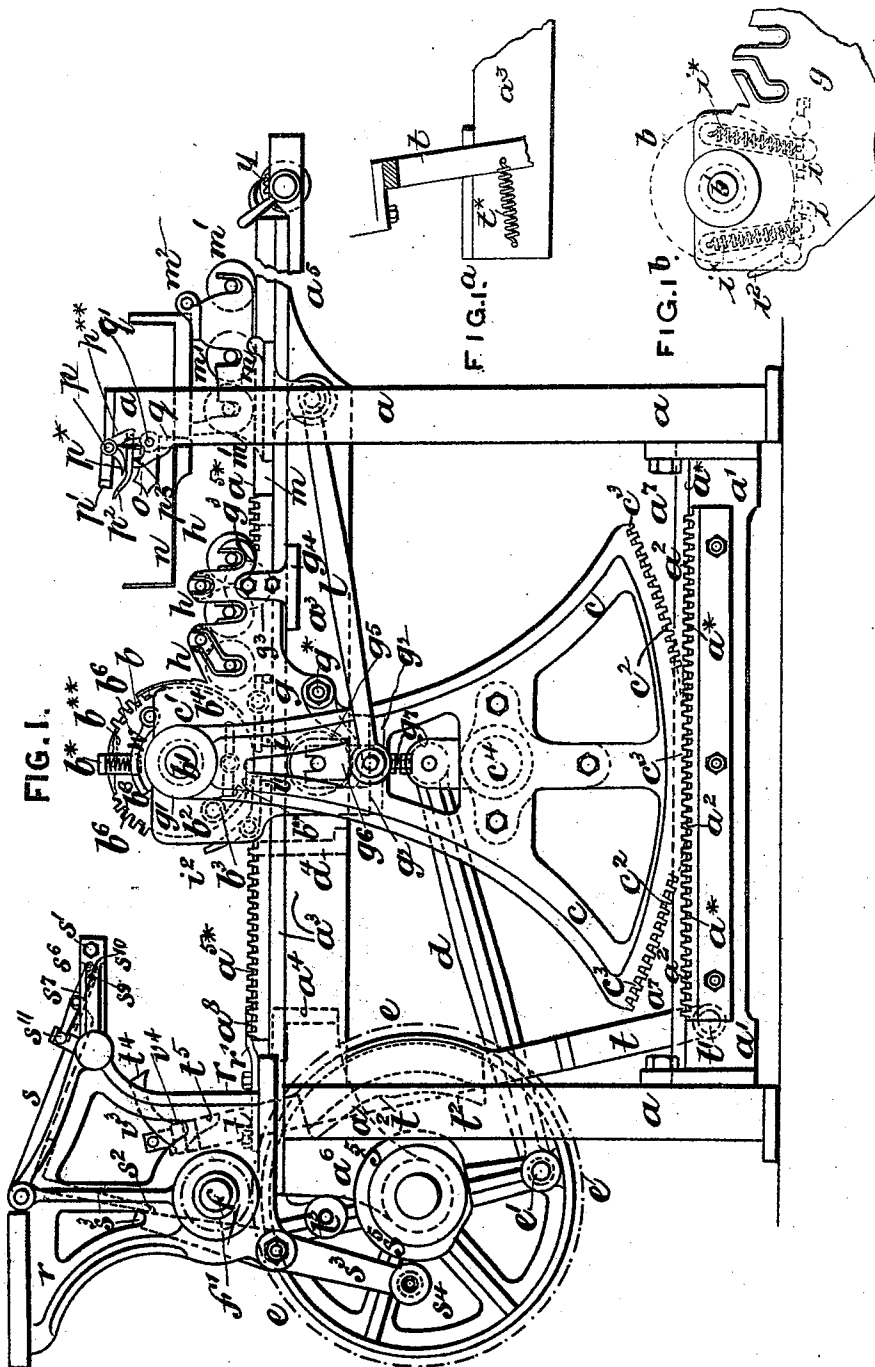


C. BUTTERFIELD.

TRAVELING CYLINDER PRINTING MACHINE.

No. 516,913.

Patented Mar. 20, 1894.



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Edward L. Knight.

