

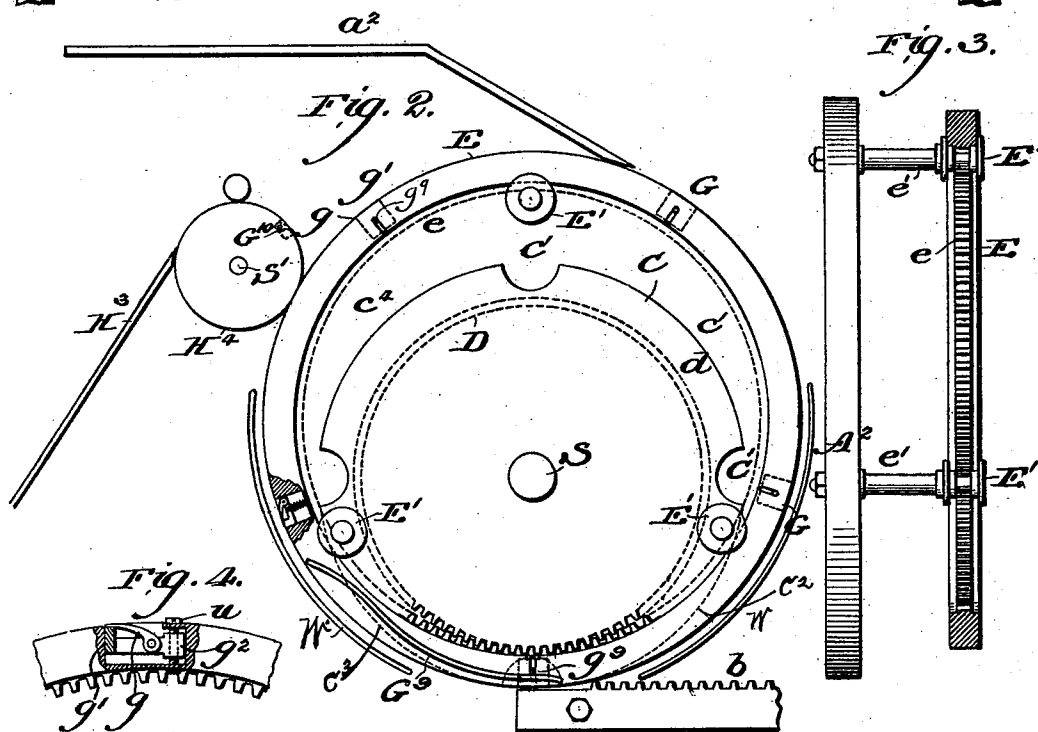
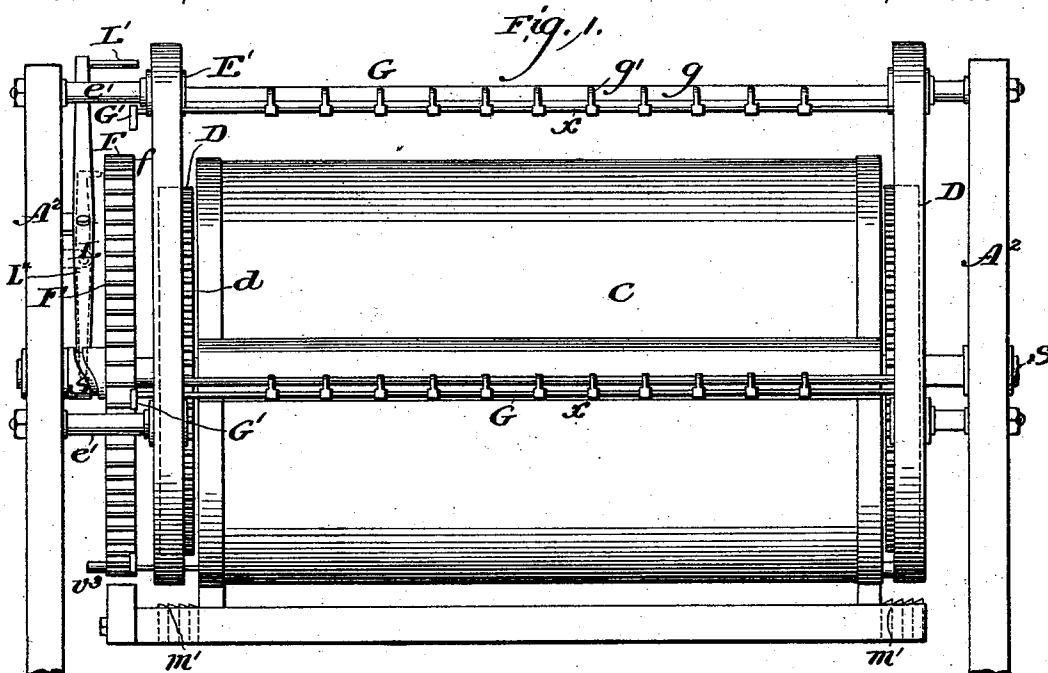
(No Model.)

