No. 690,638. Patented Jan. 7, 1902.

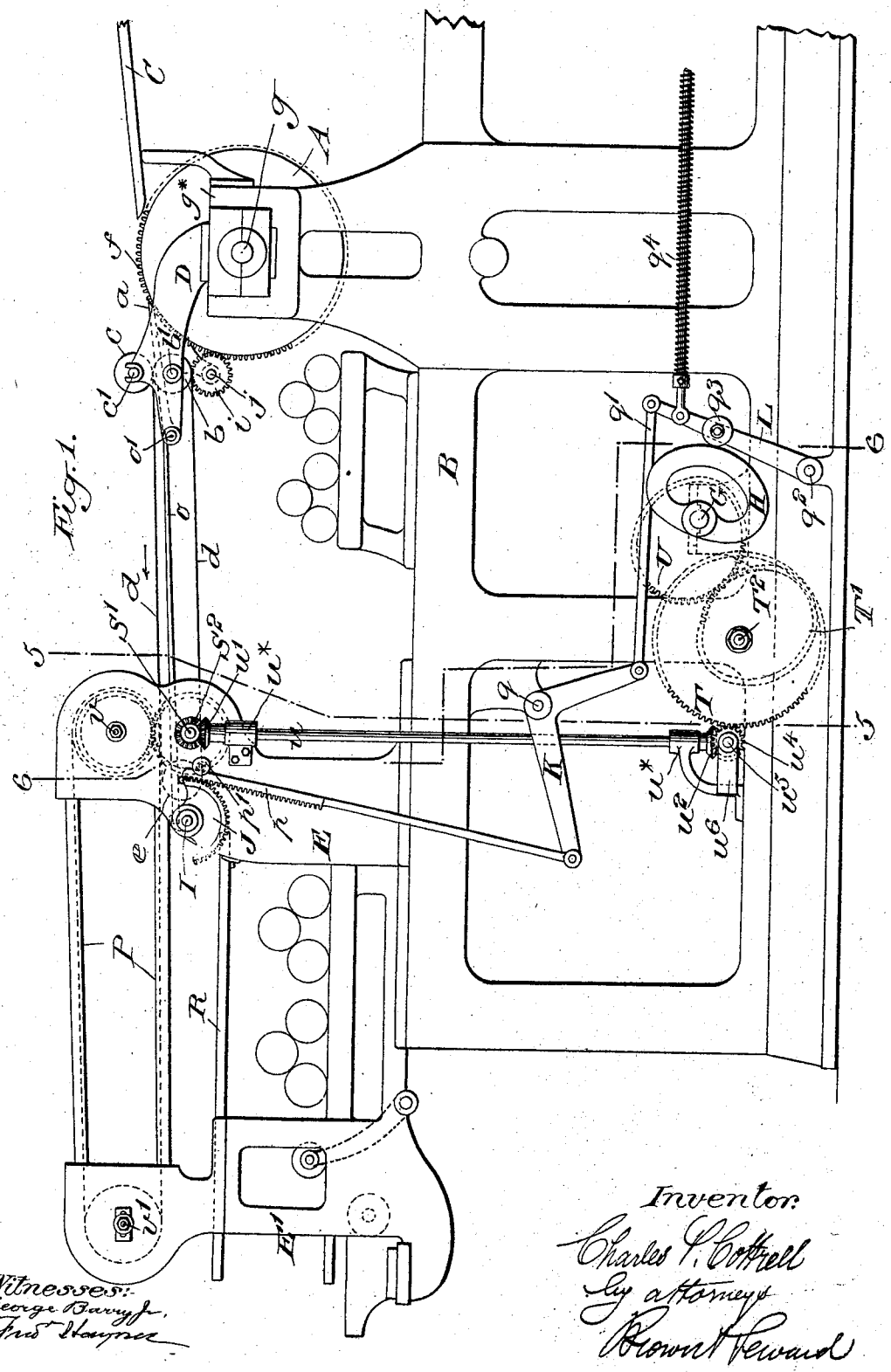
C. P. COTTRELL.

