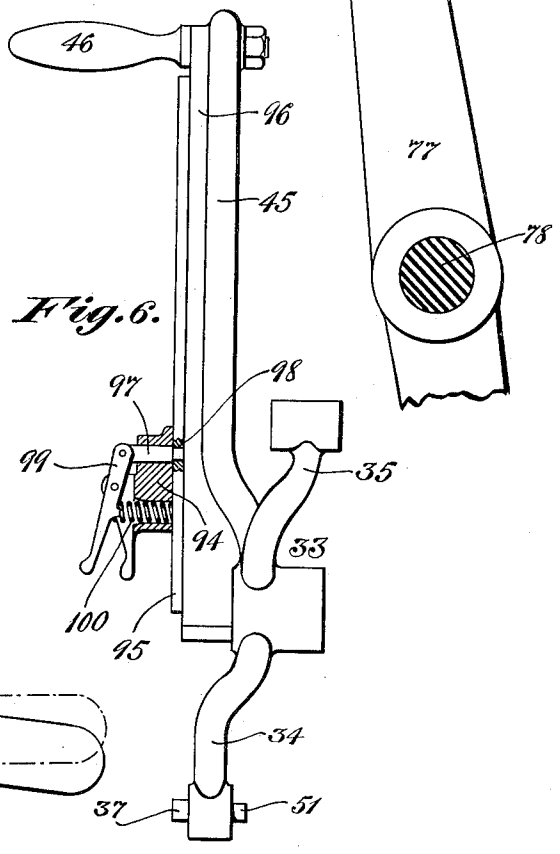


Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD J. F. REA AND CHARLES E. CLARK, OF HARTFORD, CONNECTICUT, ASSIGNORS TO AMERICAN AUTOMATIC PRESS COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

CONTROLLING MECHANISM.

1,084,295. Specification of Letters Patent. Patented Jan. 13, 1914.

Application filed May 25, 1912. Serial No. 699,669.

To all whom it may concern:

Be it known that we, EDWARD J. F. REA and CHARLES E. CLARK, citizens of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Controlling Mechanism, of which the following is a specification.

This invention relates to controlling mechanism, and it may be employed with advantage in many different ways, although it is of particular advantage when incorporated in or forming part of a printing press, the object of the invention being to provide effective means of the character noted, accurate and precise in action for controlling one or more sub-mechanisms.

In the drawings accompanying and forming part of the present specification we have shown in detail one of the several convenient forms of embodiment of the invention which to enable those skilled in the art to practise the same will be set forth fully in the following description, the novelty of the invention being set forth in the claims succeeding said description. From this it will be clear that we do not restrict ourselves to such showing; we may depart therefrom in many and material respects within the scope of our invention defined by said claims.

Referring to said drawings: Figure 1 is a side elevation of a controlling mechanism involving our invention. Fig. 2 is a vertical sectional view of some of the parts shown in Fig. 1. Fig. 3 is a detail view of a valve-holding latch. Fig. 4 is a detail view with parts broken away, of the inking roller, feed mechanism therefor and certain coöperating devices. Fig. 5 is a similar view of a controlling lever and an associated latch, the dotted lines in said view showing the different positions assumed by said parts. Fig. 6 is a front elevation of said lever and also shows in section a block connected therewith.

Like characters refer to like parts throughout the several figures.

As already intimated controlling mechanism involving our invention can be utilized with advantage in widely different connections, although it is of prime utility when incorporated in a printing press. We have shown in Figs. 1 and 2 of the drawings, portions of such a machine. The framework for sustaining the different parts thereof may be of any suitable character, that shown being denoted in a general way by 10 and comprising two side members tied together by struts, rods or bolts as may be desired, at proper intervals. The controlling mechanism as will hereinafter appear, coacts preferably with a power shaft or equivalent element such as 11, the framework 10 being equipped with bearings for supporting said shaft which is ordinarily continuously driven; that is the shaft 11 will be rotated notwithstanding the fact that some of the sub-mechanisms may be out of action. This shaft 11 may be driven in any desirable manner, although no means is shown for this purpose.