4 Sheets—Sheet 1.

W. H. R. TOYE.
PRINTING MACHINE.

No. 534,299.

Patented Feb. 19, 1895.



WITNESSES:
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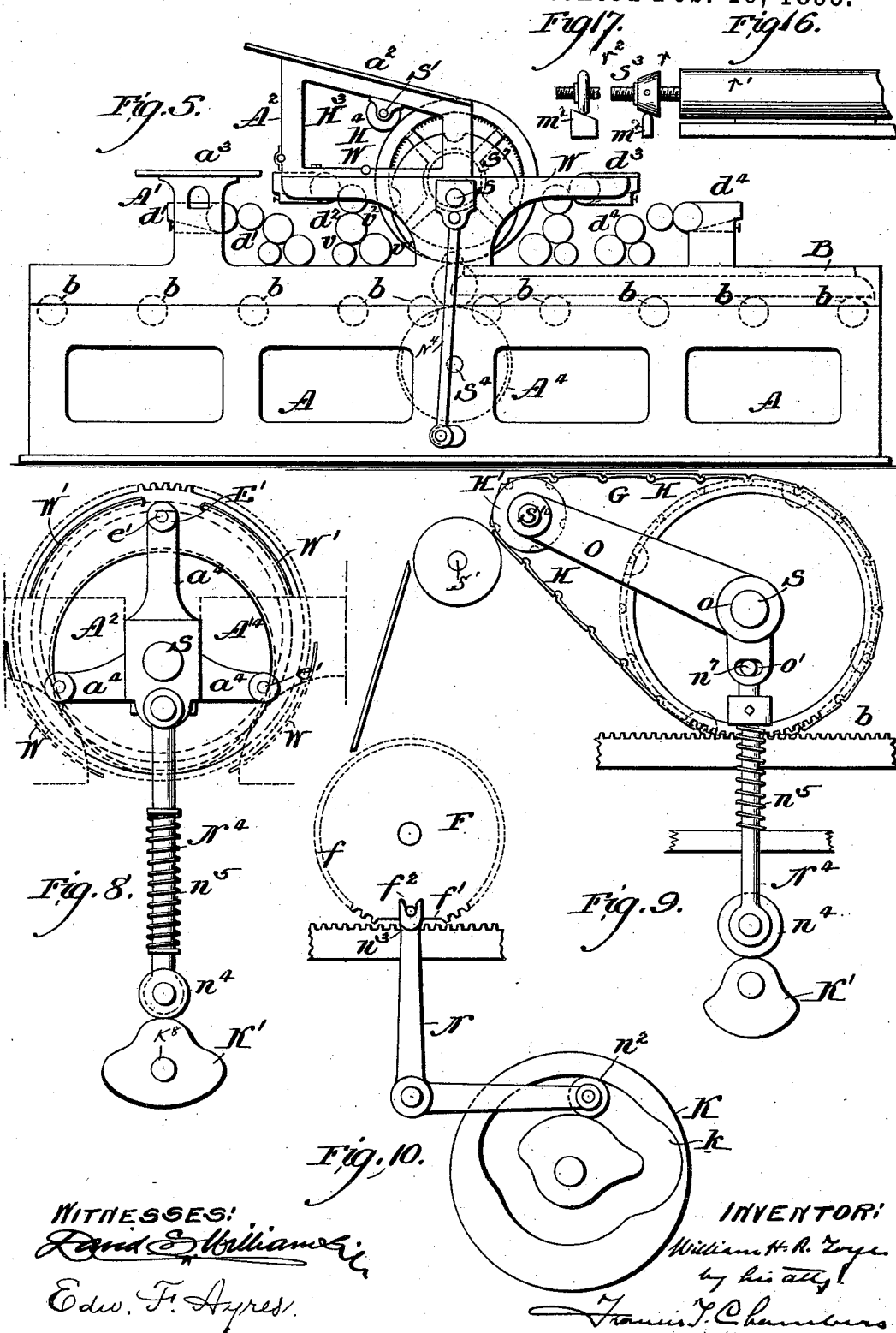
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4 Sheets—Sheet 2.

