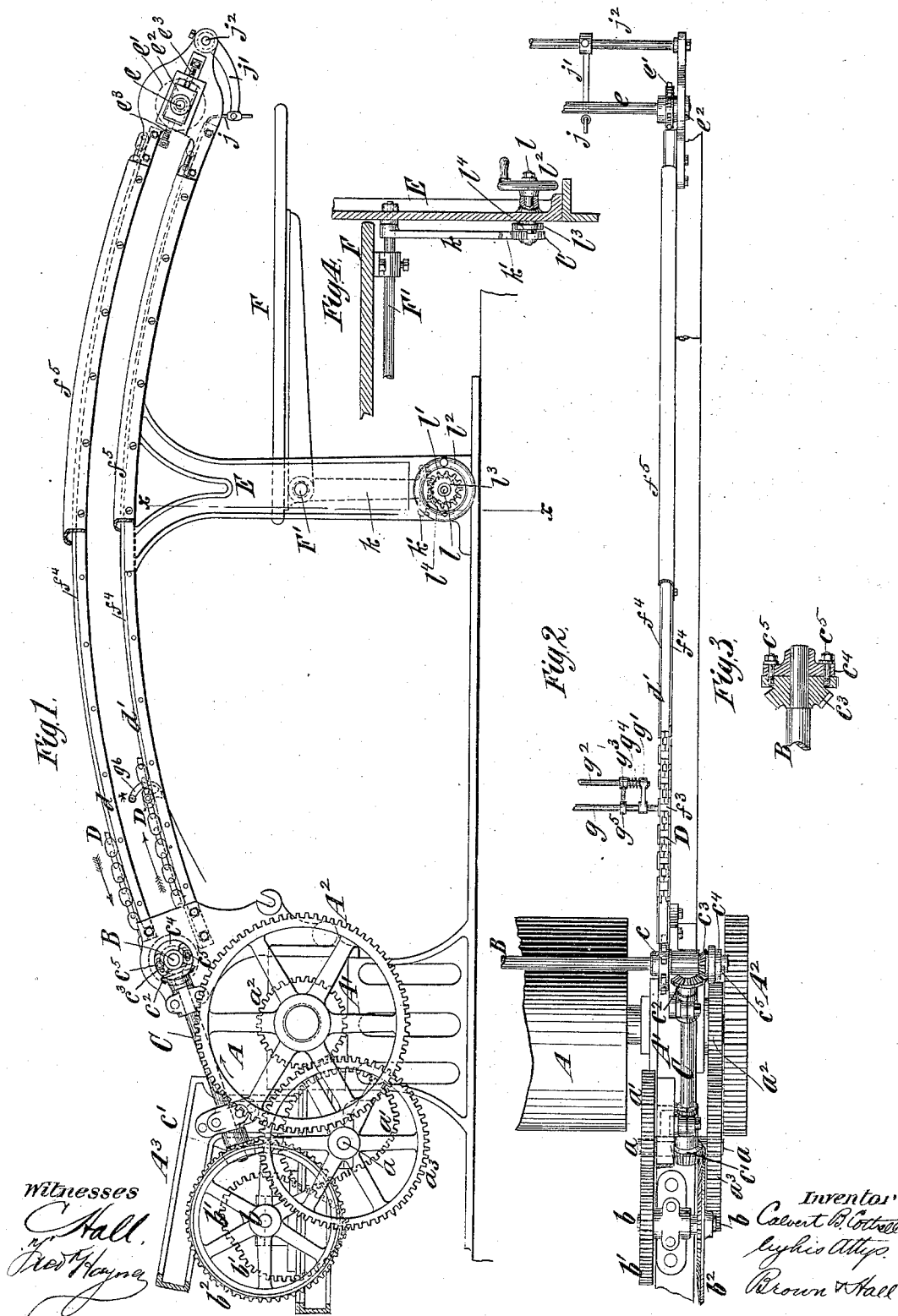


C. B. COTTRELL.

SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 319,460.