In a printing press it is generally the custom to place a stack or pile of sheets of paper on a suitable feed-member such as the feed box 12, and in the present case the sheets are taken from the bottom of the pile in some positive manner and directed to a feed board as 13 which is equipped in practice with elements well-known in this art for regulating the movement of the sheets. Between the bottom of the feed box 12 and the feed board 13 a positive force feeding member is interposed, and the tubular oscillatory part 14 serves satisfactorily in this connection, said force feed member 14 being of pneumatic type. It is not essential that we employ in the organization of the feed box, the feed board and the force feed member, although the three parts are of advantage and a pneumatic force feed device is particularly advantageous, in that we can assure effective control of the sheets. This force feed member 14 as will hereinafter appear has a connection with a vacuum or exhaust apparatus, and during normal operation as it oscillates, it removes by suction, the lowermost sheet of the pile in the feed box 12, and as it swings forward transfers said sheet onto the feed table 13 from which the sheet is in some suitable way conducted to the printing mechanism or otherwise disposed of, this depending upon the nature of the machine in which the mechanism is incorporated. The sheets should be fed continuously or practically so, there being of course a slight interval between the rear end of one sheet and the front end of the sheet immediately back of it. If, however, there

is any break in the continuity of feed, means is provided for instantly throwing the force feeding member out of action as will hereinafter appear. At the same time we provide in such an event to arrest or stop the supply of ink, stop the throw of the type or form bed, thereby eliminating the possibility of an impression being made upon the cylinder, stop the counting mechanism and at the same time may throw into or out of action other parts, to properly govern the machine. The type or form may be supported by a reciprocatory bed such for instance as illustrated in Letters Patent No. 843,535 granted to James W. Hoag on February 5, 1907.

Sustained by the framework of the machine on one side thereof as shown in Fig. 1 is a chambered member 15 which comprises cylinders 16 and 17 constituting part of vacuum or suction apparatus to which we have briefly alluded. The cylinders 16 and 17 are practically integral with each other and in the cylinder 16 is reciprocative the piston 18, while the piston 19 correspondingly travels in the cylinder 17. Both pistons 18 and 19 are normally continuously operated. In the cylinder 16 is a second piston 20, the purpose and mode of operation of which will hereinafter be fully explained.

Supported above the inclined feed board 13 is an oscillatory shaft 21, with which is associated feeler mechanism consisting for example of a light wire feeler member or finger (or fingers) 22 fastened to said shaft 21. There is also connected with said shaft 21 a valve 23 governing the inlet end of the pipe or duct 24 carried by the framework of the machine, the discharge end of which opens into the cylinder 16 between the two pistons 18 and 20. This valve 23 is carried by the stem or shank 25 suitably fixed to the shaft 21. The normal relations of the feeler member 22 and valve 23 are shown by full lines in Fig. 2 being maintained by the sheets of paper as they are advanced. Should there be an abnormal interruption in the feed from any cause, the feeler member 22 will drop back by its own weight toward the front edge of the inclined feed board 13 and at the same time the valve 23 will close the inlet end of the pipe 24, which opens normally into atmosphere. During normal operation, therefore, while the piston 18 reciprocates, it accomplishes nothing, the atmospheric air being alternately drawn into and then expelled from the pipe 24. When, however, the valve 23 closes in the manner set forth, the pipe 24 is closed to atmosphere so that the piston 18 on its suction stroke can create a vacuum and draw down piston 20 to effect through the latter, tripping of a latch as will hereinafter appear. There is a lost motion connection as will be hereinafter explained, between this piston 20 and the latch so as to permit a certain amount of movement of the piston 20 without tripping the latch, under ordinary conditions, which compensates for any variations in distance between the sheets irrespective of their size and the distance between them. As we intimate if there be any unusual break in the feed, the piston 20 will be so operated as will hereinafter appear to trip the latch to which we have referred.

The piston 19 is coöperative with the pneumatic force feed device 14 for the purpose of creating a suction or vacuum in the latter, and we will now describe the connection shown between the cylinder 17 and the feed roller 14.

The vacuum apparatus 15 has the chamber 26 which is connected by the pipe 26′ with said feed roller 14 as shown by dotted lines in Fig. 2. Between the chamber 26 and the cylinder 17 is a passage 27, said chamber 26 and passage 27 being intersected by the annular space 28. The upper enlarged end of the passage 27 is open to the atmosphere and is also in communication with the interior of the cylinder 17 by the part 27′. The upper open end of the passage 27 which opens into the atmosphere, is governed by a valve as 29 which is shown open in Fig. 2 and when this relation is present no vacuum can be created in the feed roller 14. When, however, the valve 29 is closed, this permits the formation of a vacuum in said roller 14, so that when the latter oscillates it can feed the sheets by suction. To start the machine as will hereinafter appear, the first thing requisite is to close the valve 29. It should also be added that if there be any interruption in the feed of the paper, this valve will be automatically opened as will hereinafter appear.

