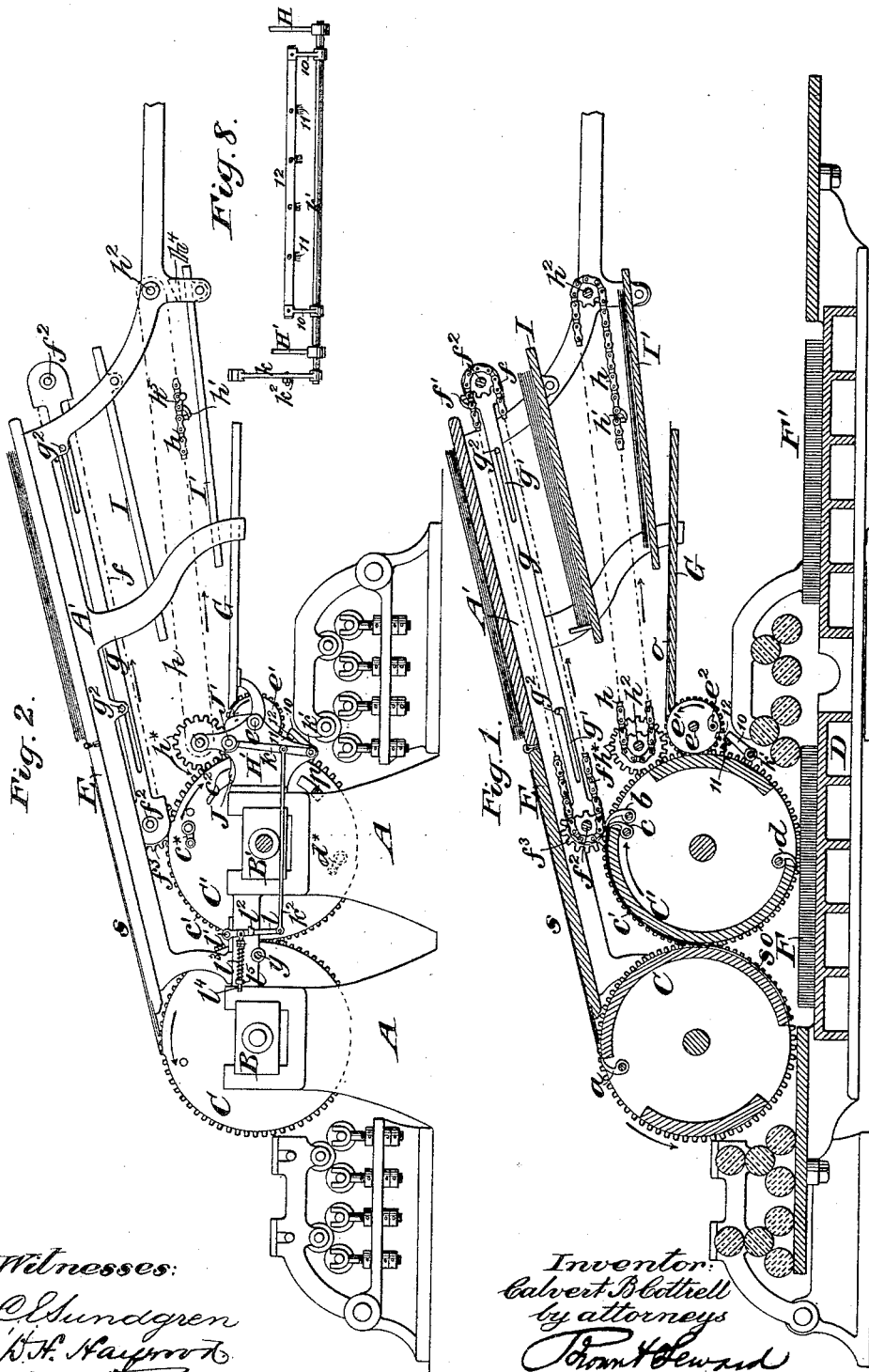


C. B. COTTRELL.
PRINTING MACHINE.

No. 453,758.

