

(No Model.)

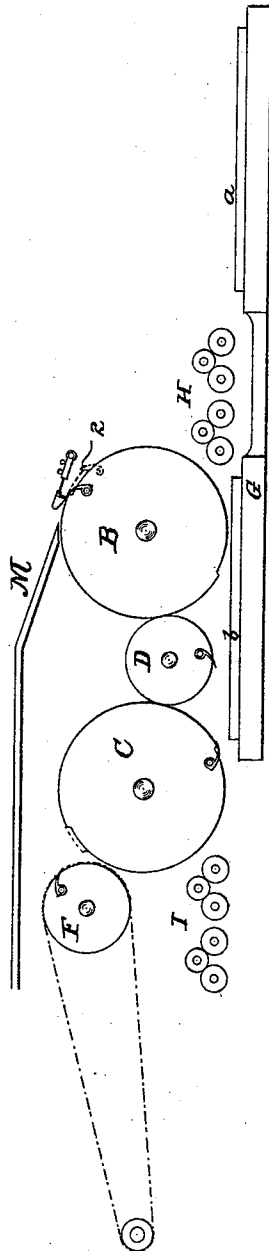
3 Sheets—Sheet 1.

J. BROOKS.
CYLINDER PRINTING MACHINE.

No. 529,702.

Patented Nov. 27, 1894.

Fig. 1.



Witnesses
Chas Hanimann
N. Marler

Inventor
John Brooks
By his Attorney
E. H. Graham

(No Model.)

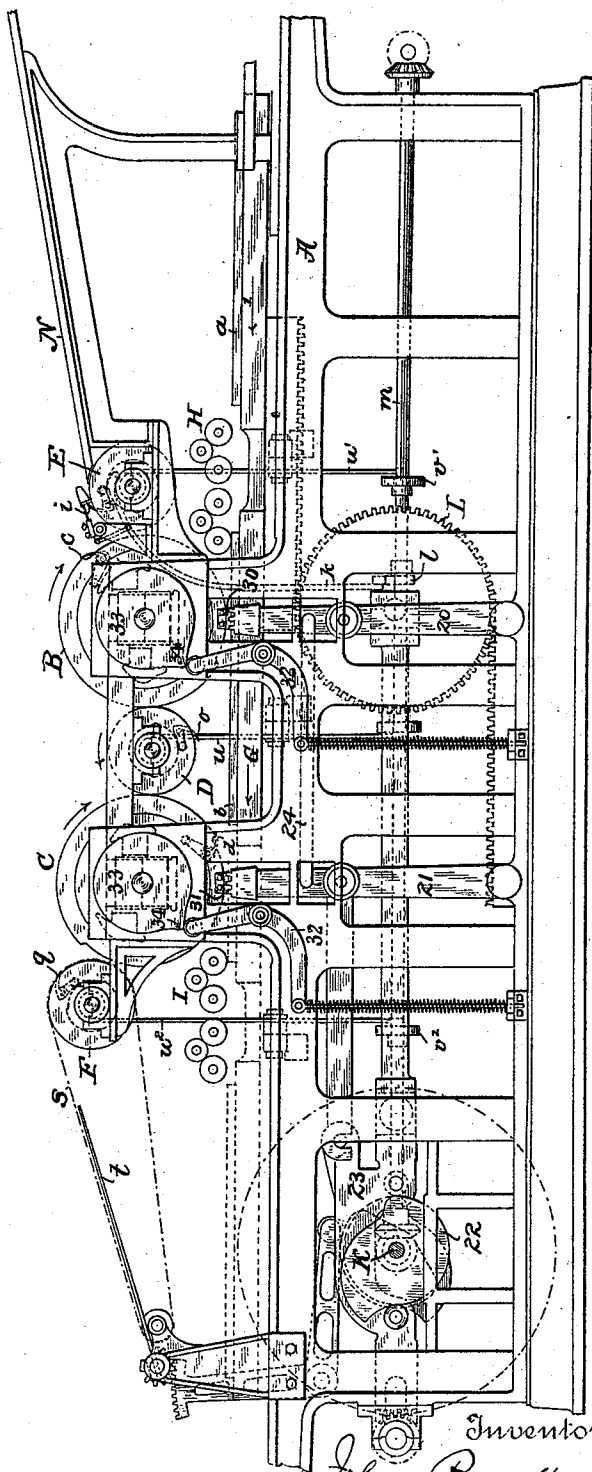
3 Sheets—Sheet 2.