SHEET DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Aug. 24, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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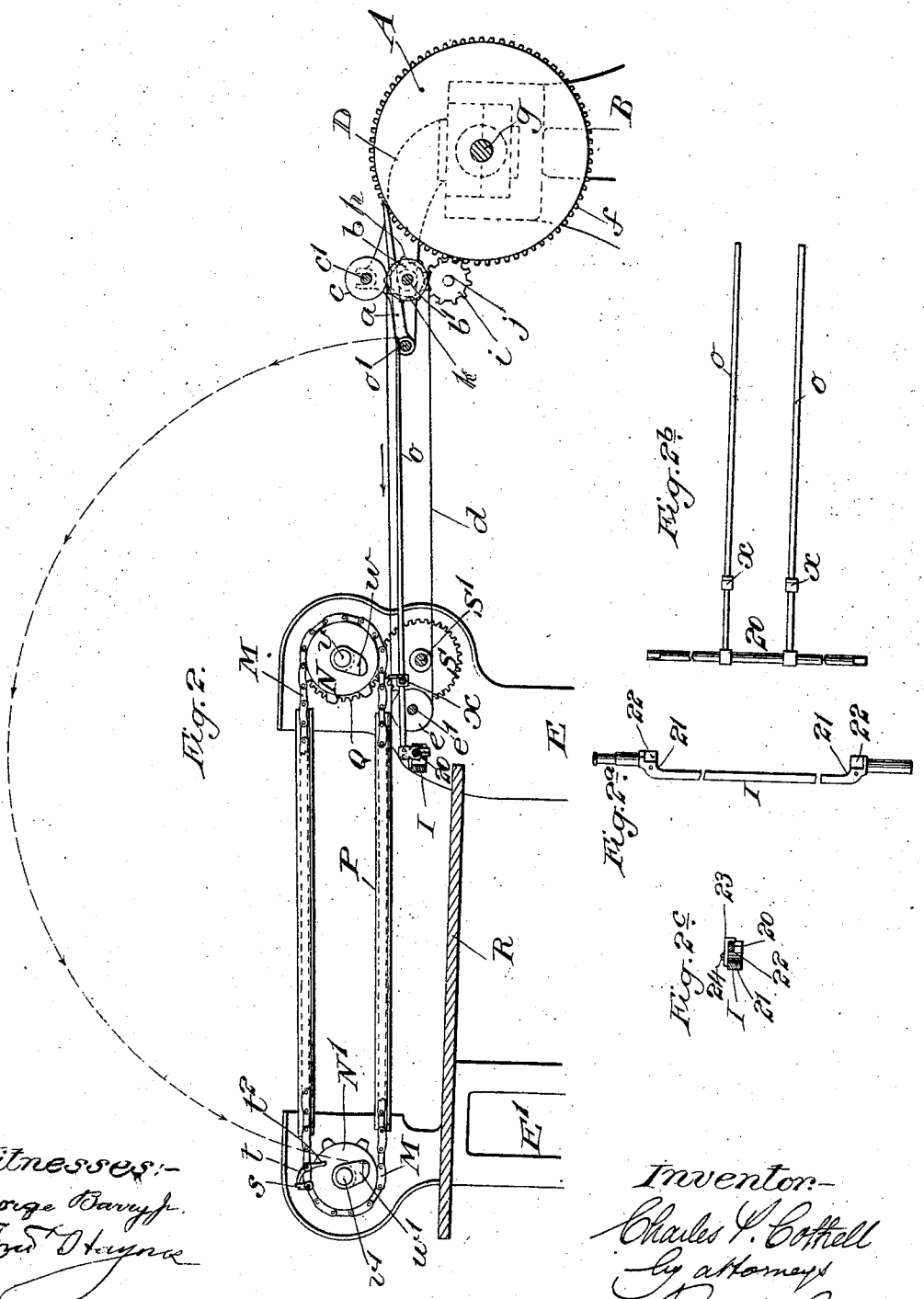
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SHEET DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Aug. 24, 1901.)