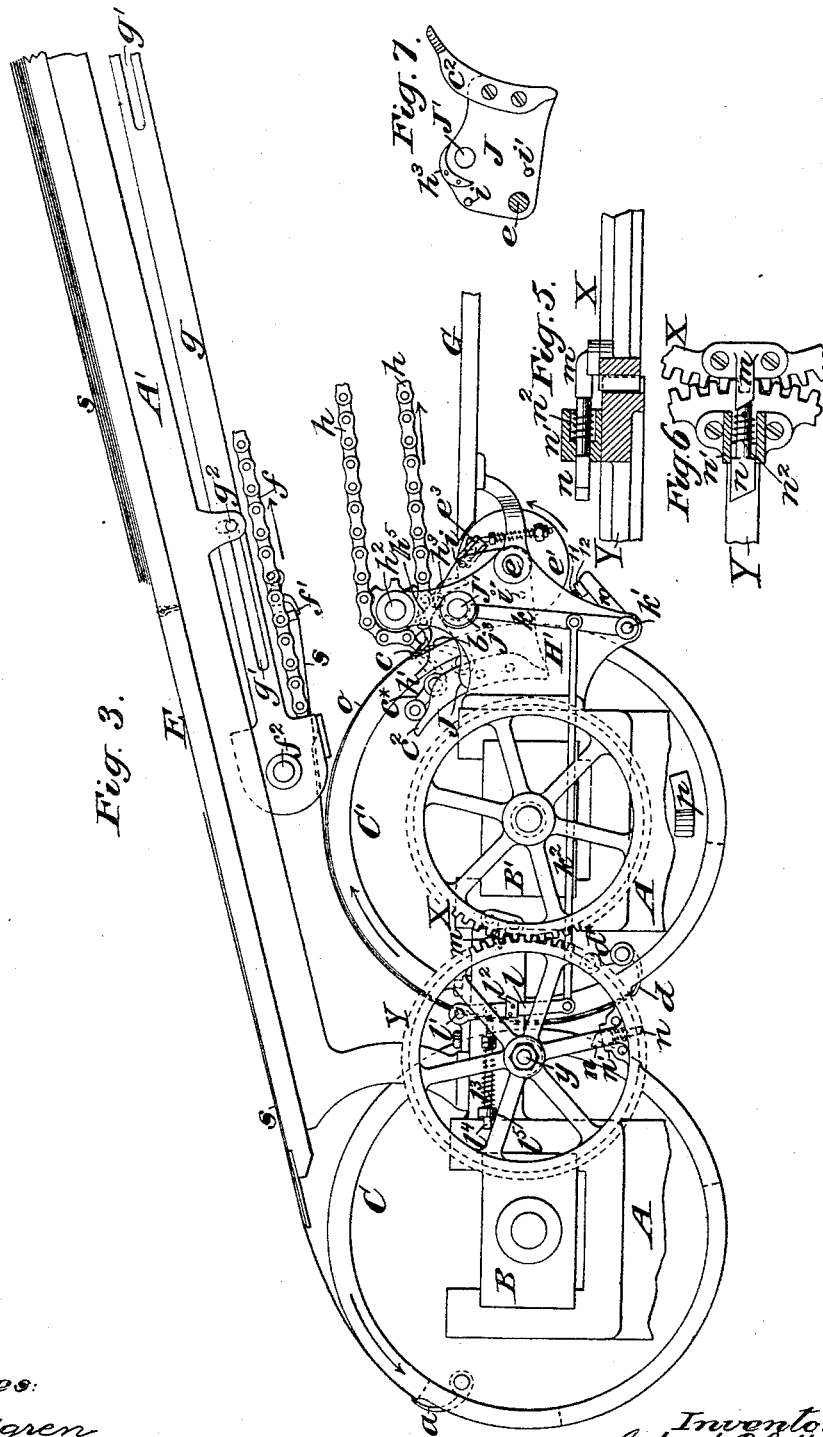
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