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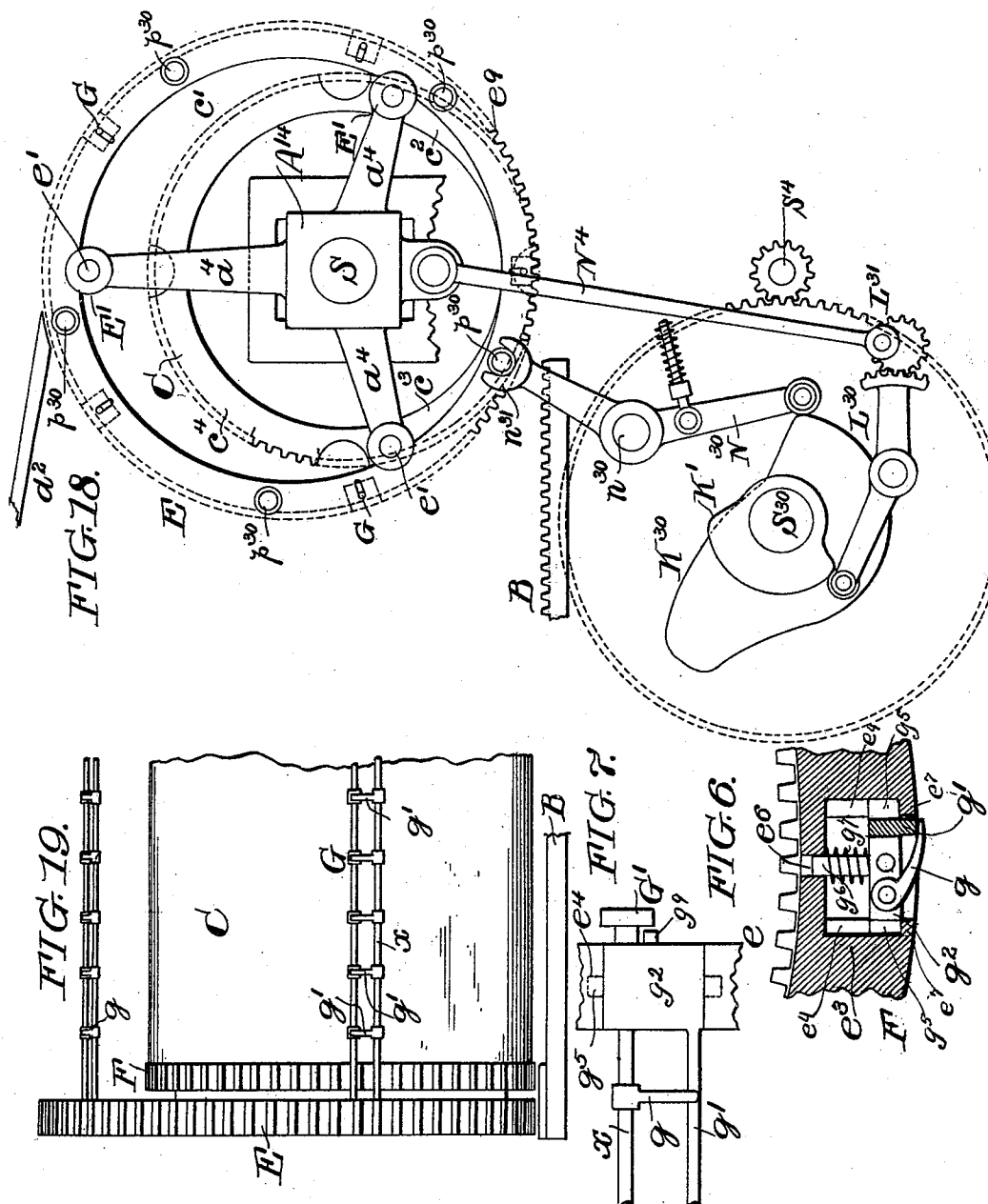
(No Model.)

4 Sheets—Sheet 3.

W. H. R. TOYE.
PRINTING MACHINE.

No. 534,299.