J. BROOKS.
CYLINDER PRINTING MACHINE.

No. 529,702.

Patented Nov. 27, 1894.

Fig. 2.



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J. BROOKS.
CYLINDER PRINTING MACHINE.

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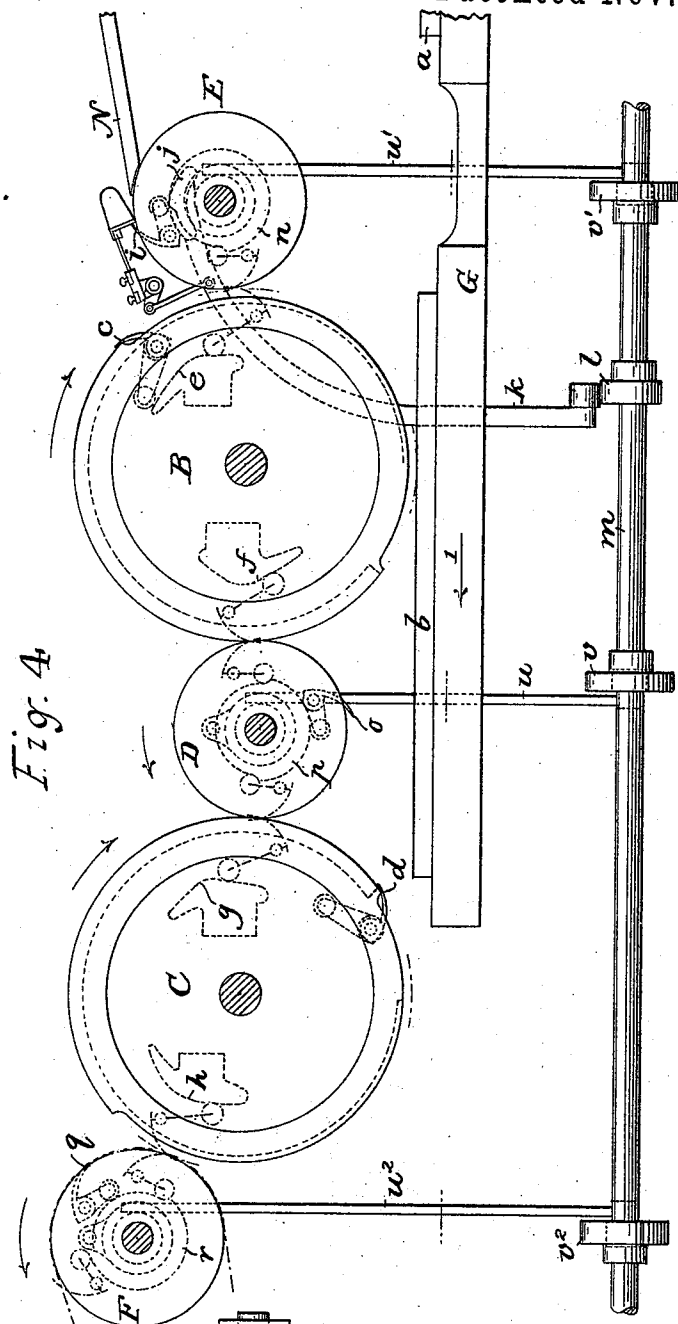


Fig. 4

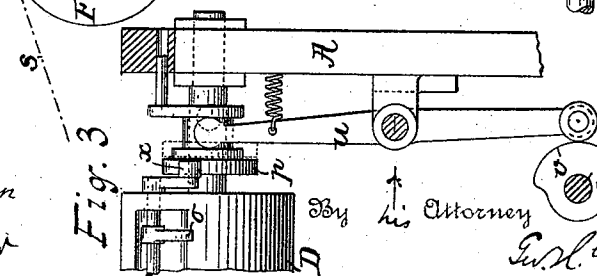


Fig. 3

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UNITED STATES PATENT OFFICE.