Patented June 9, 1885.



(No Model.)

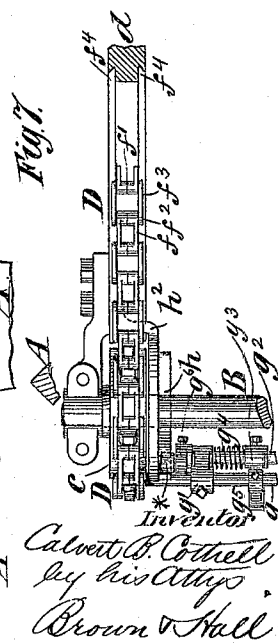
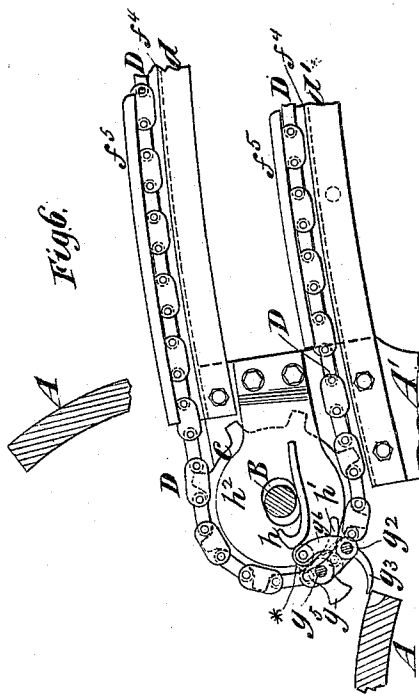
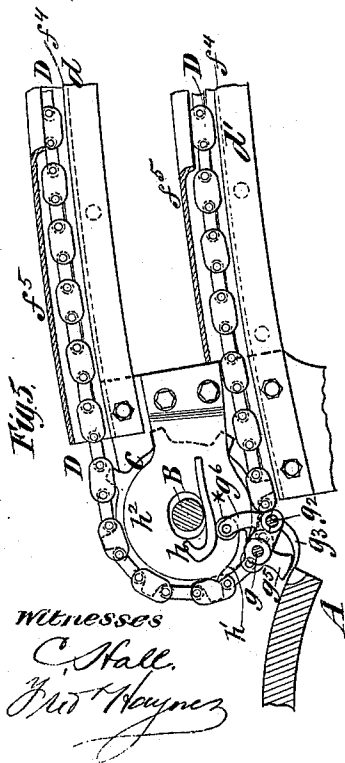
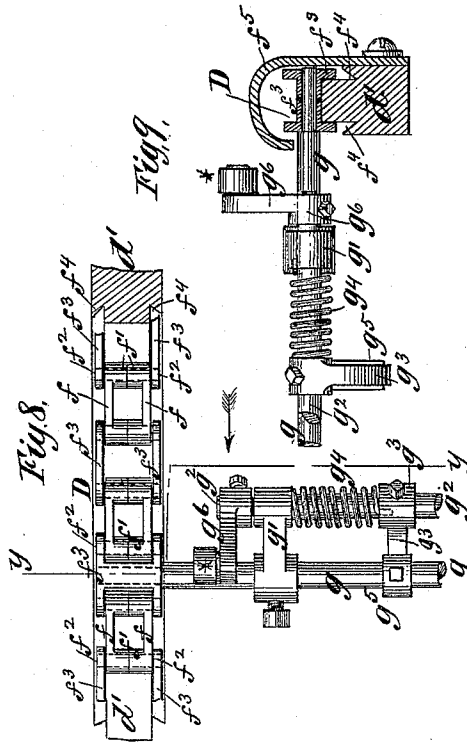
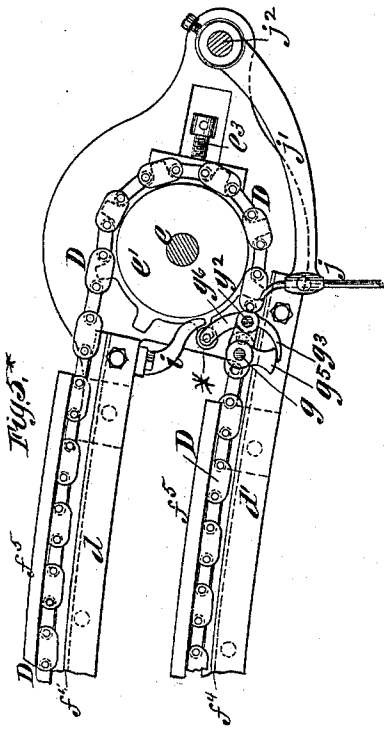
3 Sheets—Sheet 2.