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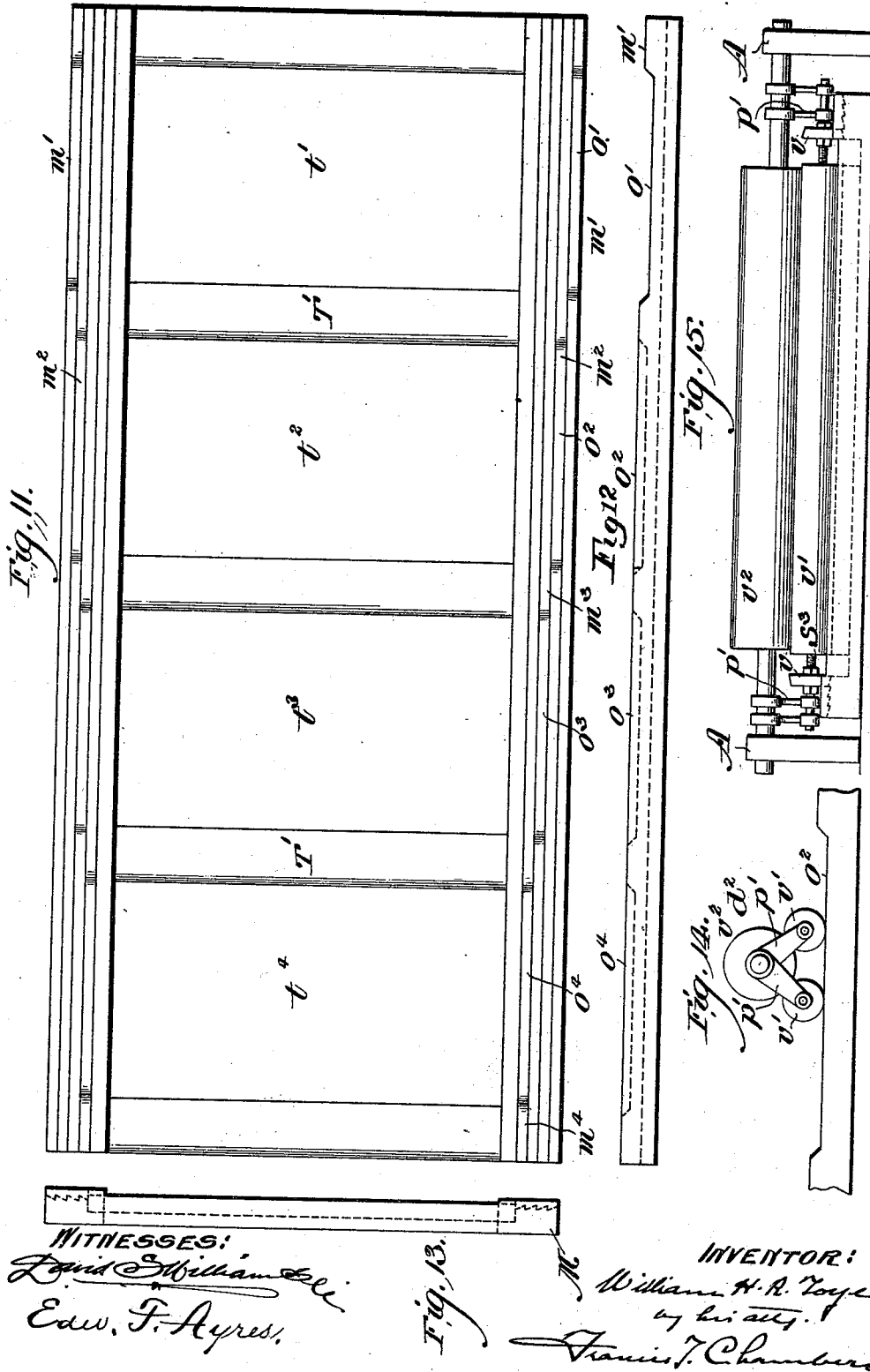
(No Model.)

4 Sheets—Sheet 4.

W. H. R. TOYE.
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Patented Feb. 19, 1895.



UNITED STATES PATENT OFFICE.

WILLIAM H. R. TOYE, OF PHILADELPHIA, PENNSYLVANIA.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 534,299, dated February 19, 1895.