Tapped into the vacuum apparatus 15 over and in communication with the chamber 25 is a valve casing 30, the valve 31, of which is provided with an operating handle 32 and by operating this valve the tension of the vacuum in the roll 14 can be regulated, it being understood that the casing 30 has an opening to atmosphere.

The apparatus includes a controlling member which may be of any desirable nature but which is preferably operated in one direction by hand to throw the various parts into action and which is moved in the opposite direction automatically to throw such parts out of action. Although as intimated this controlling member may vary as to character, a lever such as that denoted in a general way by 33 answers satisfactorily in this connection. The lever 33 has three arms 34, 35 and 36, and is fulcrumed at the junction of said arms to a bracket 33′ on the top of the suction or vacuum apparatus 15. The arm 34 is shown having on its outer side a stud 37 coöperative with a valve holding

latch 38 shown as pivoted to the pivot 39 of the latch 40 hereinafter more particularly described, said pivot 39 in the construction shown supporting the latch 40 between the ends thereof and being supported by the bracket 33'. Connected with the latch 38 between the ends thereof is a coiled pull spring 41 which exerts a constant tendency to pull said latch 38 downward. Said latch is shown having a loose connection as by a pin and longitudinal slot joint denoted in a general way by 42, with the stem 43 of the valve 29, and when the machine is at rest the lever 33 will uphold the latch 38 to thereby maintain the valve 29 open. By advancing or moving the lever 33 forward, the latch 38 will be tripped and will be instantly swung downward by the spring 41 so that the valve 29 can be closed. Owing to the pin-and-slot joint 42 between the latch and valve, the valve can have relative motion during running conditions, with respect to the latch. Therefore, when the piston 19 is on its up stroke any oil in the apparatus 15 can be expelled into the atmosphere through the outer end of the passage 27, the valve 29 being forced open by such piston for said purpose during such action.

The stud or projection 37 is shown as cylindrical and as adapted to fit a notch 44 in the latch 38, and when this relation is present the latch 38 will be upheld to maintain the valve open. When the stud or pin is moved out of the notch or aperture the latch 38 is free to drop in the manner already described, this particular result being obtained in the present case, by advancing the lever 33, the arm 36 for this purpose having an upward, arcuate extension 45 provided at its upper end with an operating handle 46. The purpose of the arcuate extension 45 will be hereinafter explained.

The lever 33 has four positions as shown in Fig. 5, it being shown in its primary position in full lines in Figs. 2 and 5 at which time, although the shaft 11 be rotating, none of the parts governed by the controlling mechanism will be operated. The dotted lines in Fig. 5 denoted respectively by 47, 48, 49 and 50 represent the four positions, the dotted line 47 position being the primary relation, while the position 49 is the running or normal relation, although as we will hereinafter explain the lever is initially swung over to the position 50. To start the press the lever 33 will be advanced from its primary position 47 and shifted successively to the positions 48, 49 and 50, being adapted when in position 48 to effect through the intermediate described parts, the release of the latch 38 and the consequent closing of the valve 29. After the lever is moved to position 50 it is at once returned to the position 49 where it is positively held in some suitable manner as by the latch 40 to which we have already hereinbefore briefly referred. The reasons for these different positions and the action of the lever will be hereinafter described more in detail.

The arm 34 is provided on its inner side with the projection or stud 51, which when the machine is at rest, is adapted to engage the working arm of the latch 40 to uphold said latch, and said stud or projection has four positions 47', 48', 49' and 50' corresponding to the four positions of the lever 33. When the stud 51 is moved to position 48' the working arm of the latch 40 can drop. Position 50' is of course, the extreme position of the stud at which time it enters the notch 52 in the working arm of the latch 40, while in the third position or that designated by 49' the stud 51 will engage against the forward wall of said notch or slot 52 all as indicated in Fig. 5. When this last mentioned relation is present, the latch 40 will positively hold the lever 33 in its shifted position, and this will be maintained until said latch is tripped, at which time the lever 33 is instantly and automatically moved to its primary position for example by the pull spring 53 connected at its ends to the clips 54 and 55, the clip 54 being pivoted to the arm 35, while the clip 55 is similarly connected to the rock shaft 56 hereinafter more particularly described. While the press is properly running, therefore, the lever 33 is positively held in its manually shifted position. It will be assumed that there is a stoppage in the feed of the paper as we have already described. In this event the valve 23 closes the inlet end of the pipe 24 permitting the formation of a vacuum in said pipe 24 and in the chamber or cylinder 16, resulting in pulling down the piston or plunger 20 which is operatively connected with the outer arm of the latch 40 to thus elevate the inner arm of said latch and disengage it from the stud or projection 51 at which point the lever 33 is moved to its original position by the power of the spring 53 to thereby throw out of action certain mechanisms as already partly set forth and hereinafter further referred to.