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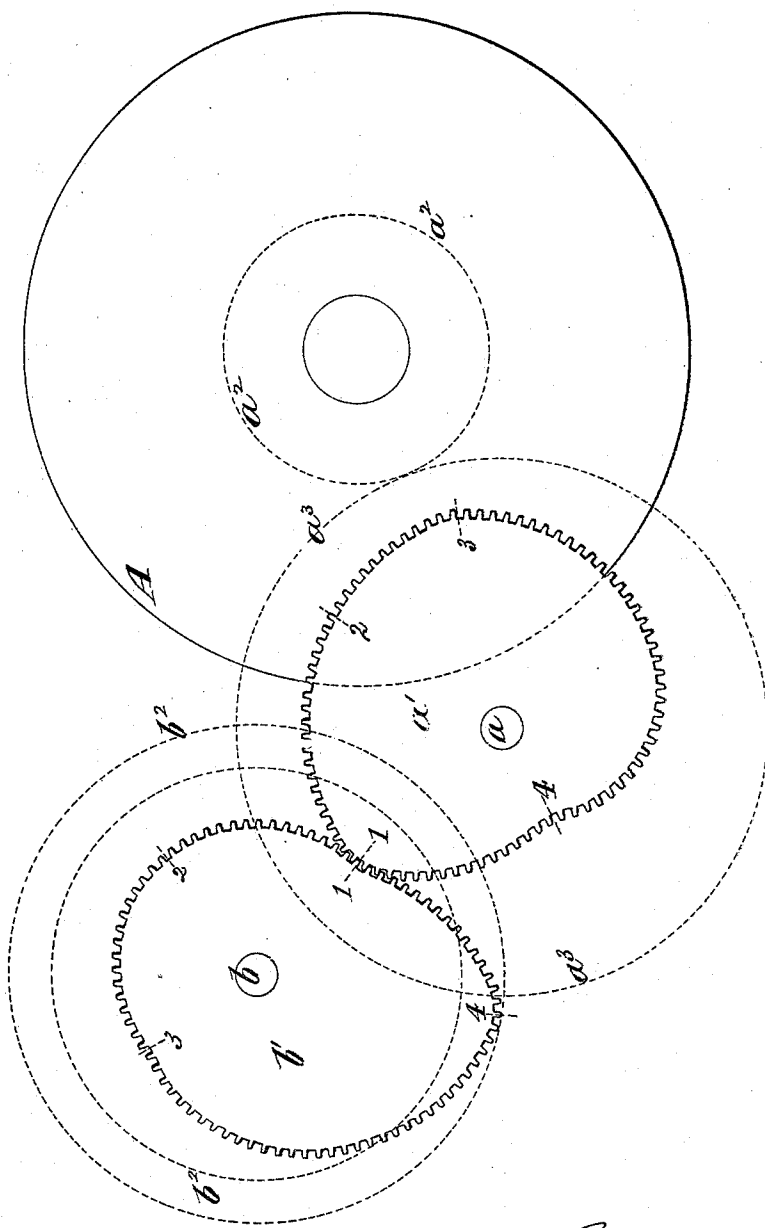
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Fig 10.



Witnesses:

Chas. S. Nagren
Matthew Pollock

Inventor:

Calvert P. Cottrell
by his Attys.
Brown & Hall.