(No Model.)

4 Sheets—Sheet 2.



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SHEET DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Aug. 24, 1901.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

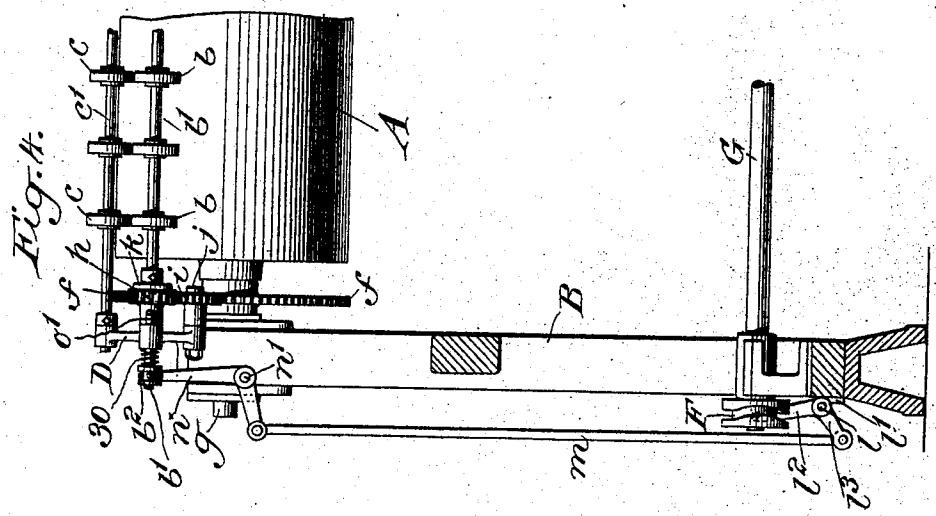
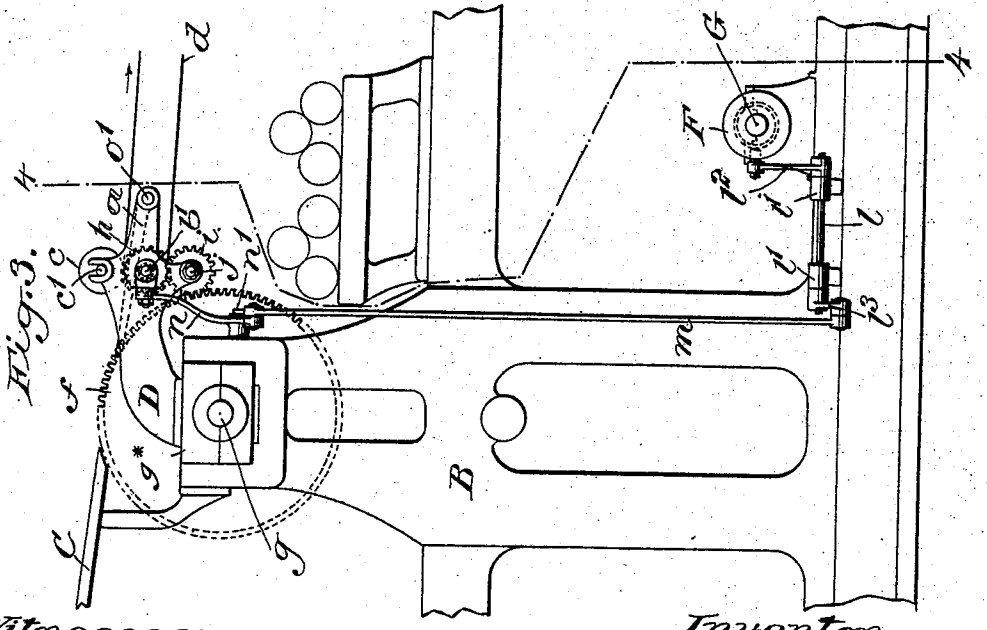


Fig. 3.