Any suitable operative connection may be provided between the piston 20 and the latch 40 although a loose connection is shown for this purpose, the stem 57 of said piston having a longitudinal slot 58 to receive the stud 59 on the adjacent end of the latch 40 which stud may as shown, consist of an anti-friction roller. By reason of the connection described the piston 20 may have as already intimated, a certain amount of relative motion with respect to the latch without accomplishing anything, the latch being tripped only when there is something radically wrong in the feed of the paper.

The machine partially illustrated is of the

kind comprising a traveling bed and a traveling cylinder, and in the Hoag patent to which we have referred the form or type is carried on the bed and at a predetermined time is given a movement transversely of the line of motion of the bed and cylinder to make an impression upon the paper on the cylinder. None of these parts is shown, although we do illustrate what might be considered a form-governing member such as the part 60 which is only, however, partly illustrated. This part 60 is shown as being in its lowermost position in Fig. 1, and when in this particular position, the form will not be operated, but when it is in its highest position it sets into action certain parts, for effecting the movement of the form in the manner set forth to obtain the necessary impressions. Said parts 60 has four different positions corresponding with the four positions of the lever 33. It has an operative connection with said lever, so that when the latter is actuated the part 60 will be similarly operated. The arm 36 of the lever is connected by an arm or link 61, with one arm of the angle lever 62 supported by a bearing 63 on the side of the framework 10, the other arm of the lever being slotted or forked as at 65 to receive the pin 66 on the form-governing member 60 which at suitable intervals in its length has diagonally disposed slots 67 to receive projections 68 on the framing of the machine. When the lever 33 is advanced in the manner already described, the rod or link 61 is thrust downward thereby through the intermediate parts lowering the member 60. This part 60 is given an overthrow movement which corresponds to the fourth position, simply to put in action certain pawls which we have not shown, and when this particular result is accomplished, the lever 33 is moved to its third or running position to correspondingly position the member 60, which, as will be understood, is in its third position when the press is printing. During normal operation, therefore, the member 60 through intermediate parts causes the motion of the form with respect to the traveling bed. When, however, the part 60 is in its original position, the form will not be operated. It will, therefore, be clear that when the latch 40 is tripped in the manner already described for instance by a stoppage in the feed of the paper, the lever 33 will be instantly returned to its primary position by the power of the spring 53, and the part 60 will through its described connection with said lever 33, be simultaneously returned to its original position, by virtue of which the form will not be shifted with respect to the bed notwithstanding the fact that the bed is traveling back and forth.