Inventor:
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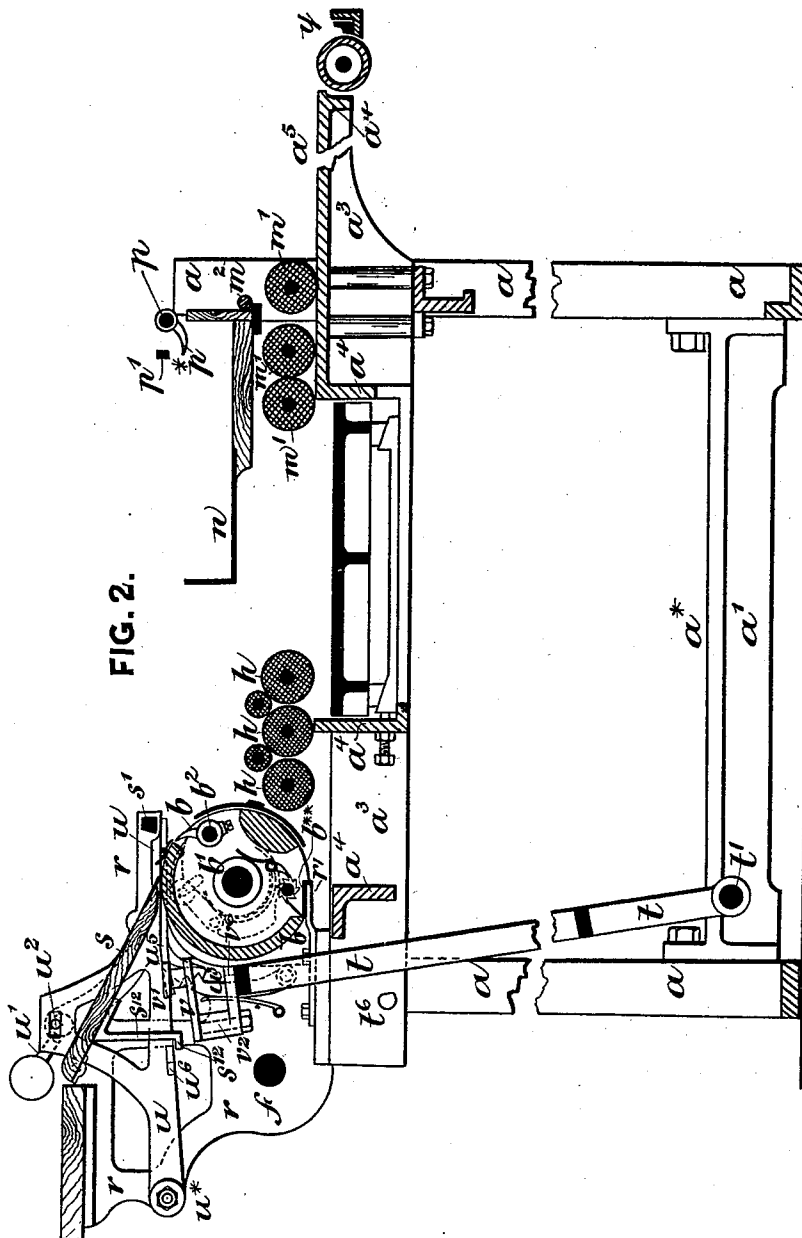


FIG. 2.