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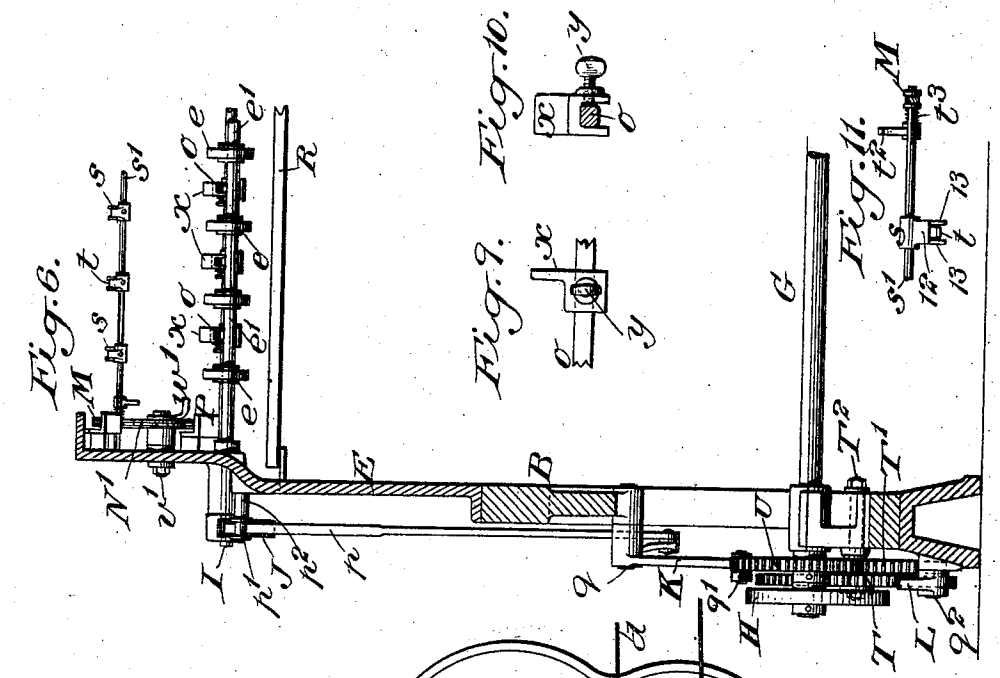
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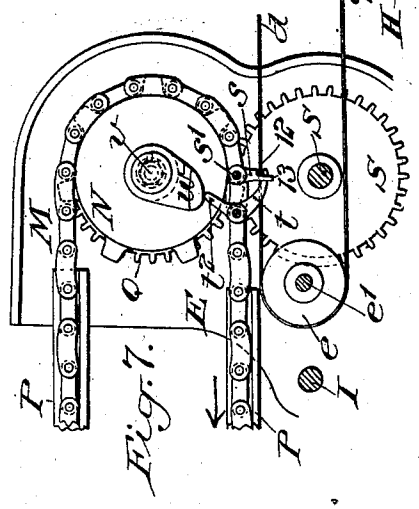
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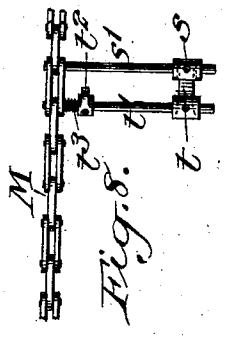
SHEET DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Aug. 24, 1901.)

(No Model.) 4 Sheets—Sheet 4.







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UNITED STATES PATENT OFFICE.

CHARLES P. COTTRELL, OF WESTERLY, RHODE ISLAND, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF STONINGTON, CONNECTICUT, AND NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

SHEET-DELIVERY MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 690,638, dated January 7, 1902.

Application filed August 24, 1901. Serial No. 73,151. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. COTTRELL, a citizen of the United States, and a resident of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Sheet-Delivery Mechanism for Printing-Machines, of which the following is a specification.