In addition to controlling the feed of the paper and the form, we also provide means for controlling the supply of ink, and this in the present instance is effected by arresting the motion of the ink roller or equivalent device, although a roller 70 is shown for this purpose, being fixed in some suitable manner to the shaft 71 sustained by bearings on the frame. This roller 70 in the present case is rotary, and for turning it pawl and ratchet mechanism may be provided, the ratchet wheel 72 being rigid with the roller 70 and being operable by the spring-operated pawl 73 pivoted to carrier 74, which has peripheral teeth 75 arranged in segmental order and in mesh with the teeth of the segment 76 at the upper end of the rock lever 77, supported by the stud-shaft 78 on the framing of the machine and connected at its lower end with the pitman 79 operable by the eccentric 80 on the main shaft 11. It will, therefore, be clear that when the shaft 11 is rotated the segmental pawl-carrier 74 will be rocked to impart a corresponding movement to the pawl 73 whereby the latter in turn will operate the ratchet-wheel 72 to impart an intermittent feed movement thereto. The degrees of movement of the ink roller 70 is regulable by suitable means as the shield 81 which may be also utilized to throw the pawl 73 out of action and therefore entirely stop the movement of the ink roller 70. This shield is shown as a disk or plate loose on the shaft 71 and rigid with the gear wheel 82 meshing with the segment 83 pivotally supported by a pivot 84 on the framework 10, and it has a peripheral cam portion 85 constituting the active portion thereof and along which the pawl 73 is adapted to travel. By adjusting the shield 81 the cam portion 85 can be moved to such position as to permit the pawl 73 on the stroke of the segmental carrier 74, to feed the ratchet wheel 72 one or more teeth or the shield 81 can be so adjusted that the pawl 73 will travel entirely on the cam portion 85 and in the latter event the pawl cannot operate the ratchet wheel 72, the consequence being in such case that the ink roller 70 will not be operated and hence no ink will be supplied. As will hereinafter be pointed out, this throwing of the ink roller out of action is automatically secured through the shifting of the lever 33. It will also be understood that the various parts can be thrown out of operation at any time by hand by the manipulation of said lever. Pivoted to the segment 83 is a link 86 likewise connected to the rock arm 87 fast to the shaft 56, to which we have already referred, said shaft as will hereinafter appear having an operative connection with the hand lever 33 by which the throwing out of action of the ink roller can be accomplished when the lever is returned to its primary position; this connection is also

an adjustable one, so that the degree of movement of the ink roller can be regulated.

Rigid with the shaft 56 is the rock arm 88 to the other end of which is pivoted the tube 89 which receives the rod 90 this rod as will hereinafter appear having an adjustable connection with the hand lever 33. Encircling the rod 90 within the tube 89, is a spring 91, one end of which bears against a screw plug 92 fitted in the open end of the tube 89, while the opposite end of the spring bears against a collar 93 on the extreme outer end of the rod 90 by reason of which the said rod 90 is yieldably connected with the arm 88, so that when the lever 33 is advanced to put the pawl 73 into action, no breakage of parts can result. The rod 90 at its forward end is pivoted to the block 94 which has a slidable connection with the segment 95 fastened by riveting or otherwise, to the segmental bead 96 on the extension 45 to which we have already referred. The block 94, can, therefore, be adjusted longitudinally of the segment 95, and is adapted to be held in its various adjusted positions, by the pin 97 which interchangeably enters the holes or perforations 98 in the overhanging portion of the segmental plate 95, these holes 98 being numbered consecutively from zero up commencing with the lowermost one in which the pin 87 is shown as fitted in Fig. 2. The pin 97 is pivoted to an operating lever 99 supported between its ends by a suitable bearing on the block 94, and against which the spring 100 constantly acts, the block being socketed or bored to receive said spring, the function of which is to constantly advance the pin or plunger 97. It will be clear that by moving the block 94 along the segment 95 the guard or shield 81 will be shifted and the parts are so related that when the holding pin 97 is in the lowermost hole 98 the guard or shield 81 will be in such position that the pawl 73 on its stroke cannot feed the ratchet wheel 72 but when moved into the next higher hole the pawl can feed the ratchet one tooth, and so on.

The piston 18 is continuously operable, and in the present instance it is moved in one direction through the primary agency of the shaft 11, opposite movement thereof being secured by spring means as will now be set forth. Pivoted to the piston 18 is the rod 110 jointed at its lower end to the lever 111 fulcrumed between its ends to the bearing 112 on the framing, the free end of the lever carrying a stud 113 shown as an antifriction roller operable by the cam 114 fixed to the driving shaft 11. Connected to the rear arm of the lever 111 is the coiled pull-spring 115 which also has a connection with the casing of the vacuum apparatus 15. The purpose of the cam 114 is through the intermediate parts, to impart a downward stroke to the piston 18, the upward stroke thereof being effected by the spring 115. Connected to the piston 19 is a rod 116 jointed at its lower end to the lever 117 fulcrumed to the bracket 63. Rigid with the shaft 11 is an eccentric 118 provided with a strap 119 furnished with an extension 120 pivoted to the lever 117 between the ends thereof, it being therefore clear that as the shaft 11 turns, the piston 19 through the parts just described will be reciprocated.

In the chamber 26 is located a valve 121 to which is pivoted the rod 122, said rod being eccentrically connected by a pivotal joint at its lower end, with the disk 123 rigid with the shaft 11, such crank connection serving to impart a continuous reciprocatory movement to the rod 122 to thereby correspondingly operate the valve 121. The parts are so related that the valve 121 crosses the annular space 28 just at the moment the piston 19 commences its upward stroke, thereby cutting off communication between the passage 27 and duct 26, so that particles of oil and other like substances, will be prevented from entering into the said duct 26.