JOHN BROOKS, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO CHARLES POTTER, JR., HORACE W. FISH, JOSEPH M. TITSWORTH, AND DAVID E. TITSWORTH, OF NEW YORK, N. Y.

CYLINDER PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 529,702, dated November 27, 1894.

Application filed August 13, 1891. Serial No. 402,515. (No model.)

To all whom it may concern:

Be it known that I, JOHN BROOKS, a citizen of the United States, residing at Plainfield, county of Union, and State of New Jersey,

5 have invented certain new and useful Improvements in Cylinder Printing-Machines, fully set forth in the following description and represented in the accompanying drawings.

This invention relates to stop cylinder 10 printing machines, and while particularly adapted to that class of such machines known as color presses or in which the sheet after receiving one impression is transferred the same side upmost to another impression cylinder 15 to receive another impression on the same side, embraces improvements equally applicable to other forms or styles of cylinder printing machines.

The object of the present invention, among 20 other things, is to increase the capacity of cylinder printing machines so far as enabling the printing of larger length of sheets without increasing the diameter of the impression cylinder or cylinders, and without increasing the 25 size of the machine; and in the class of color presses referred to having this increased capacity, adapt the transfer cylinder, of less diameter than the impression cylinder, to take the sheet from the first impression cylinder 30 and transfer it to the other cylinder in proper register without interference with the co-operating devices, such as the grippers of the transfer cylinder and the impression surface of the impression cylinder. It also has for its 35 object to provide a stop motion applicable to two-cylinder machines as well as to the particular class of color presses referred to.

To these ends the invention consists in the novel construction, combination and arrangement 40 of parts hereinafter fully set forth, reference being had to the accompanying drawings, which illustrate a practical embodiment thereof.

In said drawings:—Figure 1, is a diagram 45 illustrating the old form of color press with dotted lines showing the increased length of the impression surface. Fig. 2, is a side elevation of a color press provided with the improvements. Fig. 3, is an enlarged cross section, showing in detail the manner of moving 50

the gripper-cam. Fig. 4, is an enlarged view of the cylinders and operative connections of Fig. 2, the frame being omitted.

The various parts of the cylinder printing machine, Fig. 2, are mounted in a suitable 55 frame A, provided with bearings for the first and second impression cylinders B, C, respectively, the transfer cylinder D, the feed cylinder E and the delivery cylinder F. With the impression cylinders there co-operates a bed 60 G, carrying two forms *a, b*, one of which forms is inked by the sets of ink rollers H and the other by a similar set of ink rollers I. The bed is reciprocated in the usual manner back and forth from a crank on the main shaft K, 65 imparting motion to a traveling gear L which engages with the usual rack on the underside of the bed and with a stationary rack at the base of the machine; and the usual rack (not shown) on the bed co-operates with toothed 70 segments (not shown) on each of the impression cylinders as common.

As shown in diagram Fig. 1, a press provided with a similar arrangement of cylinders, lacking the feed cylinder, has a feed 75 board M, leading direct to the first impression cylinder, so that sheets are fed directly to the grippers of the first impression cylinder therefrom.

In practice machines of the character illustrated, as most commonly built, have been 80 limited to print a sheet only equal to, or less than one-half of, the circumference of the impression cylinder, and hence to print a larger sheet, a larger machine was needed having 85 cylinders of a correspondingly greater diameter, a longer length of forms, an increased length of machine and an increased travel of the bed. In such machine if an attempt be made to increase the length of the impression 90 surface by, for instance, adding to the forward end of said surface, indicated by dotted lines 2, Fig. 1, the grippers *c*, would be brought to rest out of reach of the head of the sheet on the feed board, so that the feed board 95 would be useless; and on the other hand, if it be increased at the tail end of the impression surface, such increase would be liable to strike the form and would allow the tail end of the sheet to drag on the form on the 100

return of the bed. Again, if either mode of increase be possible, in color presses, it would result in rendering the transfer cylinder inoperative in that as it makes two revolutions to one of the impression cylinders, its grippers in the idle revolution of the transfer cylinder would strike the impression surface of the cylinders, as would those of the delivery cylinder strike the surface of the second impression cylinder, breaking them as well as destroying the sheet; and if the transfer cylinder be increased in circumference equal to such increased impression surface, its proportions to that of the impression cylinders would render it useless, except it be the same diameter, in which case it would unduly increase the size of the machine.