The object of this invention is to provide in a convenient manner in a printing-machine for the delivery of the printed sheets with either side upward as may be desired; and to this end the invention consists in certain novel combinations of parts hereinafter described and claimed, including an oscillating fly-frame for the delivery of the sheets with their freshly-printed sides downward and endless chains and attached grippers for their delivery with their freshly-printed sides upward.

Figure 1 is a side view of parts of a two-revolution cylinder printing-machine having applied to it for interchangeable use an oscillating fly delivery-frame and endless gripper-carrying delivery-chains according to my invention. Fig. 2 is a longitudinal vertical sectional view showing the cylinder and both delivery devices. Figs. 2^a, 2^b, and 2^c are detail views of the fly-frame. Fig. 3 is a view taken on the opposite side to Fig. 1 of parts of the machine. Fig. 4 is a transverse vertical section taken in the line 4 4 of Fig. 3. Fig. 5 is a transverse vertical section taken approximately in the line 5 5 of Fig. 1; Fig. 6, a transverse vertical section taken approximately in the line 6 6 of Fig. 1. Fig. 7 is a side view of part of the endless-chain delivery devices and parts of the carrying-tapes between the endless chains and the impression-cylinder. Figs. 8, 9, 10, and 11 are detail views which will be hereinafter explained.

A is the impression-cylinder, which is mounted in the usual or in any suitable manner in bearings on the main framing B of the machine.

R is the receiving-board for the delivered printed sheets supported in stands E E′ on the framing B at a level below the upper part of the cylinder A and at a distance in front thereof greater than the length of the sheets. The cylinder A is fitted with the usual grippers (not shown) which take the sheets to be printed from the feed-table C and from which the printed sheets are stripped by the usual strippers *a*, said strippers guiding the sheets between the tape-rollers *b c*, the shafts *b′ c′* of which run in bearings in brackets D, mounted on the journal-boxes *g** of the cylinder-shaft *g*.

d represents carrying-tapes arranged between the cylinder and the receiving-table and running on the rollers *b* and on rollers *e* on a shaft *e′*, which is supported in the stands E. The tape-rollers *b* and tapes *d* derive motion from a gear *f* on the cylinder-shaft *g* through a gear *h* on the roller-shaft *b′* and an intermediate gear *i*, which turns freely on a fixed stud *j*, carried by one of the brackets D and which gears with *f* and *h*. The brackets D, stud *j*, and shaft *b′* being carried by the boxes *g** of the cylinder-shaft, the gear *i* always remains in gear with the gears *f* and *h*. The upper runs of the tapes *d* travel in a forward direction away from the cylinder. The gear *h*, which runs constantly, is loose on the shaft *b′*, but is capable of engagement therewith by means of a friction clutch-disk *k*, Figs. 2 and 4, which is fast on the shaft. The engagement of said shaft *b′* with and its disengagement from said gear *h* is effected by a slight longitudinal movement of said shaft in opposite directions to bring the friction-disk *k* into or out of contact with the gear *h*. This movement is provided for by means of a grooved cam F (see Figs. 3 and 4) on the cam-shaft G, which also carries the cam H for operating the fly-frame, as will be hereinafter described, the said shaft G making one revolution for each impression. This cam F operates through a short rock-shaft *l*, a rod *m*, and an elbow-lever *n*, which is forked at its upper end to embrace a grooved collar b^2 on the shaft *b′*, said rock-shaft working in fixed bearings *l′* on the main framing B and having one arm, l^2, which engages with the groove of the cam F, and another arm, l^3, which is connected by the rod *m* with the lower arm of the elbow-lever *n*, said lever working on a fixed fulcrum *n′* on the framing B. The throw of the cam F and the lengths of the

arms l^2 l^3 of the rock-shaft l and of the two arms of the elbow-lever n should be so proportioned that the longitudinal movement of the shaft b' should not be sufficient to displace the rollers b b from the rollers c c. It is obvious that the said longitudinal movement requires to be extremely slight. The engagement of the shaft b' with the gear h is also provided for by a spring 30, (see Fig. 4,) which is applied between the collar b^2 and the adjacent bearing of said shaft and which acts to press the friction-disk k in contact with the gear h.