Mounted on one side of the feed box 12 is a counter or register as 130 and which as will hereinafter appear is adapted to count the number of sheets printed during the normal operation but which is thrown out of action in case there is any stoppage in the feed of sheets. For directly operating the counter 130 the rod or link 131 may be provided, said rod or link 131 being connected at its lower end with a stud 132 at the rear end of the link 133, said stud as shown consisting of a screw tapped into the link 133 and fitted for sliding motion for a purpose that will hereinafter appear in the longitudinal slot 134 of the rocker 135 pivoted to the side of the feed box 12. Pivotally connected to the forward end of the rocker 135 is the rod 136 having a similar connection with the lever 111 hereinbefore described. The link 133 is jointed at its forward end to the arm 35 of the lever 33 which is shown as occupying its primary position in Fig. 1 at which time the stud or screw 132 is located adjacent the center of motion of the rocker 135, so that notwithstanding the fact that said rocker is oscillated on the motion of the shaft 11, the link 131 is not given sufficient stroke to operate the counter 130. When, however, the lever 33 is moved to running position the stud 132 is carried a distance sufficient from said center of motion as to impart enough stroke to the link 131 to operate the counter, it being understood that the rocker is operated by the rod 136, and the latter in turn by the lever 111. As already described said lever 111 is rocked by the joint action of the cam 114 and spring 115. It will be understood that when the latch 40 is tripped

in the manner already described, the lever 33 is returned to its original position by the spring 53 and at the same time the counter 130 is thrown out of action.

When the controlling or hand lever 33 is in its original position as shown in Fig. 1 and there held by the latch 40, the paper will not be fed; ink will not be supplied and the form will not be operated, notwithstanding the fact that the shaft 11 may be in operation. To start the machine the lever 33 is advanced first to its fourth position and then it is as all the working parts controlled thereby, put in action which places certain trip mechanism in operative position which is position number three being the running position. When the lever is in said position three, the press will operate and will continue to do so until there is an interruption in the feed of the paper at which point the valve 23 will be closed as already set forth, whereby the piston 18 can draw down the piston 20 to trip the latch 40 and thereby release the lever 33, so that the latter can be returned to its primary position by the power of the spring 53 to throw out of action the force feed, the ink supply, the form controlling mechanism, and the counter, the first mentioned action being accomplished by opening the valve 29 so as to put the passage means between the cylinder 17 and the roller 14 into communication with the atmosphere. It will be understood that when the lever 33 is returned to its original position, the stud 37 elevates the latch 38 to thus open the valve 29.

The foregoing is a concise statement of the action of the machine, and this in connection with the more definite description already given will enable the action of the apparatus to be easily comprehended. We should also state that by the described organization we can feed the sheets without printing or counting and that ink can be supplied without feeding or printing.

While the mechanism described is advantageous in action, we do not restrict ourselves to any of the means set forth as others may be substituted therefor.

There are certain features shown and described in the present application which, however, constitute the basis of a separate copending application filed April 26, 1912, Serial No. 693,358.

What we claim is:

1. The combination of vacuum-creating apparatus, sheet-feeding mechanism involving a suction-feed device, a connection between the vacuum-creating apparatus and the suction-feed device, having an opening to atmosphere, a valve for said opening, adapted when closed to permit the formation of a vacuum in said suction-feed device and when open to prevent the formation of such vacuum, a duct leading from the vacuum-creating apparatus, having an opening to atmosphere, a valve for controlling said second opening and adapted to be held open by the sheets during normal feed and automatically closable on abnormal feed of the sheets, and mechanism for automatically opening said first valve on the closing of the second valve.

2. The combination of vacuum-creating apparatus, sheet-feeding mechanism involving a suction-feed device, a connection between the vacuum-creating apparatus and the suction-feed device, having an opening to atmosphere, a valve for said opening adapted when closed to permit the formation of a vacuum in said suction-feed device and when open to prevent the formation of such vacuum, a duct leading from the vacuum-creating apparatus, having an opening to atmosphere, a valve for controlling said second opening and adapted to be held open by the sheets during normal feed and automatically closable on abnormal feed of the sheets, a controlling member, means for shifting said controlling member, means for normally preventing shifting movement of said controlling member, and mechanism for automatically opening said first valve on the closing of the second valve and for effecting approximately simultaneously the release of said controlling member.