By the improved construction now to be described this increased or lengthened impression surface is rendered possible, obviating the difficulties heretofore encountered in attempting this result. In this construction, see Fig. 2, I dispense with the usual feed board leading directly to the first impression cylinder, and employ in lieu thereof the feed cylinder E and feed board N, and in color presses in combining with such impression cylinders having the increased impression surfaces the transfer cylinder of its usual size,—one half the diameter of the impression cylinders—the grippers whereof are rendered inoperative at every alternate revolution of the cylinder as well as those of the feed and delivery cylinders, when these cylinders are used, as will now be explained in greater detail. Each of the impression cylinders is provided with the usual set of grippers *c, d*, respectively, held closed by a spring, the grippers *c* being opened to take the sheet from the feed cylinder by the stationary cam *e* and again opened to release the sheet as it is taken by the transfer cylinder by the stationary cam *f*. In like manner the grippers *d* are opened to receive and take the sheet from the transfer cylinder by the stationary cam *g* and are opened to release and deliver the sheet by a like cam *h*. The feed cylinder E is also provided with a set of grippers *i*, opened by a movable cam *j*, mounted at the end of a vertically moving arm *k*, operated at the proper time to allow the grippers to close before the cylinder moves by a suitably shaped cam *l*, upon the longitudinal cam shaft *m*; and these grippers *i* are opened to release the sheet and deliver it to the first impression cylinder by a cam *n*. The transfer cylinder D is likewise provided with a set of grippers *o*, which are opened to receive and take the sheet from the grippers of the first impression cylinder by the cam *p*, and are opened by the same cam to release the sheet to permit it to be taken by the grippers of the second impression cylinder C. The delivery cylinder also carries a set of grippers *q*, that are operated to open, to receive and take the sheet from the grippers of the second impression cylinder by a cam *r*, and are again opened by the same cam to deliver the

sheet onto the delivery tapes *s*, which carry the sheet over the usual fly *t*, which in the usual manner flies the sheet onto a suitable receiving piling table.

In order to render the grippers of the transfer cylinder inoperative during each alternate revolution of that cylinder, the gripper-cam *p* is movable out of the path of the gripper arm roll *x*. For this purpose said cam is mounted loosely upon the transfer cylinder shaft and is adapted to slide on suitable guides into and from operative relation with the gripper arm roll, moved by a pivoted arm *u* that is acted upon in proper time by a cam *v*, on the longitudinal shaft *m*.

The opening cam *n*, for the grippers of the feed cylinder and the similar cam *r* for the grippers of the delivery cylinder are similarly mounted to slide to and from operative relation with their respective gripper arm rolls, through pivoted arms *u'*, *u''*, and properly timed cams *v'*, *v''*, on the shaft *m*. The bed *G*, is of the same length and has the same extent of travel as usual in machines without the increased length of impression surfaces, thus preserving the usual crank throw, the forms *a, b*, only being increased in size to correspond to such enlarged impression surfaces.