I is the rock-shaft of the fly delivery-frame, and o the fly-fingers attached thereto. This fly delivery-frame, except as to the position of the rock-shaft and the provision for detaching all the fingers together therefrom, which will be hereinafter described, resembles fly-frames commonly used in printing-machines for delivering the printed sheets. The bearings for said rock-shaft in the stands E are situated at a distance forward of the cylinder A beyond the forward tape-carrying rollers e, which rollers are at a distance from the cylinder greater than the length of the printed sheets. The fly-fingers o are so spaced that they may intervene between the carrying-tapes d and their rollers e. The rock-shaft I and the rest-bar o', provided in the brackets D for the ends of the fly-fingers, are at such elevations that when the frame is thrown backward, as shown in Figs. 1 and 2, with the fingers resting on said bar o', the fingers will be below the upper runs of the tapes d. The means for producing the oscillating movement of the fly-frame may be and are represented as substantially like those commonly used in printing-machines, as I will now briefly describe. The rock-shaft I is furnished at one end with a toothed sector J, which gears with a toothed rack-bar p, which derives a longitudinal reciprocating motion from the cam H, before mentioned, the said rack-bar being connected with one arm of an elbow-lever K, which works on a fulcrum q, fixed on the framing, and the other arm of which is connected by a rod q' with a lever L, which works on a fixed fulcrum q^2 on the framing, the said lever L being provided with a roller q^3, which is kept in contact with the cam H by a spring q^4, applied between the lever L and a suitable fixed bearing. (Not shown.) The toothed rack on the bar p is kept in gear with the toothed sector J by a bearing-roller p' applied behind said bar on a stud p^2, affixed to the framing.

For the purpose of removing all the fly-fingers o together from the rock-shaft I the said fingers are all attached by clamps of any suitable kind to a transverse rod 20, which is parallel with the rock-shaft and detachably secured therein in any suitable manner—for example, that illustrated by Figs. 2^a, 2^b, and 2^c, Fig. 2^a being a plan view of the rock-shaft I, Fig. 2^b a plan of the fly-finger rod 20, with some of its attached fingers o, and Fig. 2^c a transverse section of the rock-shaft with the fly-finger rod 20 secured therein. The rock-shaft is cranked at two points in its length, as shown at 21 in Fig. 2^a, at a sufficient distance apart to receive the ends of the finger-rod 20 in angular recesses 22, formed in the so-cranked parts. The ends of the finger-rod are squared or flattened to enter these recesses and are secured therein, as shown in Fig. 2^c, by clamping-pieces 23, which, overlapping the rod, are fastened to the rock-shaft by screws 24. It will be understood that by unscrewing the screws 24 and removing or turning aside the clamping-pieces 23 the finger-rod 20 may be removed with all the fly-fingers.

M is one of the two gripper-chains which carry the grippers s t and are so arranged above the receiving-table R that they may take the sheets from the endless tapes d and deposit them on the said table with the last-printed side upward. These chains being both alike and such gripper-carrying chains being common in sheet-delivery apparatus, I have thought it sufficient to represent one of them. The said chains are carried above the level of the tapes d on the sprocket-wheels N, which turn on fixed studs v, carried by the stands E, and on sprocket-wheels N', which turn on fixed studs v', carried by the stands E', and between the said sprocket-wheels N and those N' the said chains are supported in straight guides P, carried by the stands E E'. Said stands, chains, and guides are at a distance apart laterally greater than the width of the fly-frame, that the fingers o of the latter may pass between them. The sprocket-wheels N, on which the rearward portions of said chains run, are a short distance in rear of the tape-carrying shaft e' and rollers e. For giving motion to said chains the sprocket-wheels N have attached to them spur-gears Q, which gear with two spur-gears S on a shaft S', which turns in bearings in the stands E and which has on one end a bevel-gear S^2, gearing with a bevel-gear u' on an upright shaft u, which works in bearings u^3 on the outside of the framing B and stand E. This shaft u has on its lower end a bevel-gear u^2, which gears with a bevel-gear u^3, which is carried by a spur-gear u^4, turning on a fixed stud u^5 in a stand u^6 on the lower part of the framing B. The spur-gear u^4 gears with a spur-gear T, which is carried by a spur-gear T', turning on a fixed stud T^2, affixed to the framing B. The gear T' gears with and is driven by a gear U, Figs. 1 and 6, on the cam-shaft G, and so imparts motion through the gears T u^4 u^3 u^2, shaft u, and gears u' S^2 to the sprocket-wheel driving-shaft S'.