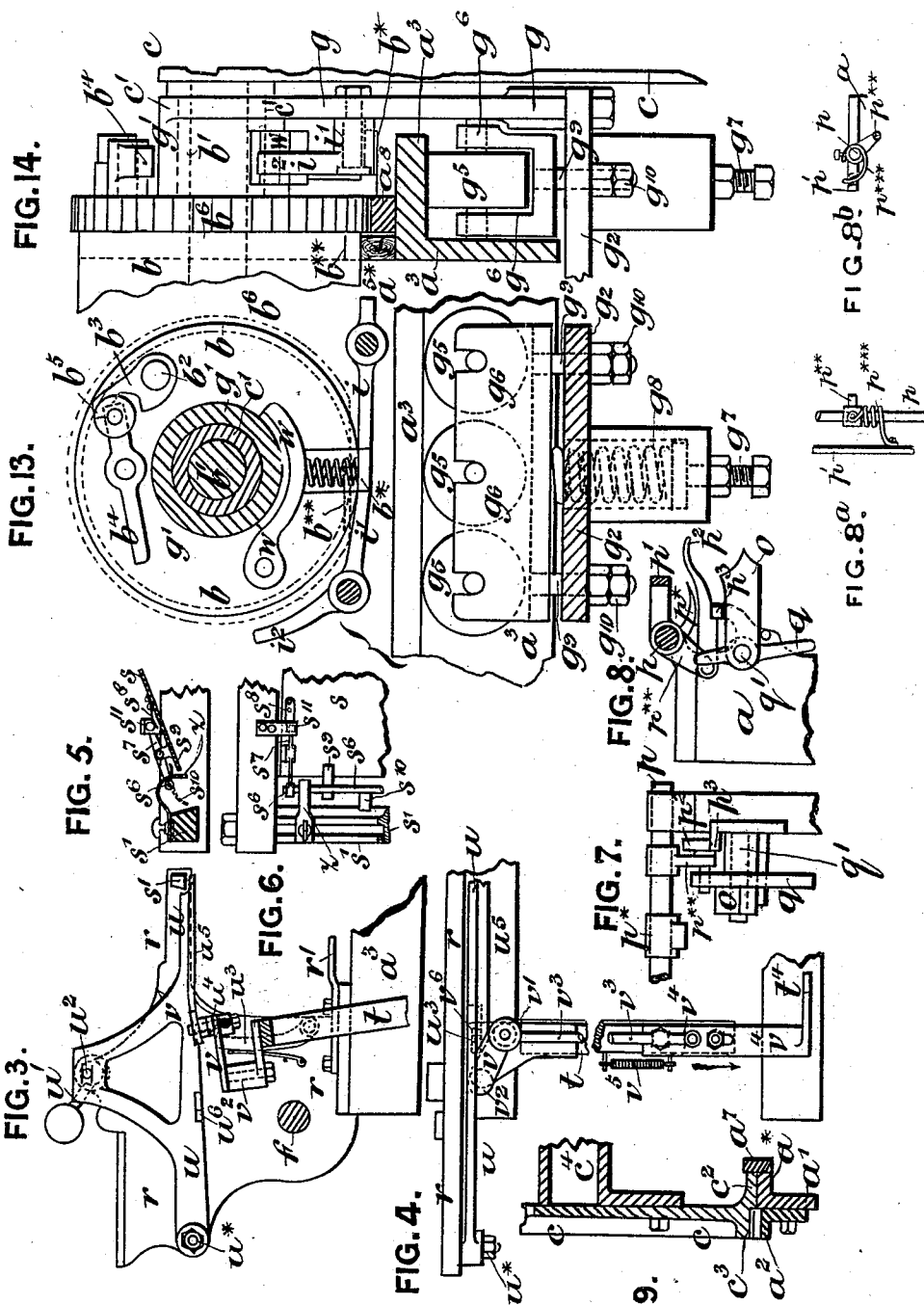
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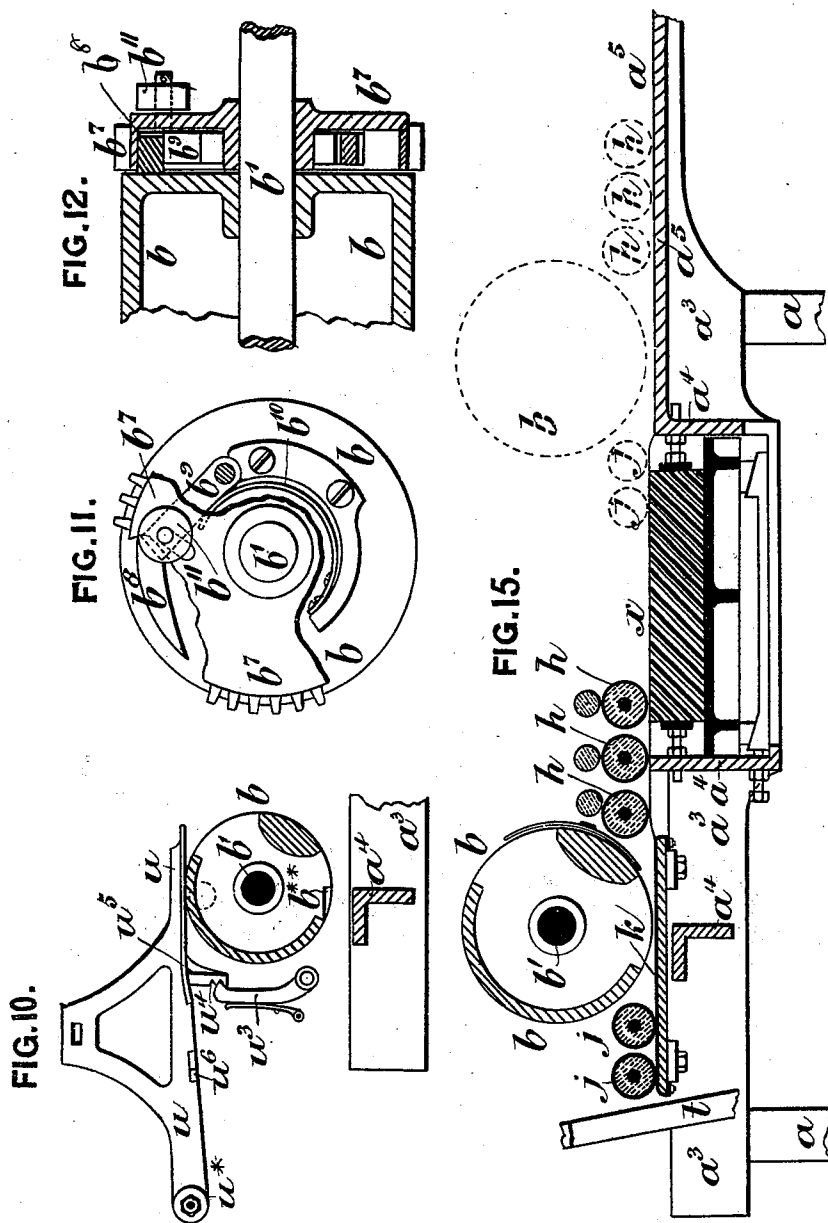
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UNITED STATES PATENT OFFICE.