Application filed May 8, 1893. Serial No. 473,423. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. R. TOYE, a citizen of the United States, residing in Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Printing-Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to printing machines and especially to mechanism connected therewith which is designed to insure a perfect register, and which, while suitable for general application, I have shown in connection with a stop cylinder press designed to print in different colors.

My invention will be best understood as described in connection with the drawings illustrating printing presses and parts thereof embodying my improvements, and in which—

Figure 1 is a front elevation of the stop cylinder and carrier mechanism for conveying the blanks to be printed. Fig. 2 is an end view of the device shown in Fig. 1, the frame and driving pulley being removed. Fig. 3 is a sectional view of a hubless carrier shown in Fig. 2, the section being taken on the line $x-x$. Fig. 4 is a view showing an adjustable gripper mechanism. Fig. 5 is a side elevation of a stop cylinder printing press embodying my invention. Fig. 6 is a detailed view showing an adjustable gripper mechanism. Fig. 7 is a top view of the device shown in Fig. 6. Figs. 8, 9 and 10 are fragmentary views showing various modes of effecting the stop movement of the impression cylinder when the reciprocating bed is being returned to the position shown in Fig. 5 after having made a forward or printing stroke. Fig. 11 is a plan view of the bed with the inking rolls and impression cylinder removed. Fig. 12 is a side view, and Fig. 13 an end view of the bed shown in Fig. 11. Fig. 14 is a side view showing the inking rolls and their supporting rolls, and Fig. 15 an end view of the rolls shown in Fig. 14. Figs. 16 and 17 are detailed views showing a mode of adjusting the inking roll. Fig. 18 is a side view very similar to that shown in Fig. 2, and showing independent mechanism for stopping and starting the carrier, and also showing a different mode of

driving this carrier; and Fig. 19 is a fragmentary end view of the carrier shown in Fig. 18.

A represents a main frame on which are suitably journaled the various shafts, and on which are supported the various parts which go to make up a printing press.

A' is an extension of the frame for supporting the-receiving board a^3 , and A² another extension which serves to support the feed board a^2 .

Power is communicated to the moving parts of the press by means of a pulley A⁴ and a shaft as S⁴ and is employed to reciprocate the bed B by means of a crank or connecting rod or in any manner preferred, and to drive the impression cylinder C and its connected parts. The impression cylinder C in my preferred form of press is divided into four sections c^1 c^2 c^3 c^4 so that four different primary colors may be printed, it being obvious however, that the cylinder may be divided into any number of sections which may be found desirable.

In the preferred construction, as shown in Figs. 1 and 2, a shaft S, suitably journaled in the frame A², has secured to it the impression cylinder C, gear wheels as D D to drive the carrier E, and a driving gear F. Studs e' are suitably arranged either in the main frame A², or in movable journal boxes, as described later, and carry on their inner ends small wheels E' which support and carry a rim as E which is provided with a series of gripper mechanisms G and serves as a carrier to bring blanks between the impression surfaces on the cylinder C and the types or form plates carried by the bed B.

The carrier E is of greater length than the circumference of the impression cylinder, more exactly, it is, in the construction shown, five-fourths as long as the circumference of the cylinder, it having one more set of gripper mechanisms than the number of sections into which the impression cylinder is divided and the distance between each set of gripper mechanisms is equal to the length of a division of the impression cylinder.

The gripper mechanisms shown consist of a bar as g' and fingers g mounted on rod x and which fingers serve to hold the blanks between themselves and the bar g' and which fingers are tumbled by suitable tumbler cams

as G' which are actuated at proper times by pins as L' in a well known manner.

In operation, the bed B travels from the front end of the press, as shown in Fig. 5, to the rear end, and in so doing is inked, and also gives an impression to whatever blanks are carried by the gripper mechanisms between the types or plates on the bed and the impression surfaces on the cylinder C. When the bed B makes its return from the rear of the press to its first position, the impression cylinder is held from motion and in a certain definite position by any suitable stop device such as is common on this class of presses.

In Fig. 8, K' is a suitable cam carried by a shaft k⁸ operated in any suitable manner from the power shaft, which cam, on rotation, serves at the proper time to lift the link N⁴, which is provided with the cam roller n⁴ and through the link N⁴ to raise the journal box A¹⁴, which slides vertically in the frame A². This journal box A¹⁴ has arms a⁴ to which the studs e' and rollers E', which support the carrier E, are secured and is also provided with a bearing for the shaft S so that the carrier and all the gears and the impression cylinder are raised together and to such a height that the teeth on gear wheel F are lifted out of mesh with the rack on the bed; a duplicate cam and link being arranged on the opposite side of the press.