3. The combination of sheet feeding means involving a suction feed device, a cylinder, a reciprocative piston in said cylinder, passage means connecting the cylinder and the suction feed device, having an opening to atmosphere, between the cylinder and the suction feed device, a valve for said opening, adapted when closed to permit the formation of a vacuum in said suction feed device and when open to prevent the formation of such vacuum, a vacuum-creating member, a duct connected with said vacuum-creating member, a valve controlling the inlet of said duct, means for maintaining said second valve open during normal feed, and means for automatically opening the first valve on the closing of the second valve.

4. The combination of vacuum-creating apparatus, sheet-feeding mechanism involving a suction-feed device, a connection between the vacuum-creating apparatus and the suction-feed device having an opening to atmosphere, a valve for said opening adapted when closed to permit the formation of a vacuum in said suction-feed device, and when open to prevent the formation of such vacuum, a device for opening said valve, a latch acting against said valve-opening device, a duct leading from the vacuum-creating apparatus, having an opening to atmosphere, a valve for controlling said second opening and adapted to be held open by the sheets during normal feed and automatically clos-

able on abnormal feed of the sheets, and mechanism for automatically tripping said latch on the closing of the second valve.

5. The combination of sheet feeding means involving a suction feed device, a cylinder, a reciprocative piston in said cylinder, passage means connecting the cylinder and the suction device, having an opening to atmosphere between the cylinder and the suction feed device, a valve for said opening adapted when closed to permit the formation of a vacuum in said suction feed device and when open to prevent the formation of such vacuum, a vacuum creating member, a duct connected with said vacuum creating member, a valve controlling the inlet of said duct, means for maintaining said second valve open during normal feed, a member spring operable in one direction, provided with means for opening said first valve, a latch for holding said spring operable member against movement by its spring, and means for tripping said latch on the closing of the second valve.

6. The combination of sheet feeding means involving a suction feed device, a cylinder, a reciprocative piston in said cylinder, passage means connecting the cylinder and the suction feed device, having an opening to atmosphere, between the cylinder and the suction feed device, a valve for said opening adapted when closed to permit the formation of a vacuum in said suction feed device and when open to prevent the formation of such vacuum, a member having a loose connection with said valve, a second member provided with means acting against the first member to open said valve, means for preventing shifting and valve opening movement of said second member during normal feed, and means for effecting the release of said second member and the consequent opening of said valve on abnormal feed.

7. The combination of sheet feeding means involving a suction feed device, a cylinder, a reciprocative piston in said cylinder, passage means connecting the cylinder and the suction feed device, having an opening to atmosphere, between the cylinder and the suction feed device, a valve for said opening adapted when closed to permit the formation of a vacuum in said suction feed device and when open to prevent the formation of such vacuum, a lever, means coöperative with the lever for causing the closing of said valve when the lever is moved from its original to a shifted position, and for opening said valve when the lever is returned to its original position, a latch engaging the lever to hold the same in its shifted position, means for tripping said latch to release the lever on abnormal feed, and means for returning said lever to its original position when the latch is tripped.

8. The combination of a vacuum-creating device, sheet feeding mechanism involving a suction feed device, a connection between said vacuum-creating device and the suction feed device, having an opening to atmosphere, a valve for said opening, a second vacuum-creating device, a duct leading from the second vacuum creating device, having an opening to atmosphere, a valve for controlling said second opening and adapted to be held open by the sheets during normal feed and automatically closable on abnormal feed of the sheets, and mechanism for automatically opening the first valve on the closing of the second valve.

9. The combination of sheet feeding mechanism involving a suction feed device, passage means extending from said suction feed device, having an opening to atmosphere, a valve for said opening, a duct having an opening to atmosphere, a valve for said second opening, adapted to be held open by the sheets during normal feed and automatically closable on abnormal feed of the sheets, means for exhausting the air from said duct and for simultaneously exhausting the air from said passage means, the opening of the latter being between the place at which the air is exhausted from said passage means and said suction feed device, and mechanism for automatically opening the first valve on the closing of the second valve.

In testimony whereof we affix our signatures in presence of two witnesses.

EDWARD J. F. REA.
CHARLES E. CLARK.

Witnesses:
WM. GRISWOLD,
LOUISE A. SEXTON.