CHARLES BUTTERFIELD, OF NOTTINGHAM, ENGLAND.

TRAVELING-CYLINDER PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 516,913, dated March 20, 1894.

Application filed March 7, 1893. Serial No. 464,930. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BUTTERFIELD, a subject of the Queen of Great Britain, residing at 181 Pym Street, in the town and county of Nottingham, England, have invented certain new and useful Improvements in Traveling-Cylinder Printing-Machines, of which the following is a specification, reference being made to the accompanying drawings, and to the letters marked thereon.

The invention has for its object improvements in that description of cylinder printing machines in which the type bed or lithographic stone is held stationary while the cylinder having the paper thereon and the damping and inking rollers are caused to traverse to and fro over the type bed or lithographic stone, the cylinder being rotated when traveling in the direction for printing and being held stationary when traveling in the contrary direction after the printing has been effected.

My present invention relates to various improvements whereby such description of machines is rendered much firmer and the various operations more certain and effective than heretofore.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a letterpress printing machine constructed according to my invention. Figs. 1^a and 1^b are detail side views. Fig. 2 is a longitudinal section of the machine. Fig. 3 is a sectional elevation and Fig. 4 is a plan of parts for "throwing the impression" on and off. Fig. 5 is a sectional elevation and Fig. 6 is a plan of parts at the lower edge of the feed table for presenting the lower edge of the sheet in a proper direction to be taken by the cylinder grippers. Fig. 7 is a front elevation and Fig. 8 is a sectional elevation of parts showing the retainer, and parts for actuating the same, for seizing the edge of the printed sheet as presented to it by the cylinder and for delivering it to the receiving table. Fig. 8^a is a detail plan view and Fig. 8^b is a detail side view of parts of the sheet-retainer. Fig. 9 is a cross section of one of the segments, its rack, carrying rail and guide. Fig. 10 is a sectional elevation of parts for holding up or down the lever controlling the apparatus

for "throwing the impression" on and off. Fig. 11 is an end elevation of the impression cylinder with its loose toothed wheel broken away in order to show the catch arrangement, and Fig. 12 is a longitudinal section of the same. Fig. 13 is a longitudinal section and Fig. 14 is a cross section showing the impression cylinder, locking arrangement, brake, trip lever, gripper bar lever, and a slight modification of parts for holding the impression cylinder down to the machine side rails, which modification is more applicable to lithographic printing machines, and Fig. 15 is a longitudinal section representing a modification of the machine when adapted for lithographic work.

In all the figures like parts are indicated by similar letters of reference.

I construct the frame of the machine with two end standards *a a*, connected together at their lower parts by longitudinal rails *a'* provided with toothed racks *a²*. The upper parts of the end standards *a a* carry the bed of the machine, which latter consists of a rail *a³* on each side of the length of the machine, cross bars *a⁴ a⁴*, ink slab *a⁵* and bearings *a⁶* for the shaft of the large driving toothed wheel, cast together. The axis *b'* of the impression cylinder *b* is carried at its ends in bearings *c'*, forming the axes of motion of segments *c*, the rims of which are provided with plain surfaces *c²* to run on the plain or flat portions *a^{*}* of the rails *a'*, and with teeth *c³* to gear into the toothed racks *a²*. These segments *c* are connected together firmly by a cross rail *c⁴* under the bed of the machine, and such cross rail *c⁴* is connected by a link *d* to a crank pin *e'* on a toothed wheel *e* driven by a pinion *f'* on the driving axis *f*. The necks of the axis *b'* of the impression cylinder *b* pass through the bearings or hollow axes *c'* of the segments *c*, and such bearings *c'* also pass through bearings *g'* attached to a frame consisting of side rails *g* and a cross bar *g²* fixed rigidly together and carrying the inking rollers *h* and stops *i i'* for holding the cylinder *b* fast in its return traverse over the type bed or lithographic stone, having springs *i^{*}* located on the back of the side rails *g*, and partly recessed therein and connected at one end to said side rails and at the other end to the