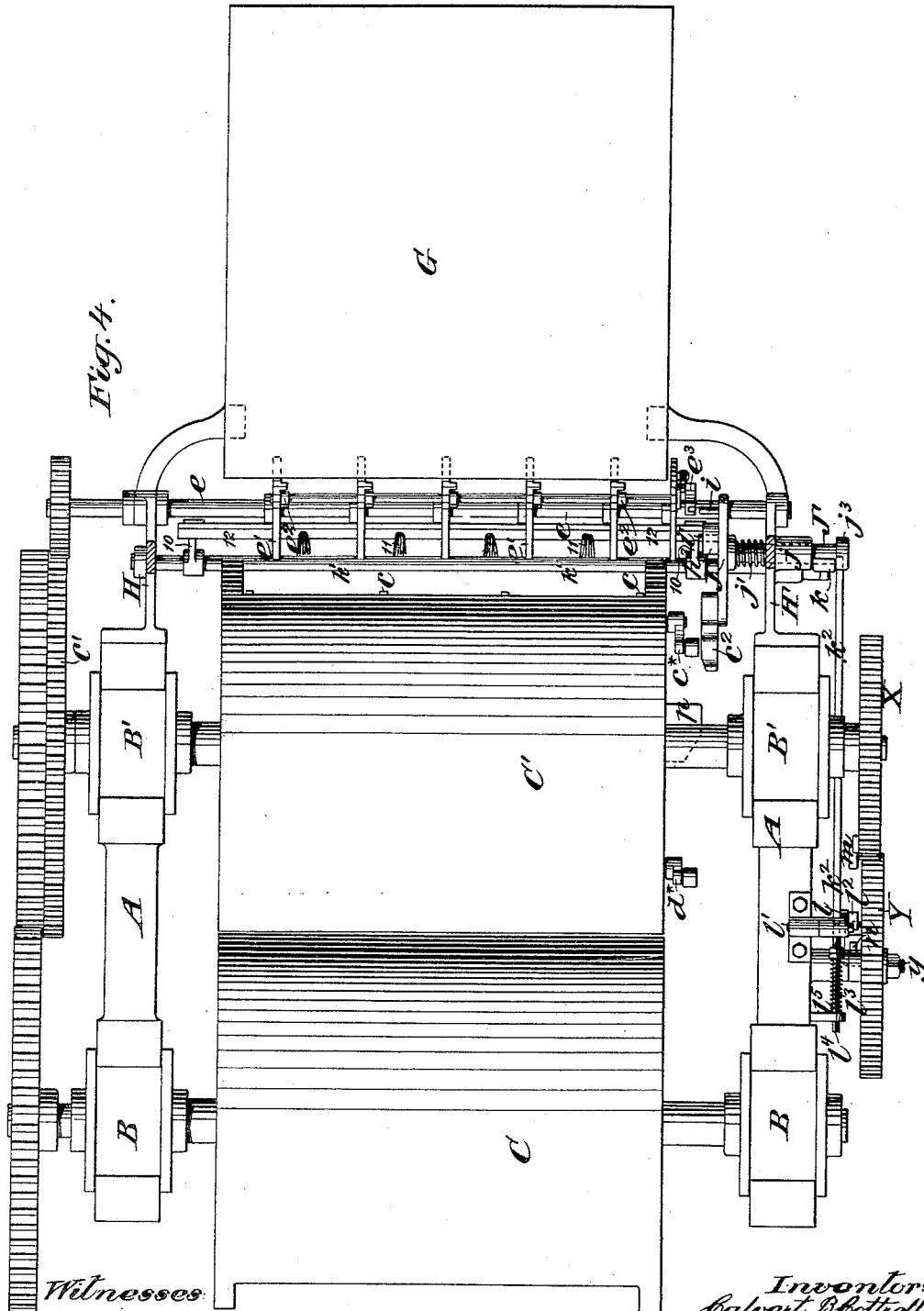
Edmundgren
H. H. Hayworth