Fig. 10 shows a construction where a segmental shaped piece is cut from one side of the drive pulley F so that there will be a space f' permitting the return of the bed without the necessity of raising the cylinder C and drive pulley bodily. To stop the drive pulley and to start it again when required, a cam wheel K, having a groove k, is so arranged that it will operate to stop and start the driving pulley F through a bell crank lever N having a cam roller n² at one end and at the other a forked head n³ which engages with the pin f² in the wheel F in a manner well known in the art. It is also possible to arrange a circular disk S⁷ on the shaft S which shall be eccentric to the shaft but concentric to the carrier E, as shown in Fig. 5, and make a suitable hub on the carrier which will serve to fit over the disk whereby the carrier can be supported, but I prefer to employ a hubless carrier and support it as shown in Fig. 2. It is also possible to construct the carrier G of separate links H. These links are preferably formed of a curvature similar to the curvature of the pulley or driving wheel with which the carrier is driven and carry gripper mechanisms, and are preferably constructed in a manner similar to those shown in my application for a patent filed in the United States Patent Office April 10, 1893, and serially numbered 469,682. In this construction, shown in Fig. 9, a wheel H' is arranged to guide the link carrier and is mounted on a shaft S¹⁰. Pivoted on said shaft in as arm O which has a bearing at o for the shaft S and a slot at o¹¹. A cam K' and a link N⁴, similar

to those shown in Fig. 8, serve to raise the shaft S and the cylinder and gear carried thereby out of gear with the teeth b on the bed; a pin n⁷ being arranged on the link to engage in the slot o' and a spring n⁵ being provided to positively draw down the arm O at the proper time.

In Figs. 18 and 19 I have shown a carrier consisting of a hubless rim in its general features very similar to that shown in Fig. 2. The carrier however, is provided with external gear teeth e⁹ which gear with the teeth of the rack carried by the bed and serve to drive the carrier during the printing stroke of the bed. A cam as K³⁰ carried by a shaft S³⁰ serves to actuate the stopping and starting lever N³⁰ which is pivoted at n³⁰ and which lever has a notched head n³¹ which is adapted to engage with suitable pins p³⁰ on the carrier E. To prevent the teeth on the bed from meshing with the teeth e⁹ on the carrier during its return stroke I raise the carrier in substantially the same way as is shown in Figs. 8 and 9, the cam K' acting on the link N⁴ to lift and lower the carrier. In the construction shown in Fig. 8 the cam K' operates directly on the link N⁴, while in Fig. 18 I have shown an interposed lever L³⁰ and crank gear L³¹. It will therefore be noted that it is possible to drive and operate the carrier entirely independently of the impression cylinder which may be driven in any suitable way. In the construction shown the impression cylinder is lifted by the same mechanism which lifts the carrier, it being pivoted in the journal A¹⁴ and I have shown the gear F, which is secured to the carrier, meshing with the rack on the bed. These various modes have been shown of arranging and actuating a stop cylinder provided with a carrier of greater length than the circumference of the cylinder; but it is, of course, obvious that many other suitable devices, well known in the art, could be substituted for those shown.

In order to adjust the gripper mechanism to and from the impression surfaces, I arrange the ends of the gripper bar, and of the rod that carries the gripper fingers, (which bar and rod are ordinarily arranged in the carrier mechanism) in bearings in a small block g², (see Fig. 4) which is arranged to slide in a suitable recess in the carrier, which carrier may consist of the rack shown in Fig. 9, or the carrier wheel E, or any other carrier mechanism which it is usual to employ to carry the sheets or blanks between the types or impression surfaces. This block is adjusted, as shown, by means of a screw as u, though obviously any other suitable means could be used to adjust the position of the blocks g². The gripper when so mounted can be adjusted at will to carry the sheets at any desired position relatively to the impression surfaces. Where a carrier is used, which travels in a path different from that in which the impression surfaces or types travel, and the gripper mechanisms are secured in said carrier

from any movement except a movement corresponding to that of the carrier, it has been found, in practice, that there will be a slight pulling of the sheets and so a lack of register due to the different paths taken by the gripper mechanisms which carry the front end of the sheet, and the impression cylinder against which the sheet is pressed by the types. To remedy this, I so arrange the gripper mechanisms that they can be caused to travel in a path different from the path of the carrier on which they are placed. In the present instance, I give the gripper mechanisms at that portion of their travel, when the sheets held by them are being printed on, a motion which is substantially parallel to the circumference of the impression cylinder.