stops i , i' , and such frame also carries, when used for lithographic purposes, the damping rollers j represented at Fig. 15, in which case the bed $a^3 a^4$ of the machine carries a damper k , in contact with which the damping rollers j run during part of their to and fro motion. The inking rollers, when not supported by the ink slab, run over wood rails a^{5*} resting on the side rails a^3 . The side rails g of said frame run mainly clear of the side rails a^3 of the machine bed, but the rear ends thereof rest, by the rollers g^3 , upon the machine side rails a^3 , and such rear ends of the side rails g are held down to the machine side rails a^3 by the brackets or clamps g^4 . The impression cylinder b is held down to the side rails a^3 by adjustable clamps fixed to the cross bar g^2 , and each consisting, according to the arrangement represented at Fig. 1, of a friction roller g^5 carried by a bracket g^6 pivoted at g^* , which bracket is adjustable in height by means of a screw g^7 passing through the cross bar g^2 .

In the modification shown at Figs. 13 and 14, the adjustable brackets or frames g^6 each carry three friction rollers g^5 , of which latter more or less may be used, and said brackets or frames, instead of being acted upon directly by the screws g^7 have springs g^8 interposed between said screws and brackets or frames, while the latter are limited in their upward motion by screws g^9 fixed to said brackets and passing loosely through holes in the cross bar g^2 , nuts g^{10} being screwed on to the lower ends of such screws. By the above arrangement the principal weight of the cylinder and its frame is carried by the segments c resting on the flat parts a^* of the lower rails a' .

The rails a' are provided with flanges a^7 to retain the segments c in correct position and consequently prevent endwise motion to the impression cylinder b and other parts moving therewith. As an alternative the segments c may be provided with flanges, or the frames g may be provided with guides working against the side rails a^3 . By the above described arrangement of driving mechanism a smoother and more balanced motion is given to the cylinder b and other parts than heretofore.

The segments c are connected by links l to a frame m carrying the distributing rollers m' , receiving table or board n , and arm or pin m^2 for releasing the sheet retainer at the required time to cause the printed sheet to fall on to the said table or board n .

The impression cylinder b is provided with a gripper bar b^2 , on one end of which is a lever b^3 , which is operated by a trip lever b^4 at each end of the traverse of the impression cylinder b in the following manner. The frame uprights a , carrying the sheet retainer, also carry a lever cam o , which, by the pressure against the lower side thereof of the impression cylinder bearing or other part moving with it, is caused, by its upper part, to act upon the truck b^5 , and thereby to give a quick

motion to the trip lever b^4 , which latter, by acting upon the lever b^3 gives a partial rotary motion to the impression cylinder gripper shaft b^2 , and thereby releases the paper on the impression cylinder b at the precise moment when the movable jaw p^* of the sheet retainer is caused to close against the fixed bar or jaw p' to grip the paper. This closing action of the jaw p^* is effected by the top side of the truck b^5 coming against the under side of the lever catch p^3 hereinafter described.