UNITED STATES PATENT OFFICE.

CALVERT B. COTTRELL, OF STONINGTON, CONNECTICUT.

SHEET-DELIVERY APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 319,460, dated June 9, 1885.

Application filed January 28, 1884. (No model.)

To all whom it may concern:

Be it known that I, CALVERT B. COTTRELL, of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Sheet-Delivery Apparatus for Printing-Machines, of which the following is a specification.

My invention relates to sheet-delivery apparatus comprising grippers which are employed to take the printed sheet from the front of the impression-cylinder and carry it to and deliver it upon the receiving board or table with the last printed side uppermost.

In my application for Letters Patent filed November 26, 1883, and of which the serial number is 112,916, I have shown and described a front-delivery apparatus consisting of an endless carrier composed of two endless chains and gripper-rods extending between them, arranged at the front of the cylinder, and having an alternately accelerated and retarded movement, whereby the carrier is moved quickly to carry the printed sheets from the cylinder to the receiving-table, and is slowed down to deliver the printed sheets. In my aforesaid application the carrier was operated during the principal portion of its movement by mechanism independent of the cylinder, but at the time of taking the sheets the carrier received motion from the cylinder alone, in order to insure the movement of the delivery-grippers at the same speed as the cylinder during the transfer of the printed sheet from the cylinder-grippers to the delivery-grippers, and during such time as the said carrier was driven from the cylinder the mechanism for imparting the accelerated and retarded motion to the carrier was inoperative.

An important object of my present invention is to provide for driving the carrier from the cylinder alone, or from a shaft having a uniform rotary motion alone, and imparting to it the requisite accelerated and retarded movement without ever disconnecting it from the driving mechanism operated from the cylinder or from said uniformly-rotating shaft.

The invention consists, essentially, in the combination, with an impression-cylinder, of an endless carrier provided with delivery-grippers arranged at the front of the cylinder, and mechanism, substantially such as hereinaf-

ter described, receiving motion from the cylinder alone, and serving to impart an alternately accelerated and retarded movement to the carrier, whereby the carrier will be moved quickly to take the printed sheets from the cylinder to the receiving-table, and slowed down to deliver the printed sheets.

The invention also consists in the combination, with an impression-cylinder, of an endless carrier provided with delivery-grippers, arranged at the front of the cylinder, and mechanism, substantially such as hereinafter described, and comprising cam-shaped gear-wheels for transmitting an alternately accelerated and retarded movement to the said carrier from a shaft having a uniform rotary motion. The cylinder of a two-revolution press has a uniform rotary motion, and the mechanism above referred to and comprising the cam-shaped gear-wheels may receive motion from the cylinder shaft or journal.

The invention also consists in various novel combinations of parts and details of construction in the mechanism through which the endless carrier is operated, as hereinafter particularly described, and pointed out in the claims.

The invention also consists in the combination, with an impression-cylinder and endless chains provided with delivery-grippers arranged at the front of the cylinder, and having an alternately accelerated and retarded movement, of tracks or ways for said chains, a chain-wheel shaft, and chain-wheels at the ends of the tracks or ways which are adjacent to the cylinder, and chain-wheels or idlers supported by said tracks or ways at their opposite ends.

The invention also consists in the combination, with an impression-cylinder and endless chains arranged at the front thereof, of a novel construction and arrangement of the several parts of the gripper mechanism, including a cam for opening the grippers, all as particularly hereinafter described, and pointed out in the claims.

The invention also consists in the combination, with an impression-cylinder, of endless chains provided with delivery-grippers arranged at the front of the cylinder, tracks or ways for said chains having an upward curvature between their ends, and a pivoted re-

ceiving-table capable of being raised and lowered.

The invention also consists in the combination of a receiving-table, a rock-shaft whereby it is pivotally supported, and mechanism, particularly hereinafter described, and pointed out in the claims, for adjusting said table in different positions.

To enable the invention to be more readily understood, I will first give a brief description of a sheet-delivery apparatus embodying my invention and applied to a two-revolution press.