Inventor:
Calvert B. Cottrell
by attorneys
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UNITED STATES PATENT OFFICE.

CALVERT B. COTTRELL, OF WESTERLY, RHODE ISLAND.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 453,758, dated June 9, 1891.

Application filed January 27, 1891. Serial No. 379,235. (No model.)

To all whom it may concern:

Be it known that I, CALVERT B. COTTRELL, of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to flat-bed perfecting printing-machines.

Its object is to automatically feed offset-sheets to the second impression-cylinder of such a machine and remove said sheets from said cylinder after a certain number of revolutions thereof, when they have become soiled.

I will first describe my improvement with reference to the accompanying drawings, and afterward point out its novelty in claims.

Figure 1 is a central longitudinal sectional view of the cylinders, the bed, and the feeding apparatus and part of the framing of a printing-machine embodying my invention. Fig. 2 represents a side view corresponding with Fig. 1, but not showing the bed and having parts of the external gearing removed. Fig. 3 is a side view showing the cylinders, the feed-boards, and parts of the delivery apparatus on a larger scale than Figs. 1 and 2. Fig. 4 is a plan corresponding with Fig. 3. Figs. 5, 6, 7, and 8 are detail-views which will be hereinafter explained.

Similar letters of reference designate corresponding parts in all the figures.

A designates part of the framing of the machine; B B', the cylinder-boxes, and C C' the impression-cylinders.

D is the reciprocating bed, and F F' the two forms. The bed, forms, and impression-cylinders resemble those of flat-bed perfecting-presses at present in use, and may be driven in the same way.

E is the feed-board from which the sheets to be printed are fed by hand to the first impression-cylinder C, and G is a feed-board from which offset sheets are supplied to the second impression-cylinder C', the said feed-board G being arranged behind the said cylinder C' under the feed-board E.

The first impression-cylinder C is furnished with an ordinary set of grippers *a* for taking the sheets to be printed. The second impression-cylinder C' is furnished with an ordinary

set of grippers *b*, for taking from the first impression-cylinder the sheets to be printed on the second side, and is also furnished with two sets of grippers *c* and *d* for holding the offset sheets *o*, these grippers being of a similar kind to those for taking the sheets to be printed, the grippers *c* being for holding the front ends and those *d* for holding the rear ends of the said sheets. The grippers *a* and *b* may be operated in the same manner and by the same means as those of other perfecting-presses, and therefore need no further description.

The means for operating the grippers *c* and *d* will be hereinafter described.

Behind the second impression-cylinder C', between the said cylinder and the feed-board G for the offset sheets, a rotary shaft *e* is supported in bearings in brackets H H', carried by the framing A, the said shaft having upon it a series of reels or disks *e'* *e'*, carrying grippers *e*², which are represented as of the kind well known as "tumbler-grippers" for taking the offset sheets from the said feed-board and feeding them to the said cylinder, and which for that purpose are operated as will be hereinafter explained.

In carrying out my invention two sets of delivery apparatus are employed, one set for delivering the printed sheets and another set for the offset sheets. As represented in the drawings, the delivery apparatus for the offset sheets is below that for the printed sheets. The delivery apparatus for the printed sheets is represented as consisting of endless chains *f*, furnished with spring-closed grippers *f'* and running on chain-wheels on shafts *f*², fitted to bearings on the front and rear ends of frames *g*, arranged under the feed-board E, one of the said shafts *f*² being geared by a gear *f*³ with a gear *c'* on the second impression-cylinder C'. Below the rear portions of the frames *g* and chains *f* is a receiving-board I, for receiving the printed sheets from the delivery apparatus. This delivery apparatus is substantially like that employed in other printing-machines and well known, and the means of opening the grippers to make them receive the sheets from the cylinder and deposit them on the receiving-board will be such as are commonly employed, and therefore no further description of them here is necessary. The frames *g* are represented as

having longitudinal slots g' , which receive stationary pins g^2 in the sides of the upper framing A' , which supports the feed-board, the said pins supporting the delivery apparatus, and the said slots permitting the said

5 the said slots permitting the said apparatus to be slid back from over the cylinder C' when the forward hinged portion of the feed-board E is turned back for making the said cylinder ready. The rear ends of

10 the forward slots g' are turned upward, as shown in Figs. 1 and 3, to permit the said delivery apparatus to rise and fall with the cylinder C' . The delivery apparatus for the offset sheets is represented as an endless carrier consisting of endless chains h , furnished

15 with spring-closed grippers h' and running on chain-wheels on shafts h^2 , having their bearings in the framing A' , one of the said shafts h^2 being geared by a gear h^* with the gear c' on the cylinder C' . These delivery-chains and grippers are like those for delivering the printed sheets and they deliver the offset sheets onto a stationary receiving-board I' . The said grippers h' are opened