The sheet retainer consists of the fixed bar p' and the spring gripper bar p , which are carried by brackets or extensions of uprights a of the machine frame, or such parts may be carried by brackets fixed to the machine bed side bars a^3 ; the spring gripper bar p is provided with a spring p^{***} coiled around the bar, one end of the spring being fastened to a screw on an arm p^{**} , and at the other end to the bar p' . The arm p^{**} is located on the spring gripper bar and is fitted with a catch p^2 pivoted thereto, and such catch acts in connection with a fixed stop p^3 , so that when required the grippers p^* of the spring gripper bar p can be held away from the fixed jaw or bar p' of the sheet retainer and, at the moment when the paper is released from the impression cylinder, the truck b^5 of the afore-said trip lever b^4 acts upon the pivoted catch p^2 as above described to release it from the fixed stop p^3 and thereby permit the grippers p^* of the spring gripper bar p to close against the fixed jaw or bar p' of the sheet retainer. In the forward motion of the frame m carrying the distributing rollers m' , &c., a fixed arm or pin m^2 on such frame acts against one end of a lever q , the other end of which acts to move the grippers p^* of the spring gripper bar p away from the fixed bar or jaw p' to release the printed sheet and at the same time places the pivoted catch p^2 against the stop p^3 to keep the sheet retainer open until, on the return of the impression cylinder b , it is again released to cause the sheet retainer to grip a fresh printed sheet. The lever q works on a fixed axle q' in the standard (the same axle carries the arm o for opening the grippers on the impression cylinder). The pin m^2 by moving with the rollers m and receiving table or board n comes into contact with the lower end of the lever q the upper end of which moves back the arm p^{**} thereby turning the shaft p , and removing the grippers p^* from the fixed bar p' to release the sheet, the lower end of the arm p^{**} carries the catch p^2 which drops against the fixed stop p^3 fastened to the standard and holds the grippers p^* open until the next sheet is to be gripped, then by raising the catch p^2 the spring p^{***} causes the grippers p^* to close on the sheet.

The front of the machine has brackets r standing up therefrom, and to these brackets the feed table s is pivoted. The lower edge of the feed table s is a short distance away from a fixed stop or bar s' , against which the

blank sheet of paper is fed. The lower edge of the feed table *s* has a dipping motion imparted thereto by its own weight acting in combination with the following parts.

5 The feed table *s* has connected thereto an arm *s*², which rest against one end of a lever *s*³, whose other end rests, by a truck or roller *s*⁴, against a cam *s*⁵; thus the cam *s*⁵ causes the feed table *s* to be raised to its upper position
10 when a sheet of paper is to be fed on to the same, so that the lower edge of the sheet, when fed on to the table, will slide down and rest against the fixed bar or stop *s*⁶; then, when it is desired to lower the sheet to the
15 position for it to be taken by the impression cylinder grippers, the cam *s*⁵ allows the feed table *s* to dip by its own weight. The lower edge of the feed table *s* has a bar *s*⁶ carried at the rear ends of levers *s*⁷ pivoted to brackets
20 fixed to said table and at a short distance beyond the lower edge of the latter; this bar *s*⁶ is acted upon by a spring *s*⁸ to cause it to dip in relation to the lower edge of the feed table when required, so that fingers *s*⁹ there-
25 on shall grip the sheet of paper on such feed table, and other fingers *s*¹⁰ shall cause the lower edge of the sheet to be depressed into position to be securely gripped by the impression cylinder grippers. The feed table
30 *s*, in rising, brings the front end of one of the pivoted arms *s*⁷ carrying the spring finger bar *s*⁶ against a fixed stop *s*¹¹ and thereby raises such pivoted finger bar *s*⁶ into position to enable a fresh sheet of paper to be fed on to the
35 feed table *s* against the fixed stop *s*¹¹. This arrangement of parts for presenting the lower edge of the blank sheet to the impression cylinder grippers is also applicable to other cylinder printing machines.
40 A lever frame *t* is mounted on axes *t*¹ at the lower part of the front of the machine framing and a cam *t*² fixed to one arm of the lever frame *t* is acted upon by a roller *t*³ carried by the toothed wheel *e*, so as to move the said lever frame *t* in one direction, the weight of the
45 frame *t*, assisted by a spring *t*⁴ acting to move it in the opposite direction until such frame comes to rest against a stop *t*⁵. This lever frame *t* carries, as will be hereinafter described, a finger *t*⁴, which, by acting on the under side of the plain end of the trip lever
50 *b*⁴, releases the impression cylinder grippers *b*³ at the required time to cause them to grip the lower edge of the sheet of paper as the latter is presented to the impression cylinder, and the lever frame *t* also carries, as will be hereinafter described, a lever pusher *t*⁵, which, at the moment after the impression cylinder
55 grippers have seized the sheet of paper, pushes the lever arm *i*² of the stop *i*¹ and releases the impression cylinder, thereby enabling it to rotate during its traverse motion for printing. One of the brackets *r* has pivoted thereto at *u*⁶, a lever *u*, which, by means of a
60 weighted tumbler lever *u*¹ and eccentric *u*², is capable of being raised and lowered at its free end, thereby enabling the impression to be