In front of the cylinder is arranged a chain-wheel shaft, on which are the driving chain or sprocket wheels, by which the two endless chains constituting the endless carrier are moved. Adjacent to and preferably behind the cylinder are two short shafts geared together by cam-shaped spur-wheels. The first of these two shafts is geared directly with the cylinder-shaft, or with a shaft having a uniform rotary motion, and by means of the cam-shaped spur gear-wheels the uniformly-rotating first shaft transmits a variable rotary motion to the second shaft. By means of a large bevel-wheel and pinion the said second shaft transmits its variable rotary motion to a diagonal or inclined shaft, which extends upward and forward to the chain-wheel shaft above referred to, and which is connected by bevel-wheels with said chain-wheel shaft. The bevel-wheel on the chain-wheel shaft is not fast thereon, but may be fixed relatively thereto by clamping or securing it by bolts to a disk or flange which is fast on said chain-wheel shaft, and by turning the chain-wheel shaft slightly the delivery-grippers may be turned so that they will come into position for taking the printed sheet at just the right moment, and the bevel-wheel may then be fixed relatively to the shaft by tightening up the bolts which secure said wheel to the disk or flange which is fast on said chain-wheel shaft. From the two chain-driving wheels above referred to pairs of tracks or ways extend forward, the tracks or ways of each pair being arranged or supported one above the other. The lower of the two tracks or ways supports the chain as it travels from the cylinder, and the upper of said tracks or ways supports the chain as it returns toward the cylinder. The pairs of tracks or ways are arched or curved upwardly, and are supported at their ends nearest the cylinder and at about the middle of their length. Their front ends need no support, but are provided with bearings wherein chain-wheels or idlers are held. The upward curvature of the tracks or ways causes the printed sheets to be carried high above the form and clear over the inking apparatus, and also affords ample room for access to the form. Between corresponding links of the two chains there extends a non-rotary gripper-bar having projecting arms, wherein is journaled the gripper-shaft, and on one end of the gripper-

shaft is an arm, which is operated on to open and close the grippers. The delivery-grippers are opened by the aforesaid arm striking on a cam-surface adjacent to one of the chain-driving wheels, and I may also employ a second cam for acting on the said arm to close the grippers on the sheet positively in taking the sheet from the cylinder. I may also employ a receiving-table which is pivoted at its rear end, so that its front end may be dropped down slightly, to better receive sheets from chains moving on arc-shaped or curved tracks or ways. The pivot of said table is formed by a rock-shaft, which extends transversely across the press, and is provided with a downwardly-extending arm, on which is a geared sector. A short shaft provided with a pinion engaging said sector and a hand-wheel for turning it serves as a means of tilting the receiving-table, and said table is held in the position to which it is adjusted by a pawl engaging with a ratchet-wheel on said short shaft.

In the accompanying drawings, Figure 1 is a side view of such parts of a press as are necessary to illustrate my invention. Fig. 2 is a plan of a portion thereof, including one end portion of the cylinder, one chain, and the mechanism for operating the chains from the cylinder. Fig. 3 is a detail sectional view showing the adjustable connection of a bevel-wheel with the chain-wheel shaft. Fig. 4 is a vertical section on the line *xx*, Fig. 1, showing the mechanism for adjusting the receiving-table. Fig. 5 is a sectional view of a portion of the cylinder, also showing in side view that chain and pair of tracks or ways which are on the side of the press opposite that shown in Fig. 1, said view being upon a larger scale, and illustrating the delivery-grippers as just closed on the sheet. Fig. 5* illustrates the forward ends of the tracks or ways, and shows the grippers about to deliver. Fig. 6 is a sectional side view, similar to Fig. 5, of that portion of the chain which is adjacent to the cylinder, illustrating the delivery-grippers in their open position. Fig. 7 is a plan of the parts shown in Fig. 6, the positions of the several parts corresponding to Fig. 6. Fig. 8 is a plan, on a much larger scale, of a portion of one of the endless chains and gripper mechanism, also including a part of the track or way. Fig. 9 is a sectional view on the dotted line *yy*, Fig. 8, and on the same scale; and Fig. 10 is a diagram illustrating the cam-shaped spur-wheels on a much larger scale, also including in dotted outlines the parts from which these wheels receive motion and through which they transmit motion.