20 to receive offset sheets from the cylinder C' , and again opened to deposit them on the receiving-board I' by means of a cam h^3 , (see Figs. 4 and 7,) arranged near the cylinder C' and a cam h^4 , (see Figs. 1 and 2,) arranged near the outer end of the receiving-board I' , the said cams operating upon said grippers in the same way as the stationary

25 cams commonly employed to operate the grippers of endless-chain delivery apparatus. The cam h^4 is stationary, as it does no harm by opening the grippers h' when there is no sheet in them, but as the opening of the said grippers as they pass the cylinder C' should only take place when an offset sheet is to be removed from the latter—that is to say, only

30 once after many revolutions of said cylinder—the cam h^3 instead of being stationary is attached to what I call a "cam-stock" J , (see Figs. 2, 3, 4, and 7,) which is movable laterally or parallel with the axis of the cylinder, and which is held aside, as will be presently described, to keep the said cam out of the way of the arm h^5 of the grippers until the proper time for opening them. The said cam-stock J also carries a cam c^2 for operating on the arms c^* d^* of the cylinder-grippers $c d$ to open the said grippers, this cam also having to be held aside out of the way until the time for liberating the offset sheets. There are

35 also attached to or provided on said cam-stock devices represented as consisting of two short pins or projections $i i'$ for operating in the tumbler e^3 of the grippers e^2 of the shaft e , which take the new offset sheets from the board G , which devices also have to be held aside until the time for changing the offset sheets.

The cam-stock J , of which an inner face view is shown in Fig. 7, consists of a plate

65 attached to a horizontal stem or stud J' , which is capable of sliding through a bored hub or guide j on the bracket H' . A hole provided

in said stock or plate J , for the passage through it of the gripper-shaft e , before mentioned, makes the said shaft serve as an additional

70 guide and prevents the said stock from turning. A spring j' , (see Fig. 4,) between the said stock and the said bracket, constantly presses the said stock toward the cylinder and tends to bring the cams $h^3 c^2$ and tumbler-operating

75 pins $i i'$ within range, respectively, of the gripper-arms h^5 , c^* and d^* , and the gripper-tumbler e^3 , but this action of the said spring is prevented until the proper time for the operation of the grippers by means of a locking-

80 lever k , which is fast upon a shaft k' , which works in bearings in the lower parts of the brackets $H H'$. The upper end of this lever is formed to enter between the hub j of the bracket H' and a collar j^3 on the outer end

85 of the stem J' , as shown in Figs. 3 and 4. The locking-lever k is connected by a rod k^2 with the lower end of a lever l , which works on a fixed fulcrum l' , secured upon the upper part of the machine framing. To this lever

90 l is attached a rod l^2 , which slides through a stationary guide l^5 , between which and a shoulder on the said rod is applied a spiral spring l^3 , which tends to press the said lever l and its rod k^2 toward the lever k , and so

95 keep the said lever engaged between the hub j and the collar j^3 . It is only necessary to withdraw this lever k from between the said hub j and the shoulder j^3 to allow the spring j' to throw the cam-stock to the position for

100 its cam and pins to operate.

I will now describe means by which the lever l is tripped to effect such withdrawal of the lever k for the purpose of changing the

105 offset sheets.

X is a spur-gear fixed on the shaft of the second impression-cylinder C' .

Y is another spur-gear gearing with X and turning freely on a fixed stud y in the machine framing. The gear Y has one more

110 tooth than the gear X , the number of teeth of X being equal to the number of revolutions which the cylinder C' is to make before the changing of the offset sheets, which is effected during the next revolution. We

115 will suppose that gear X has two hundred and fifty-one teeth and gear Y two hundred and fifty-two teeth, it being desired to change the offset sheets during every two hundred and fifty-second revolution of the cylinder.

120 Every time the gear X makes a revolution the gear Y lacks one tooth of a full revolution, so that during two hundred and fifty-two revolutions of the gear X Y will make only two hundred and fifty-one revolutions.