As so far described the operation of the machine is as follows: A sheet on the feed board is taken by the grippers of the feed cylinder E, and in the rotation of said grippers is carried onward to the grippers of the first impression cylinder B, which then carry the sheet to the plane of impression with the form *a*, the bed reciprocating in the direction of the arrow 1. As soon as the head of the once printed sheet reaches the transfer cylinder D, its grippers grasp it and carry it around with said cylinder to the grippers of the second impression cylinder C and after carrying said sheet onward therewith for a short distance toward the plane of impression with the second form *b*, is, in this form of machine, stopped by the stop mechanism hereinafter described, in the position shown in full lines Fig. 1, the other cylinder being likewise arrested. During the stoppage of the impression cylinders, the bed with the forms returns idly to its normal position ready on the rotation of the impression cylinders to again move forward in the direction of the arrow 1. A second sheet is then likewise fed to the grippers of the feed cylinder, taken by the first impression cylinder and printed upon by the form *a*. While this second sheet is moving forward to be printed, the first sheet—then being gripped by the grippers of the second impression cylinder and extending over the transverse cylinder and lying partially against the rear side of the first impression cylinder—is carried onward into the plane of impression with the second form *b*, receives a second impression and is thence delivered to any suitable delivery or folding mechanism, as for instance to the grippers of the delivery cylinder F and finally piled upon

the table. During this time the said second sheet is carried into the plane of impression with the first form *a*, is once printed and taken by the grippers of the transfer cylinder, when the operations are repeated. The point of rest of the impression cylinders B, C, is such that the grippers of the second impression cylinder are below the horizontal axis of the cylinders, while those of the first impression cylinder are above said axis, and thus the once printed sheet, within the grasp of the second impression cylinder grippers, receives its second impression earlier than the succeeding sheet receives its first impression.

Between each feed of the sheets to the grippers of the first impression cylinder, the feed cylinder E makes an idle revolution—that is to say, it receives and carries a sheet once every two revolutions of that cylinder, so that during its first revolution the grippers are operated to open and close, to grasp a sheet by the movement of the gripper-cam *j*, and to open to release the sheet by the cam *n*. In the succeeding revolution, the gripper-cam *j* may remain in its normal or down position so that no operation of the grippers will take place and hence be no danger of the premature feed of a sheet; and on this revolution also the opening cam *n* will have been moved out of operative position so that the grippers will have remained closed and hence not have struck the rear end of the enlarged impression surface of the cylinder B. So too with the transfer cylinder D making two revolutions to one of the impression cylinders. Its grippers on its first revolution will be opened and closed to grasp the sheet from the first impression cylinder and opened to release the sheet to the second impression cylinder, when the gripper-cam will be moved from operative position (see dotted lines Fig. 3) so that on the succeeding revolution of the transfer cylinder the grippers will remain closed and prevented from striking the enlarged impression surfaces of both cylinders B and C, and destroying the sheets in those cylinders. The grippers of the delivery cylinder likewise open and close to take the sheet from the cylinder C during its first revolution and then open to deliver the sheet to the tapes *s*, and on the succeeding revolution of that cylinder, the gripper-cam is moved out of operative position so that the grippers are not operated.

It is obvious that while I have shown and described that particular form of grippers which are held normally closed as by a spring and opened positively by a cam, it is to be understood that other well known forms of grippers and gripper operating mechanism may be employed with equal facility and with the same result; and while the delivery cylinder shown is one half the size of the impression cylinders, it may in some constructions be of equal size, making turn for turn with the impression cylinders, in which case its gripper-cam will not be moved; and so far

as the delivery of the printed sheets is concerned, any other mode of delivery may be used, such delivery not being essential to the invention, except that when the half-sized cylinder shown is employed, its grippers—when grippers are used—should remain idle during every alternate revolution.

Sheets may be supplied to the feed cylinder by hand from the feed board N, or by an automatic cutting and feeding mechanism extending under the feed board, as shown in Letters Patent No. 433,715, granted to me August 5, 1890.

The remaining part of the invention relates to the stop motion for the two impression cylinders.

It has hitherto been proposed in two-cylinder machines to employ a stop motion for each cylinder operating to stop said cylinders at different times. The present invention employs a pair of pivoted stop levers 20, 21, one for each cylinder, operated from a single cam 22 on the crank shaft K, through the usual connections 23, and coupling rod 24 between the two levers. The upper ends of the levers are toothed to engage with the respective stop racks 30, 31, on each of the cylinders B, C. The time of the cam 22 is such that just before the two impression cylinders arrive at the end of a complete revolution, the stop levers are rocked to engage the stop racks and hold both of the cylinders locked in the position shown in Fig. 1, during the return or idle movement of the bed. The cam 22 again rocks the stop levers in the starting movement of the cylinders and returns those levers to their normal positions ready to operate as before.