The grippers s t, hereinbefore mentioned as carried by the endless chains, consist of any suitable number of members s and corresponding members t, which operate between the carrying-tapes d. The gripper members s consist of jaws rigidly attached to a bar s', which is rigidly attached to the two carrying-

chains, and the members t are jaws fastened on a spindle t', which is pivoted into the carrying-chains and which is furnished near one end with a tappet t^2 (see Fig. 7 and the detail plan, Fig. 8, and back view, Fig. 11) for operation against stationary cams w w', which are affixed to the sprocket-wheel studs v v' for the purpose of opening the grippers at the proper times to receive the printed sheets from the tapes d and to release them for deposit on the table. The gripper members t are normally closed by coiled springs t^3 (see Figs. 8 and 11) on the spindle t', one end of said spring being fastened to the spindle and the other end to one of the chains. The gripper-jaws s are forked, as shown at 13 in Fig. 11, to project beyond their gripping-faces 12, as shown in Figs. 7 and 11, over the sides of the jaws t, the edges of the projecting portions 13 constituting stops to the printed sheets as they are carried forward by the tapes d and presented to the grippers. Sheet-stops x are also provided on the fingers o of the fly-frame, as shown in the detail views, Figs. 9 and 10, which are respectively a side view and a front view, the said stops being slid over the said fingers and secured thereon by binding-screws y, providing for their adjustment lengthwise on the fingers.

To explain further the operations of the two deliveries, I will first suppose that the fly-delivery is to be used for delivering the sheets with the last-printed side downward. In this case the finger-bar 20, with its attached fly-fingers, remains, of course, affixed to the rock-shaft I; but either the gripper-bar t', with its grippers t, should be removed from the chains M or the gears T T' removed from the stud T^2. If the gripper-bar and grippers only be removed, the chains will run inoperatively; but if the said gears only be removed the chains should be moved to bring the gripper-bar and grippers to the position shown in Fig. 2, in which position the grippers will remain stationary, the chain-driving mechanism being inoperative. For this operation of the fly-delivery the shaft b', which drives the tapes, is disconnected from the cam F, which may be done by taking out the pin which connects the rod m with the rock-shaft arm l^3, leaving the said shaft b' under the control of the spring 30, which keeps the gear h constantly coupled with the shaft b' by the friction-disk k and the tapes constantly running. The printing-machine being then set in operation, each printed sheet taken on by the carrying-tapes d, which are then in motion, will be carried forward printed side upward over the fly-fingers, while the latter are thrown back to the position shown in Figs. 1 and 2 until the front edge strikes the stops x. The cam H then by its movement permits the fly-frame to be thrown forward by the action of the spring q^4 on the lever L to turn over the sheet and deposit it on the table R. After this deposit of the sheet the fly-frame is swung back by the action of the cam H to its position of rest on the bar o' ready for the reception of another sheet to be delivered on the table R in the same manner.