125 On the gear X is fixed a tappet-tooth m , and on the gear Y is a tappet n , which is fitted to slide radially in a guide n' , on the gear Y , and to which is applied a spring n^2 , which tends to press it outward so far that in every

130 two hundred and fifty-second revolution of the gear X the said tappet-tooth and sliding tappet come together, and the tappet-tooth m will push in the sliding tappet n far

enough to strike a tappet-lug l^2 on the lever l , and trip the said lever l . During two hundred and fifty-one of every two hundred and fifty-two revolutions of the gear X the tappet-tooth m does not meet the sliding tappet n , and the spring n^2 keeps the tappet pushed out so far that its inner end will not reach the tappet-lug l^2 ; but when in the two hundred and fifty-second revolution of the gear X the said tappet-tooth m meets the sliding tappet n , the said sliding tappet is always opposite the tappet-lug l^2 , and the said tooth m pushes in the said sliding tappet n far enough to reach the said tappet-lug l^2 , and hence the said lever l is then tripped to withdraw the locking-lever k and permit the spring j' to push the cam-stock and its cams to the operative position. This tripping of the lever l is only instantaneous. As soon as the sliding tappet n passes by the lug l^2 on the said lever, the spring l^3 again pushes forward the said lever and brings the end of the lever k against the collar j^3 , where the latter lever then rests only until in the revolution of the cylinder C' . A cam p on the side of the said cylinder serves by its operation against the inner face of the cam-stock or its cam c^2 to push aside the cam-stock to a position to be re-engaged and locked by the dropping in of the lever k between the hub j and shoulder j^3 .

In order to expel the air from between the cylinder C' and the new offset sheet which is taken by the grippers c , and to take out the wrinkles from the sheet and draw it tight to the cylinder before the grippers d take hold of its rear end, I provide on the shaft k' of the locking-lever k arms 10, which carry a bar 12, to which are secured a series of pressers 11, which may be of any suitable construction, but are represented as consisting of brushes, between which are spaces for the cylinder-grippers d to operate. A back view of the said shaft k' and the brush attachment is given in Fig. 8. While the lever k is in position to lock the cam-stock and its attachments out of the operative position, the brushes 11 are held back from the cylinder; but when the connection k^2 , before described, pulls the locking-lever out of engagement with the cam-stock the brushes are brought against the sheet which has been just taken by the grippers c and press it to the cylinder. This operation continues as the sheet is carried around the impression portion of the cylinder and until the grippers d have closed upon the rear end of the sheet and is then intermitted by the return of the locking-lever between the shoulder j^3 of the cam-stock and the hub j of the bracket H until the time for taking a new offset sheet.

Having described the construction and operation of the several parts, I will now proceed to describe the automatic changing of the offset sheets during the printing.

An offset sheet o having been secured to the cylinder C' the printing is performed in

the same manner as in other perfecting printing-machines, the sheets being fed to the first impression-cylinder C and taken by the grippers thereof and printed thereby on the first form F , and afterward taken from the said cylinder by the grippers b of the second impression-cylinder C' and printed by the latter on the second form F' , after which they are taken from the latter by the grippers f' of the upper ordinary delivery apparatus. This goes on repeatedly without any disturbance of the grippers c and d , which hold the offset sheet on the cylinder until the tappet-tooth m meets the sliding tappet n and presses it inward against the tappet-lug l^2 , and so trips the lever l , as hereinbefore described, and pulls the locking-lever k out of engagement with the cam-stock, which is then forced inward by its spring to bring the cams c^2 and h^3 to their operative positions. Then within the next quarter-revolution of the cylinder C' , after the taking hold of the last-printed sheet by the grippers f' , the arm c^* of the cylinder-grippers c reaches the cam c^2 , and the said grippers are thereby opened to release the front end of the offset sheet on the cylinder, and at the same moment the arm h^5 of the delivery-grippers h passes the cam h^3 and takes the so-released end and carries it back over the board I' . The tumbler e^3 of the feeding-grippers e^2 then reaches the pin i , and the said grippers, which in their normal condition are open, are then quickly closed to take the front edge of a new clean offset sheet, which has been kept waiting on the table G with its said edge projecting slightly beyond the front edge of said table. The continued revolution of the cylinder C' and the reel e' bring the grippers e^2 and c together. The feeding-grippers e^2 are then opened to release the sheet by their tumbler passing the pin i' , and the cylinder-grippers c are allowed to close to take the sheet by their arm c^* , passing off the cam c^2 . The continued revolution of the cylinder winds the new offset sheet upon it and brings the gripper-arm d^* to the cam c^2 , by which the grippers d are opened to release the rear end of the old offset sheet. The length of the said cam c^2 is such that said grippers remain open until the rear or tail end of the sheet has been pressed close to the cylinder by the brushes 11, and as the arm d^* passes by the cam the grippers d in closing will take the said end and secure it to the cylinder. In the meantime the delivery-grippers h' reach the cam h^4 and the soiled offset sheet taken from the cylinder is deposited upon the board I' .