In Fig. 6, g^2 is a small block having guides as g^5 which fit in corresponding grooves e^4 in the carrier E and which serve to guide the block as it is reciprocated in the recess e^3 of the carrier. To further guide it, a hole e^6 in which slides a pin g^6 secured to the block g^2 may be arranged as shown and a spring g^7 is preferably added to keep the block in position; stops e^7 limiting the outward motion of the block. In this block g^2 is secured one end of the gripper bar g , and one end of the bar x which carries the gripper fingers g' is journaled in said block in a manner shown in Fig. 7. Connected to said block g^2 is a pin g^9 (see Fig. 2), which projects from the side of the carrier E, and a cam G^9 which, as shown, has an operative surface substantially parallel to the surface of the cylinder C, and is arranged preferably on the outside of carrier E so as to engage with the pin g^9 and so move the gripper mechanisms that, during such time as the sheet carried by the grippers is being printed on, they will travel in a path substantially parallel to the surface of the impression cylinder. It is, of course, obvious, that by means of different shaped cams any other suitable path can be given the gripper mechanisms to cause the travel of the blank to be free and not interfered with by any pull due to the different paths of the impression cylinder and carrier mechanisms.

To ink the various form plates of the bed, of which, in the present instance there are four, I provide, as usual, sets of inking rolls d^1 d^2 d^3 d^4 and on the sides of the bed arrange tracks or supports m^1 m^2 m^3 m^4 , as shown. These tracks or supports are of a contour, as best shown in Fig. 12, having depressed portions o^1 o^2 o^3 o^4 respectively. The inking rolls as v^2 v^1 v^3 v^4 which compose one of the sets of rolls, as d^2 , and serve to ink one of the plates, as t^2 , of the bed B are arranged in the usual manner having two arms p^1 p^2 carrying the rolls v^1 . On the shaft s^3 of the roll are secured rollers v which ride on the support or track m^2 and so support the rolls v and when the depressed portion o^2 of the support m^2 is reached the rolls are permitted to drop and ink the proper portions of the types.

The operation of the machine is as follows:

Suitable inks are placed in the fountains feeding the inking rolls, as for instance, black in connection with the roller system d^1 , blue for the rolls d^2 , red for d^3 , and yellow for d^4 . Sheets are now fed from the feed board a^2 and the gripper mechanisms, tumbled at proper times by a pin as L, operate to seize the sheets as presented. A lever L, pivoted at l , and operated by a cam s , serves to operate the pin L' at suitable times to tumble the cam G'. There will be during operation, several sheets being carried around by the carrier mechanism at the same time, in the construction shown, four, and one of these sheets will be released and a new sheet seized on every revolution of the cylinder C. Therefore, levers operated by a cam revolving with the cylinder C can be used to govern the seizure and release of the sheets. A sheet seized by the grippers is carried around, the grippers fitting in recesses C' and T' of the impression cylinder and bed respectively, and receives an impression from one of the sets of types as t^4 . On the next reciprocation of the bed the sheet will have been delayed the length of one section because of the greater length of the carrier, as compared to the cylinder C, in this case five to four, and the sheet will be presented to and printed upon by the types of the section t^3 of the bed, another sheet being printed on by the types at t^4 . The next reciprocation of the bed will print blue from the types on the section t^2 , and the next black, from the types on t^1 . The fully printed sheet is now released from the grippers that hold it, at a suitable time, by a pin operated by a lever as L⁴, indicated in dotted lines in Fig. 1, and is seized by grippers G¹⁰ on the cylinder H⁴ and finally deposited on the receiving board a by the fly fingers H³; the take off cylinder H⁴ and the fly fingers being operated in any suitable manner. As indicated at W W' in Fig. 8, plates of sheet metal may be arranged to prevent the blanks or sheets, while being carried around, from falling to any great extent down from the path of travel of the grippers.