thrown off or on as may be required in the following manner. A spring catch *u*³ acts in one or other of the notches *u*⁴ of the lever *u* to
70 hold the latter in whichever position it is left by the tumbler lever *u*¹. The lever *u* has fixed thereto a cam *u*⁵, the front end of which is formed to act against a truck *v*¹ carried by one end of a lever *v*, whose other end is piv-
75 oted at *v*² on a projection from the lever frame *t*, and such lever *v* is connected by link *v*³ to a sliding bar *v*⁴, which carries at one end the finger *t*⁴ and lever pusher *t*⁵. The cam *u*⁵ will, when in position to do so, act upon the truck
80 *v*¹ to push the sliding bar *v*⁴ in the direction shown by the arrow and, when in its extreme position in such direction, the finger *t*⁴ and lever pusher *t*⁵ are in position to act respect-
85 ively upon the trip lever *b*⁴ and the lever *i*² of the stop *i*¹, but when the lever *u* is lowered so that the cam *u*⁵ is below the plane of the truck *v*¹, such cam will miss the said truck in the forward motion of the lever frame *t*, and
90 the spring *v*⁵ will, when the lever frame *t* is nearly in its most backward position, pull the bar *v*⁴ in the contrary direction to that of the arrow into position for the finger *t*⁴ and lever
95 pusher *t*⁵ to miss the trip lever *b*⁴ and lever *i*² of the top *i*. As the lever frame *t* approaches nearly to its most backward position, a pro-
jection *v*⁶ acts against the spring catch *u*³ to release it from the teeth *u*⁴, at which time the lever *u* can be either raised or lowered as
100 required. When the lever *u* is in its raised position, the various parts controlling the throwing off or on of the impression, are acted upon for throwing on the impression, but when the
105 lever *u* is in its lowermost position, the various parts above referred to are acted upon for throwing off the impression. The lever *u* also, when in its lowered position, brings a
stop *u*⁶ thereon into position for an arm *s*¹² on the under side of the table *s* to rest against
110 the same, by which means the dipping of said table *s* is prevented, thereby preventing the delivery of a blank sheet of paper to the impression cylinder grippers at the time when the impression is thrown off.

The impression cylinder *b* has fixed on one
115 end thereof, a toothed wheel *b*⁶, which has a few teeth cut away or absent on one side thereof; on the other end of the axis of said impression cylinder is mounted a toothed
120 wheel *b*⁷, both of which wheels gear into racks *a*⁸ fixed on the side bars *a*³, and such wheel *b*⁷ is provided with the following arrangement of parts for enabling it to give motion to the impression cylinder and to run free thereof at the required times.
125

On the end of the impression cylinder *b* is fixed a projection *b*⁸ and pivoted to the wheel
130 *b*⁷ is an arm *b*⁹, which is acted upon by a spring *b*¹⁰ to place it in the position shown by Fig. 11, in which position said arm *b*⁹ will, by pushing against the projection *b*⁸, give rotary motion to the impression cylinder *b*, but when the impression cylinder has arrived at the end of its forward or printing motion and

the return motion commences, the wheel b^7 , still being in gear with one of the racks a^8 , will revolve in the contrary direction, but in doing so the arm b^9 will recede from the projection b^8 till it has completed such revolution, when the arm b^9 will again assume the position shown at Fig. 11 in readiness to give rotary motion to the impression cylinder. If however the lever u has been lowered to throw off the impression, the under side of the cam w^5 will, by pressing on the truck b^{11} , disengage the arm b^9 from the projection b^8 in order to prevent rotary motion being given to the impression cylinder thereby. The wheel b^6 , on the motion of the impression cylinder toward the feed table s , and also when the impression is thrown off, will, by reason of the flat portion thereof being toward the rack a^8 , pass over such rack without gearing therewith.

w is a brake, which may be of any suitable character, and which is used to overcome the momentum of the impression cylinder b and thereby prevent the stop or catch b^* thereon from over-running the spring stops i i' . The impression cylinder b , when permitted by the removal of the stop i' from the catch or stop b^* , is capable of revolving and, when about to complete its revolution to the position shown by Figs. 1 and 13, the catch or stop b^* pushes down the stop i until it just clears the latter, when, by again coming into contact with the stop i' , the impression cylinder is again locked to prevent any rotary motion thereof on its return toward the feed table.

r' is a "pusher home" finger or stop, which is fixed to one of the brackets r or to other part of the machine frame, and which, in the event of the impression cylinder having slightly over-run its correct position, will, by acting against a notch b^{**} in, or a projection on, the impression cylinder b , insure the adjustment of the impression cylinder to its correct position for the gripper to receive a sheet of paper from the feeding table s .

y is an ink duct of any ordinary character. z is a fixed but adjustable "side lay," I hangs below the feed table when the latter is in its raised position and it is used as a guide against which the paper is fed endwise so that the sheet will register.