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

A designates the cylinder mounted in the cylinder side frames, A', and provided with the ordinary cylinder gear, A², through which rotary motion in the direction of the arrow is imparted to it.

A³ designates the feed-board. Adjacent to,

and in this instance behind, the cylinder A are two short shafts, a b , which are geared together by cam-shaped spur-wheels a' b' . The first shaft, a , is geared from the cylinder by a smaller wheel, a^2 , on the cylinder-shaft, and a larger wheel, a^3 , on the shaft a ; and through the cam-shaped wheels a' b' the shaft a , which has a uniform rotary motion, imparts a variable rotary motion to the shaft b .

In front of the cylinder A is a chain-wheel shaft, B, whereon are secured chain-driving wheels c , and the shafts B and b are connected by a diagonal or inclined shaft, C, geared with both said shafts. On the second shaft, b , is a large bevel-wheel, b^2 , which gears into a bevel-pinion, c' , on the shaft C, and said shaft C is connected with the shaft B by bevel-wheels c^2 c' . The shafts a , b , B, and C are all mounted in bearings supported from the cylinder side frames, A'. The wheel c^3 is not fast on the shaft B, but is fixed relatively thereto by an adjustable connection. (Best shown in Fig. 3.) On said shaft B is securely fixed a flange or disk, c^4 , having arc-shaped slots, through which bolts c^5 pass and enter the hub of the wheel c^3 . By slackening the bolts c^5 and turning the wheel c^3 slightly on its shaft B the delivery-grippers, hereinafter described, may be timed relatively to the rotation of the cylinder, and by tightening the said bolts the wheel may be securely fixed relatively to said shaft B.

D D designate the chains which constitute the endless carrier, and which pass around and are driven by the wheels c . The endless chains D D are each supported by a pair of tracks or ways, d d' , arranged one above another, the upper, d , serving to support the chain in its movement toward the cylinder A, and the lower, d' , serving to support the chain in its movement from the cylinder. Each pair of tracks or ways are arched or have an upward curvature, as best shown in Fig. 1, and are supported at their ends adjacent to the cylinder by brackets attached to or projecting from the cylinder side frames, A'. At about the middle of their length the pairs of tracks or ways d d' are supported by uprights E, and at their forward ends the pairs of tracks or ways support a chain-wheel or idler shaft, e , on which are wheels or idlers e' , over which the chains D D pass. The ends of the shaft e are mounted in boxes e^2 , which are adjustable by means of set-screws e^3 , to vary the tension on the chains.

The construction of a chain which I find to be very desirable is best shown in Figs. 8 and 9, but also in Figs. 5, 5*, and 7. I here make no claim to this chain; but it, with other features, forms the subject of my application for Letters Patent, Serial No. 139,236, filed July 31, 1884. Alternate links of the chain are composed of two side pieces, f f' , provided with inwardly-projecting hubs f'' , which receive the chain-pins f^2 through them. Intermediate links are formed by side plates, f^3 f^3 , through which the pins f^2 also pass, and outside which

the ends of the pins are riveted. The eyes f' can then turn freely on the pins, which are fast at the ends in the plates f^3 . The depth of the side portions, f f' , is equal to the diameter of the hubs or eyes f'' , and the said hubs or eyes bear on top of the tracks or ways d d' , as is shown in Fig. 9, while the plates f^3 lap over and project down on opposite sides of said tracks or ways, as also shown in said figure. In opposite sides of the tracks or ways are inclined gutters f^4 , (best shown in Fig. 9,) which receive any oil dripping from the chain, and conduct it to one end or the other of said tracks or ways, where it will be delivered.