All the above automatic operations of changing the offset sheet are performed during about five-eighths of a revolution of the cylinder and without any interference with the printing operation.

As soon as the grippers d have closed upon the offset sheet, the cam p on the cylinder C' comes into operation on the cam-stock J and pushes it aside again to take the cams h^3 and c' and pins i i' to their inoperative position,

in which they are at once locked by the locking-lever k dropping in again between the hub j and the collar j^3 , and remains locked until the cylinder C' again makes its two hundred and fifty second revolution and brings its tappet m into operation on the tappet n and allows the cams h^3 and c' and pins i' to come to their operative positions to produce the taking away from the cylinder C' of the offset sheet last taken on and the taking thereon of a new one which has been placed in readiness on the table G .

It will be readily understood that if more tappet-teeth m are put on the cylinder-gear X the offset sheet o may be changed oftener. With two tappets on the gear X , having the number of teeth described, the sheets will be changed at every one hundred and twenty-six revolutions and with three tappets at every eighty-fourth revolution, and so on.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the impression-cylinder of a printing-machine and two sets of grippers thereon for holding both ends of offset sheets thereto, of a movable cam for producing the operation of said grippers during one of many revolutions of the cylinder for liberating a soiled offset sheet therefrom and taking a new one thereon, substantially as herein set forth.

2. The combination, with the impression-cylinder of a printing-machine and grippers thereon for holding an offset sheet thereto, of a delivery apparatus consisting of an endless carrier, and grippers thereon for taking soiled offset sheets from said cylinder, a cam for producing the operation of the cylinder-grippers by the revolution of the cylinder, and a cam for producing the operation of the delivery-grippers by the movement of their carrier, the said cams being connected and movable together to and from an operative position relative to their respective grippers at proper intervals of time, substantially as herein set forth.

3. The combination, with the impression-cylinder of a printing-machine and grippers thereon for holding an offset sheet thereto, of a feeding apparatus for feeding offset sheets to said cylinder, consisting of a carrier and attached grippers, a cam for producing the operation of the cylinder-grippers by the revolution of the cylinder, and a gripper-operating device for operating the feeding-grippers by the movement of their carrier, the said cams and devices being movable to and from an operative position relative to their respective grippers at proper intervals of time, substantially as herein set forth.

4. The combination, with the impression-cylinder of a printing-machine and grippers thereon for holding an offset sheet thereto, of a feeding apparatus for feeding offset sheets to said cylinder, consisting of a carrier and attached grippers, a cam for producing the operation of the cylinder-grippers by the

revolution of the cylinder, and a gripper-operating device for operating the feeding-grippers by the movement of their carrier, the said cams and devices being connected and movable together to and from an operative position relative to their respective grippers at proper intervals of time, substantially as herein set forth.

5. In a printing-machine, the combination, with an impression-cylinder and grippers thereon for holding an offset sheet thereto, of a delivery apparatus consisting of a carrier having grippers thereon for taking soiled offset sheets from said cylinder, a gripper-carrier and feeding-grippers thereon for feeding new offset sheets to said cylinder, a cam for producing the operation of the cylinder-grippers by the revolution of the cylinder, a cam for producing the operation of the delivery-grippers by the movement of their carrier, and a gripper-operating device, substantially as herein described, for producing the operation of the feeding-grippers by the rotation of their carrier, the said cams and gripper-operating devices being all movable to and from an operative position relatively to their respective grippers at proper intervals for changing the offset sheets on the cylinder, substantially as herein set forth.