In the modification shown at Fig. 15, which is arranged for lithographic work, the impression cylinder b and inking rollers h are similar to those of the letter-press machine hereinbefore described, but in addition there are damping rollers j , which travel over a damper k and over the lithographic stone x to the position shown in dotted lines. The bed is also modified as shown for the increased thickness of the stone, and the ink slab a^5 is proportionately extended according to the requirements; the inking rollers are of the character usually employed with lithographic printing machines.

Having fully described my invention, what

I desire to claim and secure by Letters Patent is—

1. The pivoted feed-table constructed with levers, extending a short distance beyond its lower edge, the bar, carried at the rear ends of the levers, having gripping fingers, and depressing fingers, the spring, acting upon the bar, and a fixed stop with which the bar comes in contact; substantially as described.

2. The combination of the fixed racks, the traveling and rotating impression cylinder, a partly toothed wheel fixed to one end of the impression cylinder, a projection fixed to the other end of the impression cylinder, a spring arm on the impression cylinder pushing on the projection, an axis on which the impression cylinder rotates, a toothed wheel on the axis and mechanism for carrying and traversing the impression cylinder; substantially as described.

3. The combination of the fixed racks, the traveling and rotating impression cylinder, a partly toothed wheel fixed to one end of the impression cylinder, a projection fixed to the other end of the impression cylinder, a spring arm on the impression cylinder, pushing on the projection, an axis on which the impression cylinder rotates, a toothed wheel on the axis, mechanism for carrying and traversing the impression cylinder, a truck on the spring arm, and mechanism for engaging the truck to disengage the spring arm from the projection; substantially as described.

4. The combination of the fixed racks, the traveling and rotating impression cylinder, a toothed wheel fixed to one end of the impression cylinder, a gripper-bar, on the impression cylinder, having a lever at one end, a trip-lever on the impression cylinder, for operating the gripper-bar-lever, an axis on which the impression cylinder rotates, a toothed wheel on the axis, a lever-frame having a finger for engaging the trip-lever, mechanism for operating the lever-frame, and mechanism for carrying and traversing the impression-cylinder; substantially as described.

5. The combination of the fixed racks, the traveling and rotating impression cylinder, a partly toothed wheel fixed to one end of the impression cylinder, a catch on the impression cylinder rotates, a toothed wheel on the axis, a lever-frame having a pusher, mechanism for operating the lever-frame, and mechanism, for carrying and traversing the impression cylinder, having side rails carrying spring stops with which the catch engages, one of the stops being provided with a lever-arm with which the pusher engages; substantially as described.

6. The combination of the fixed racks, the traveling and rotating impression cylinder, a toothed wheel fixed to one end of the impression cylinder, a gripper-bar on the impression cylinder, having a lever at one end, a trip-lever on the impression cylinder for op-

erating the gripper-bar lever, having a truck, an axis on which the impression cylinder rotates, a toothed wheel on the axis, the lever-cam acting upon the truck of the trip-lever, and mechanism for carrying and traversing the impression cylinder; substantially as described.

7. The sheet-retainer constructed with a fixed bar p' , a gripper-bar p the stationary brackets to which the fixed-bar and the gripper bar are secured, a spring by which the gripper-bar is rotated, the jaw p^* , secured to the gripper-bar, the arm p^{**} secured to the gripper-bar, a catch p^3 pivoted to the arm of the gripper-bar for holding the jaw open, a fixed stop p^3 with which the catch is engaged and on which it is supported, and means for resetting the catch and the jaw; substantially as described.

8. The sheet-retainer constructed with a fixed bar, a spring-gripper-bar having an arm, a catch pivoted to the arm of the gripper-bar and a fixed stop for the catch, and mechanism for re setting the sheet-retainer consisting of a lever for engaging the arm of the gripper-bar, and a sliding frame having an arm acting on the lever; substantially as described.

9. The combination of the impression cylinder, the segments having bearings in which the ends of the impression cylinder are carried, the cross-bar by which the segments are connected, power mechanism, a link connecting the power mechanism with the cross-bar, a sliding frame for carrying the distributing rollers, and links connecting the sliding frame with the segments above the cross-bar for imparting a slower motion to the sliding frame than to the impression cylinder; substantially as described.

10. The combination of the lever-frame having a spring sliding bar provided with a finger and pusher, a projection on the lever-frame, a lever pivoted to the projection, having a truck, a link connecting the lever with the sliding bar, and a lever pivoted to the frame of the machine; having a cam adapted to engage the truck; substantially as described.

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Witnesses:

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