To change from the use of the fly-delivery to the use of the endless-chain delivery for the delivery of the sheets with their printed side upward, the finger-rod 20, with the attached fly-fingers, is removed from the fly rock-shaft I, and the connection between the cam F and the shaft b' is restored. If the grippers had been removed from their carrying-chains M, they should now be replaced and the chains be so adjusted relatively to the impression-cylinder and the mechanism for operating the tapes d that the grippers arrive in such position below the sprocket-wheels N (see Fig. 7) where they are opened by the cam w just as the sheet carried by the tapes has its front edge brought to the stops 13 on the gripper members s. This adjustment of the chains may be effected by turning the shaft S' by a hand-crank or equivalent device, the gears T' T being at the time removed from the stud T^2. The latter gears having been replaced in gear with U and u^4, respectively, and the machine having been set in motion, each sheet taken from the cylinder on the tapes d with its last-printed side upward is carried forward by the latter till its front edge comes in contact with the stops 13 of the grippers, which are then held open by the cam w, and at this moment by the action of the cam F the tape roller-shaft is disengaged from its driving-gear h and the movement of the tapes is arrested. The gripper-tappet t^2 then immediately escaping from the cam w, the grippers close on the sheet, which is then carried forward over the table R until the grippers arrive at the cam w', on striking which they open and liberate the sheet, which then drops to the table with the last-printed side upward. During the above-described operation of the endless-chain delivery the fly rock-shaft I and its actuating mechanism continue in operation without interfering with the endless-chain delivery.

On reference to Fig. 1 it will be seen that the chain-driving gears U and T' are shown eccentric to their shafts. This eccentricity may not be necessary; but I consider it preferable in order that the chains may have a slower motion at the time of opening the grippers to drop the sheets upon the receiving-table. It may also be seen on reference to Figs. 1 and 2 that the tapes and the gripper-chains are represented with a downward inclination in a forward direction. I consider this inclination desirable to facilitate the carrying forward of the sheets.

What I claim as my invention is—

1. In a printing-machine, the combination of a rotary impression-cylinder, a fly delivery-frame, a chain delivery-carrier consisting of chains and attached grippers, and tapes common to said fly-frame and to said carrier for

receiving the printed sheets from the cylinder and presenting them either to said fly-frame or said carrier, substantially as herein described.

2. In a printing-machine fitted with an endless-chain delivery device and a fly-delivery, the combination with the fly rock-shaft of a rod and attached fly-fingers detachably connected with said rock-shaft, substantially as herein described.

3. In a printing-machine, the combination of a rotary impression-cylinder, endless delivery-tapes arranged in front of said cylinder for carrying the sheets forward therefrom, a receiving-table in front of said tapes, an endless-chain delivery-carrier also in front of said tapes for receiving the sheets therefrom and depositing them on said table, an oscillating fly-frame the rock-shaft of which is forward of the tapes and the fingers of which are capable of swinging forward between the tapes and backward between the chains of said carrier, and means for rendering said carrier inoperative during the operation of the printing-machine with the fly-delivery, substantially as herein described.

4. In a printing-machine, the combination of a rotary impression-cylinder, a sheet-delivery device consisting of endless chains and attached grippers and on which are sheet-stops, an endless-tape carrier for carrying printed sheets from the cylinder to said delivery device, means for driving said endless-tape carrier, and means for disengaging said carrier from its driving mechanism on the arrival of the sheets at the stops on the delivery device, substantially as herein described.

5. In a printing-machine, the combination of a rotary impression-cylinder, a sheet-delivery device consisting of endless chains and attached grippers, an endless-tape carrier for carrying printed sheets from the cylinder to said carrier, and means for driving said delivery device at a varying speed which is reduced at the time of the presentation of the sheets by the tape-carrier to said delivery device, substantially as herein described.

6. In a printing-machine, the combination of a rotary impression-cylinder, a sheet-delivery device consisting of endless chains and attached grippers, an endless-tape carrier for carrying printed sheets from the cylinder to said carrier and stops on said grippers for arresting the sheets presented thereto by the endless-tape carrier, substantially as set forth.

7. In a sheet-delivery mechanism for printing-machines, the combination of endless gripper-carrying chains and grippers consisting each of two jaws one of which is forked to overlap the sides of the other and form a sheet-stop, substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 29th day of July, A. D. 1901.

CHARLES P. COTTRELL.

Witnesses:
A. R. STILLMAN,
B. F. LAKE.