6. In a printing-machine, the combination, with an impression-cylinder and grippers thereon for holding an offset sheet thereto, of a delivery apparatus consisting of an endless carrier having grippers thereon for taking soiled offset sheets from said cylinder, a gripper-carrier and feeding-grippers thereon for feeding new offset sheets to said cylinder, a cam for producing the operation of the cylinder-grippers by the revolution of the cylinder, a cam for producing the operation of the delivery-grippers by the movement of their carrier, and a gripper-operating device, substantially as herein described, for producing the operation of the feeding-grippers by the rotation of their carrier, the said cams and gripper-operating devices being all connected and movable together to and from an operative position relatively to their respective grippers at proper intervals for changing the offset sheets on the cylinder, substantially as herein set forth.

7. In a printing-machine, the combination, with an impression-cylinder and grippers thereon for holding offset sheets thereto, of a delivery apparatus having grippers thereon for taking soiled offset-sheets from said cylinder, a rotary gripper-carrier and feeding-grippers thereon for feeding new offset sheets to said cylinder, a cam for producing the operation of the cylinder-grippers by the revolution of the cylinder, a cam for producing the operation of the delivery-grippers by the movement of their carrier, a gripper-operating device for producing the operation of the feeding-grippers by the rotation of their carrier, a movable stock to which said cams and gripper-operating devices are attached, a

spring for moving the said stock to bring the said cams and gripper-operating devices to an operative position, a cam on the cylinder for operating on said stock and moving said
 5 cams and gripper-operating devices to an inoperative position, and a locking device for locking the said cam-stock with the said cams and gripper-operating devices in an inoperative position, substantially as herein described.
 10

8. In a printing-machine, the combination, with an impression-cylinder and grippers thereon for holding offset sheets thereto, of a delivery apparatus having grippers thereon
 15 for taking soiled offset sheets from said cylinder, a rotary gripper-carrier and feeding-grippers thereon for feeding new offset sheets to said cylinder, a cam for producing the operation of the cylinder-grippers by the revolution of the cylinder, a cam for producing
 20 the operation of the delivery-grippers by the movement of their carrier, a gripper-operating device for producing the operation of the feeding-grippers by the rotation of their carrier, a movable stock to which said cams and
 25 gripper-operating devices are attached, a spring for moving the said stock to bring the said cams and gripper-operating devices to an operative position, a cam on the cylinder for
 30 operating on said stock and moving said cams and gripper-operating devices to an inoperative position, a locking device for locking the said stock with the said cams and gripper-operating devices in an inoperative position,
 35 and tripping mechanism deriving motion from the cylinder for disengaging said locking device, substantially as herein set forth.

9. In a printing-machine, the combination, with an impression-cylinder and grippers
 40 thereon for holding an offset sheet thereto, of a delivery apparatus consisting of a carrier and grippers for taking soiled offset sheets from the cylinder, a gripper-carrier and grippers for feeding new offset sheets to said cylinder, cams and gripper-operating devices for
 45 producing the operation of said several grippers

by the rotation of the said cylinder and movements of said carriers, a movable stock to which said cams and gripper-operating devices are attached, a spring applied to said
 50 stock, and a cam on the cylinder for moving the said cams and devices to operative and inoperative positions, a locking device for locking the said stock with its attached cam and devices in an inoperative position, a
 55 toothed gear on the cylinder-shaft having a tappet-tooth, and a tappet-gear gearing with said toothed gear and having a movable tappet to be operated upon by said tappet-tooth for tripping the said locking device, all substantially as herein set forth.
 60

10. The combination, with the impression-cylinder of a printing-machine and two sets of grippers thereon for successively taking
 65 and securing the front and rear ends of an offset sheet thereto, of a series of intermittently-operating pressers for pressing the said sheet to the cylinder during an interval between the successive operations of the two sets of grippers to take and secure the sheet
 70 to the cylinder, substantially as herein set forth.

11. The combination, with the impression-cylinder *C'* and the two sets of grippers *c d* thereon for successively taking and securing
 75 the front and rear ends of an offset sheet thereto, the movable cam-stock *J* and attached cam *c²* for operating said grippers, the locking-lever *k* and the shaft *k'*, carrying the said lever to lock the said cam-stock with the said
 80 cam inoperative, and a spring for throwing said locking-lever into action, of a series of pressers carried by said shaft to operate on the offset sheet during the intervals between the successive operations of said grippers,
 85 substantially as and for the purpose herein set forth.

CALVERT B. COTTRELL.

Witnesses:

A. R. STILLMAN,
 A. C. WHITFORD.