While I have shown in various instances the impression cylinder and the carrier as driven from the reciprocating bed by means of teeth b on the bed which mesh with teeth f on the driving gear F, it is, of course, obvious that other means of driving the impression cylinder could be used if desired.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a printing press, the combination with an impression cylinder divided into a number of sections, of a bed for carrying form plates or types also divided into sections, a carrier of greater length than the circumference of the impression cylinder operating to convey sheets to be printed between the printing couple, means for reciprocating the bed and driving the impression cylinder and carrier in unison therewith during the printing stroke of the bed, and means for stopping the move-

ment of the carrier and holding it at rest during the return or non-printing stroke of the bed.

2. In a printing press, the combination with
5 an impression cylinder divided into a number of sections, of a bed for carrying form plates or types also divided into sections, a carrier having gripper mechanisms one more in number than the number of the sections into which
10 the impression cylinder is divided and operating to convey sheets to be printed between the printing couple, means for reciprocating the bed and driving the impression cylinder and carrier in unison therewith during the
15 printing stroke of the bed, and means for stopping the movement of the carrier and impression cylinder, and holding them at rest during the return or non-printing stroke of the bed.

20 3. In a printing press, the combination with a reciprocating bed for carrying type or form plates, of an impression cylinder divided into a number of sections, means for reciprocating the bed, means for rotating the impression
25 cylinder in unison with the movement of the bed during the printing stroke and holding it from movement as the bed is returned to its first position, a carrier of greater length than the circumference of the impression cylinder radially movable gripper mechanisms
30 arranged in said carrier and a cam for governing the position of the gripper mechanisms relatively to the carrier.

4. In a printing machine, the combination
35 with a cylinder divided into a number of sections, of an internally toothed carrier of greater length than the circumference of the cylinder, a gear for driving the carrier, and a reciprocating bed adapted to carry type or
40 impression plates.

5. In a printing machine the combination with a stop cylinder divided into several sections and a reciprocating bed, of means for driving the cylinder and bed in unison in
45 one direction and means for returning the bed and holding the cylinder from rotation during said return of the bed, a carrier of greater length than the circumference of the stop cylinder, and means for driving the carrier.
50

6. In a printing machine the combination with an impression cylinder divided into a number of sections, and a reciprocating bed adapted to carry type or impression plates, of a
55 gear wheel D having teeth *d* and an internally geared carrier E meshing with and driven by the gear wheel D, said carrier being of greater length than the circumference of the impression cylinder.

60 7. In a printing machine, the combination with a platen or impression surface, of a carrier having gripper mechanisms, and means for moving said gripper mechanisms toward and from the platen surface independent of

the motion given the gripper mechanisms by 65 the carrier.

8. In a printing machine the combination with a type or form plate, and means for supporting said form plate, of an impression cylinder, a carrier for bringing blanks to be
70 printed between the types or plates and the impression cylinder, said carrier having gripper mechanisms, and means for moving said gripper mechanisms radially relatively to the impression surface independent of the motion of the carrier. 75

9. In a printing machine the combination with a reciprocating bed carrying types or impression plates, of an impression cylinder, a revolving carrier having gripper mechanisms and means for moving said gripper mechanisms radially relatively to the impression surface and carrier. 80

10. In a printing machine, the combination with an impression cylinder, of a carrier moving in a different path from that of the surface of the platen cylinder and having radially movable gripper mechanisms and means as the cam *G*⁹ operating to engage with and keep the gripper mechanisms and the blank carried thereby in a path substantially parallel to the circumference of the impression cylinder for a suitable portion of their travel. 85 90

11. In a printing machine, a printing couple, a carrier for conveying sheets between the printing couple, a part of the path of travel of the carrier being different from the path of travel of the impression cylinder which forms one member of the printing couple, a recess or recesses in said carrier, a block adapted to slide in said recess and carrying the gripper mechanism and means for changing the position of the block in the recess substantially as and for the purpose specified. 95 100

12. In a printing machine, a printing couple, a carrier for conveying sheets between the printing couple, a part of the path of travel of the carrier being different from the path of travel of the impression cylinder which forms one member of the printing couple, a recess or recesses in said carrier, a block adapted to slide in said recess, and carrying the gripper mechanism, a pin secured to said block, a cam adapted to engage with the pin and govern the position of the block in the recess, substantially as specified. 105 110 115

13. The combination in a printing press of a printing couple, a carrier for conveying blanks to be printed between the printing couple, gripper mechanism carried by said carrier and means for changing the travel of the gripper mechanism relatively to that of the carrier, substantially as and for the purpose specified. 120

WILLIAM H. R. TOYE.

Witnesses:

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