The tracks or ways d d' are provided with guards or shields f^5 , which lap over and cover the chains and enable the attendant to grasp the said tracks or ways without the liability of taking hold of a moving chain. These shields or guards f^5 are secured to the outer sides of the tracks or ways, as is best shown in Fig. 9, and they may be used or not, as desired.

The tracks or ways provided with oil-gutters, and also the guards above described, are embraced in my aforesaid application, Serial No. 139,236, and are not here claimed.

The arrangement and construction of the gripper mechanism is best shown in Figs. 8 and 9, but also in Figs. 5, 6, and 7. A non-rotary gripper-bar, g , extends between the two chains, and is formed integral with or rigidly secured to corresponding links, f^3 , in the two chains. These two links may be left solid instead of being formed by two plates, f^3 f^3 , and one tooth of each chain-wheel c may be removed to enable said solid link to pass the wheel.

g' designates arms which are formed integral with or are rigidly secured to the non-rotary gripper-bar g , and in which is journaled the gripper-shaft g^2 , on which are the gripper-fingers g^3 . At each end of the gripper-shaft g^2 is a closing-spring, g^4 , applied in the usual way, and said gripper-fingers close onto gripper-rests g^5 on the bar g . On the end of the gripper-shaft g^2 is an arm, g^6 , on which is a roller, *.

h h' designate two stationary cams, which are formed on a bracket, h^2 , secured to the cylinder side frames, A', and between which the roller * passes. As the chains D bring the grippers to the position shown in Fig. 6, the roller * bears on the stationary cam h and opens the gripper-fingers g^3 , as shown in Fig. 6. As they receive the sheet, the roller * bears on the cam h' , and thereby the gripper-fingers are closed positively on the sheet, as shown in Fig. 5. As the grippers are brought to the delivery position shown in Fig. 5*, the roller * strikes a projection, i , attached to one of the tracks or ways, and the gripper-fingers g^3 are thereby opened and the sheet is delivered onto the receiving-table F. The chains should have two sets of gripper mechanism, and at each retarding of their movement one set will deliver a sheet on the receiving-table F.

In order to stop the sheet as it is delivered and prevent its being carried beyond the table F by reason of its momentum after the gripper-fingers release it; I employ guards or stops *j*, against which the front edge will strike, and by which it will be prevented from shooting ahead and off the receiving-table F. These stops or guards *j* are secured in arms *j'*, which project inward from a rod, *j''*, connecting the outer ends of the pairs of tracks or ways *d d'*. The receiving-table F is mounted on a rock-shaft, F', which extends transversely across the press, and is journaled in the standards or uprights E. Upon this shaft is a downwardly-projecting arm, *k*, having a sector-gear, *k'*, at its lower end.

Journaled in one of the standards or uprights E is a short shaft, *l*, on which are secured a pinion, *l'*, gearing into said sector, a hand-wheel, *l''*, whereby the shaft may be turned, and a ratchet-wheel, *l'''*, all as shown in Figs. 1 and 4. A pawl, *l''''*, pivoted to the standard E, takes into said ratchet-wheel. The table F can be raised by turning the hand-wheel *l''* in one direction, and will then be held by the pawl *l''''* engaging with the ratchet-wheel *l'''*. When the table is to be lowered, the pawl *l''''* is disengaged and the pinion *l'* and hand-wheel *l''* allowed to turn as much as desired.

The position of the cam-shaped spur-wheels *a' b'* shown in Fig. 10 corresponds to that shown in Fig. 1, and to the position of the delivery-grippers shown in Fig. 6. The wheel *a''* is only half the size of the wheel *a'*, into which it drives, and therefore the shaft *a* and cam-wheel *a'* only make one revolution to each two revolutions of the cylinder A.