The simultaneous stopping of both of the impression cylinders greatly simplifies the stopping mechanism as well as that of the driving connections with the cylinders, as it is only necessary to provide gearing for like movements of both cylinders.

In order to overcome the momentum of the impression cylinder or cylinders B, C, there is provided a yielding stop or bunter consisting in the preferred form of a disk 33 fast to the cylinder shaft and having a cam shaped portion 34 adapted to coact with an arm or lever 32 pivoted to the framework. One end of this lever bears a roll adapted to bear against the disk and its cam shaped portion, while the opposite end is borne upon by a spring holding the roll to duty and tending to resist the passage of the cam shaped portion by the roll. The arrangement of the parts is such that the yielding stop arm in bearing against one side of the cam shaped portion opposes and overcomes the momentum of the cylinder just before its arrest by the stop motion, and in doing so the cylinder is moved backward a distance equal to the back-lash in the connecting gearing. To take this backward movement up and restore the parts to proper register before the cylinder comes to rest, the cam portion passes the stop arm and the lat-

ter bears against the opposite side of said cam shaped portion and forces the cylinder forward the distance it had previously been moved backward in stopping its momentum.

5 What is claimed is—

1. In a cylinder printing press, the combination with the impression cylinder with grippers, of a feed cylinder adjacent thereto one-half the diameter of the impression cylinder
10 and having grippers inoperative every alternate revolution, said impression cylinder having an impression surface greater than the circumference of the feed cylinder, substantially as described.

15 2. In a cylinder printing press, the combination with two impression cylinders with grippers and a feed cylinder with grippers inoperative every alternate revolution adjacent one of the impression cylinders and one-half the diameter of said impression cylinders, of
20 a transfer cylinder coacting with said impression cylinders, and a cooperating bed with two forms, each of said two impression cylinders having an impression surface greater
25 than the circumference of the feed and transfer cylinders, substantially as described.

3. In a cylinder printing press, the combination with two impression cylinders with grippers, and a feed cylinder adjacent one of the impression cylinders one-half the diameter of said impression cylinder, and having
30 grippers inoperative every alternate revolution, of a transfer cylinder coacting with said impression cylinder having grippers operative
35 every alternate revolution, and a cooperating bed with two forms, each of said impression cylinders having an impression surface greater than the circumference of said feed and transfer cylinders, substantially as described.

40 4. In a stop cylinder printing press, the combination with an impression cylinder having grippers and with an impression surface greater than one-half of its circumference, of
45 a feed cylinder adjacent thereto, one-half the diameter of the impression cylinder and hav-

ing grippers with means for rendering said grippers inoperative every alternate revolution, substantially as described.

5. In a stop cylinder printing press, the combination with two impression cylinders
50 with grippers, and each having an impression surface greater than one-half its circumference, and a cooperating bed with two forms, of feed, transfer and delivery cylinders, each one-half the diameter of the impression cyl-
55 inders, and coacting with said impression cylinders, and each having grippers with means for rendering said grippers inoperative every alternate revolution, substantially as described.

6. In a stop cylinder printing press, the combination with an impression cylinder with grippers and having an impression surface greater than one-half its circumference, and
60 a cooperating form bed, of a feed cylinder with grippers and one-half the diameter of the impression cylinder, a gripper cam and a cam and connections for moving said gripper
65 cam out of operative position each alternate revolution of the feed cylinder, substantially as described.

7. In a stop cylinder printing press, the combination with two impression cylinders with grippers and each having an impression surface greater than one-half its circumference and a cooperating bed with two forms,
75 of a transfer cylinder with grippers one-half the diameter of said impression cylinders, a gripper cam and a cam and connections for moving said gripper cam out of operative po-
80 sition each alternate revolution of the transfer cylinder, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN BROOKS.

Witnesses:

A. LUTKINS,
J. C. POPE.