As before stated, when the wheels *a' b'* are in the position shown in Fig. 10, the delivery-grippers are just about taking a sheet from the cylinder, and the carrier and cylinder have the same speed. The portions of the wheels *a' b'* from 1 to 2 are concentric, and hence such speed is preserved while the said portions are in gear. From 2 to 3 the radius of the wheel *a'* slightly increases, and the radius of the wheel *b'* slightly decreases, and hence the speed transmitted to the carrier slightly increases until the points 3 of the two wheels are together, at which time the carrier has its quickest speed of movement. At the points 4 the wheel *a'* has least radius, while at that point the wheel *b'* has its greatest radius; and while the portions 3 to 4 of said wheels are in gear the speed of the carrier is reduced as rapidly and yet easily as possible. When the points 4 of the wheels are coincident, the sheet is delivered, and as the portions 4 to 1 of the wheels work together the speed of movement of the carrier is accelerated to bring the speed of the carrier up to the surface velocity of the cylinder, at which time the sheet is taken therefrom.

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

1. The combination, with an impression-cylinder, of an endless carrier provided with

delivery-grippers arranged at the front of the cylinder, and mechanism, substantially such as described, receiving motion from the cylinder alone, and imparting an alternately accelerated and retarded movement to said carrier, substantially as herein described.

2. The combination, with an impression-cylinder, of an endless carrier provided with delivery-grippers arranged at the front of the cylinder, and mechanism, substantially such as herein described, and comprising cam-shaped gear-wheels, for transmitting an alternately accelerated and retarded movement to said carrier from a shaft having a uniform rotary motion, as and for the purpose set forth.

3. The combination, with the impression-cylinder A, of the chain-wheel shaft B, arranged at the front thereof and provided with chain-wheels *c*, the endless chains D D, provided with delivery-grippers and operated by said chain-wheels, the shaft *a*, having a uniform rotary motion, the shaft *b*, cam-shaped gear-wheels *a' b'*, connecting the shafts *a b*, the shaft C, the wheel and pinion *b'' c'*, connecting the shafts *b' C*, and the wheels *c'' c'''*, connecting the shaft C and said chain-wheel shaft B, substantially as and for the purpose herein described.

4. The combination of the impression-cylinder A, the chain-wheel shaft B, arranged at the front thereof and provided with chain-wheels *c*, the endless chains D D, provided with delivery-grippers and operated by said chain-wheels, the shaft C, wheels *c'' c'''*, connecting the shafts B C, the wheel *c''* being adjustably secured on the shaft B, the shaft *a*, having a uniform rotary motion, and the shaft *b*, geared with the shaft C by the wheel and pinion *b'' c'*, and geared with the shaft *a* by the cam-shaped wheels *a' b'*, substantially as and for the purpose herein described.

5. The combination, with an impression-cylinder and endless chains provided with delivery-grippers arranged at the front of the cylinder, and having an alternately accelerated and retarded movement, whereby said chains are moved quickly to carry the printed sheets from the cylinder to the receiving-table, and are slowed to deliver the sheets, of tracks or ways for said chains, a chain-wheel shaft and chain-driving wheels at the ends of said tracks or ways which are adjacent to the cylinder, and chain-wheels or idlers supported by said tracks or ways at their opposite ends, substantially as and for the purpose herein described.

6. The combination, with an impression-cylinder and endless chains D D, arranged at the front thereof, of the non-rotary gripper-bar *g*, extending between said chains and provided with arms *g' g'*, the gripper-shaft *g''*, journaled in said arms, and provided with gripper-fingers *g'''* and with the arm *g''''*, and a cam, *h*, for acting on said arm *g''''*, to turn said shaft for opening the grippers, substantially as and for the purpose herein described.

7. The combination, with an impression-

cylinder, of endless chains provided with delivery-grippers arranged at the front of the cylinder, tracks or ways for said chains, having an upward curvature between their
5 ends, and a pivoted receiving-table capable of being raised and lowered, substantially as herein described.

8. The combination of the receiving-table

F, the rock-shaft F', with its arm and sector k k', and the shaft and pinion l l', for adjusting
said table, substantially as herein described. 10

C. B. COTTRELL.

Witnesses:

CHANDLER HALL,
FREDK. HAYNES.