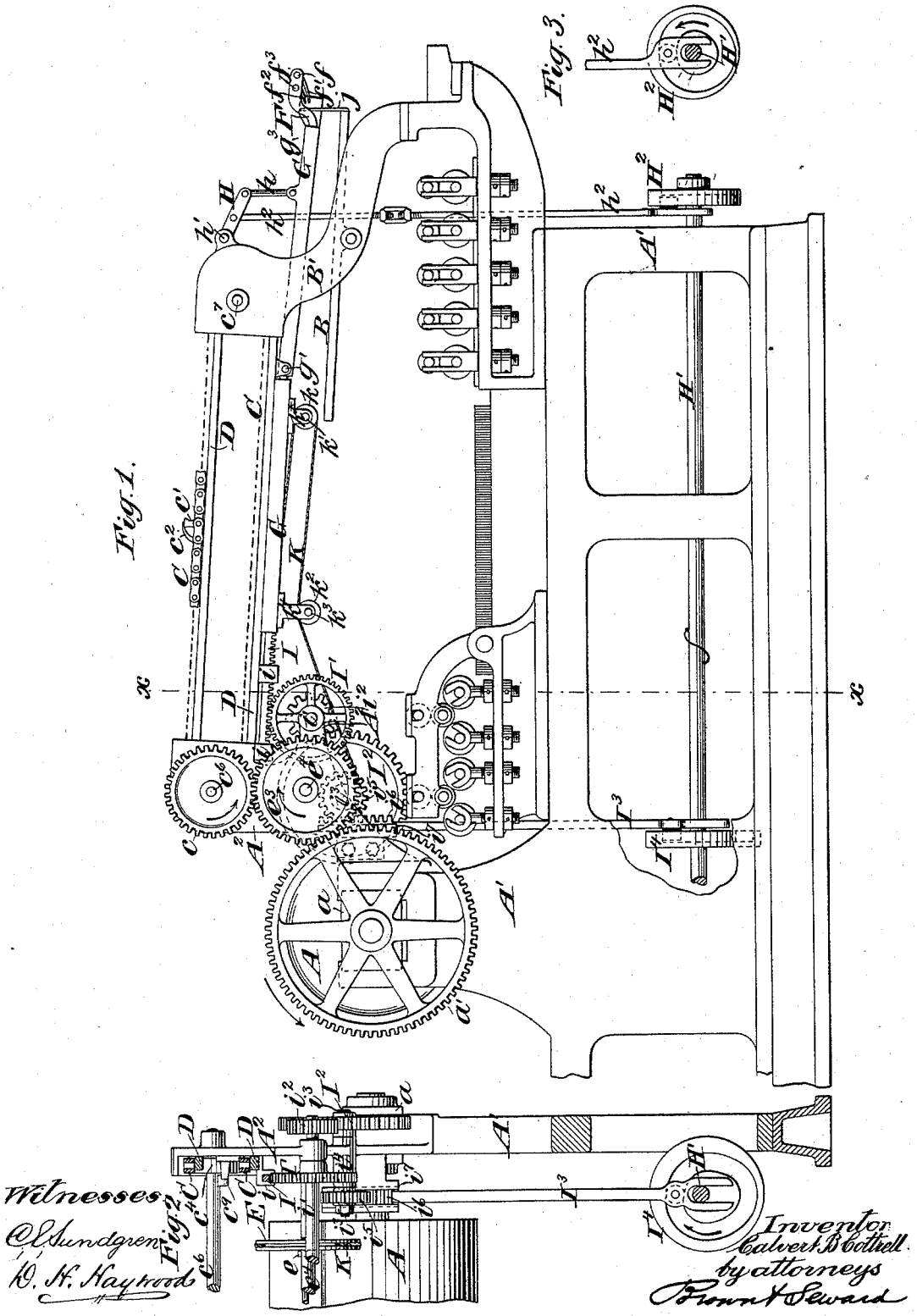
(No Model.) 3 Sheets—Sheet 1.

C. B. COTTRELL.

SHEET DELIVERY APPARATUS FOR PRINTING PRESSES.

No. 456,669. Patented July 28, 1891.



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(No Model.) 3 Sheets—Sheet 2.

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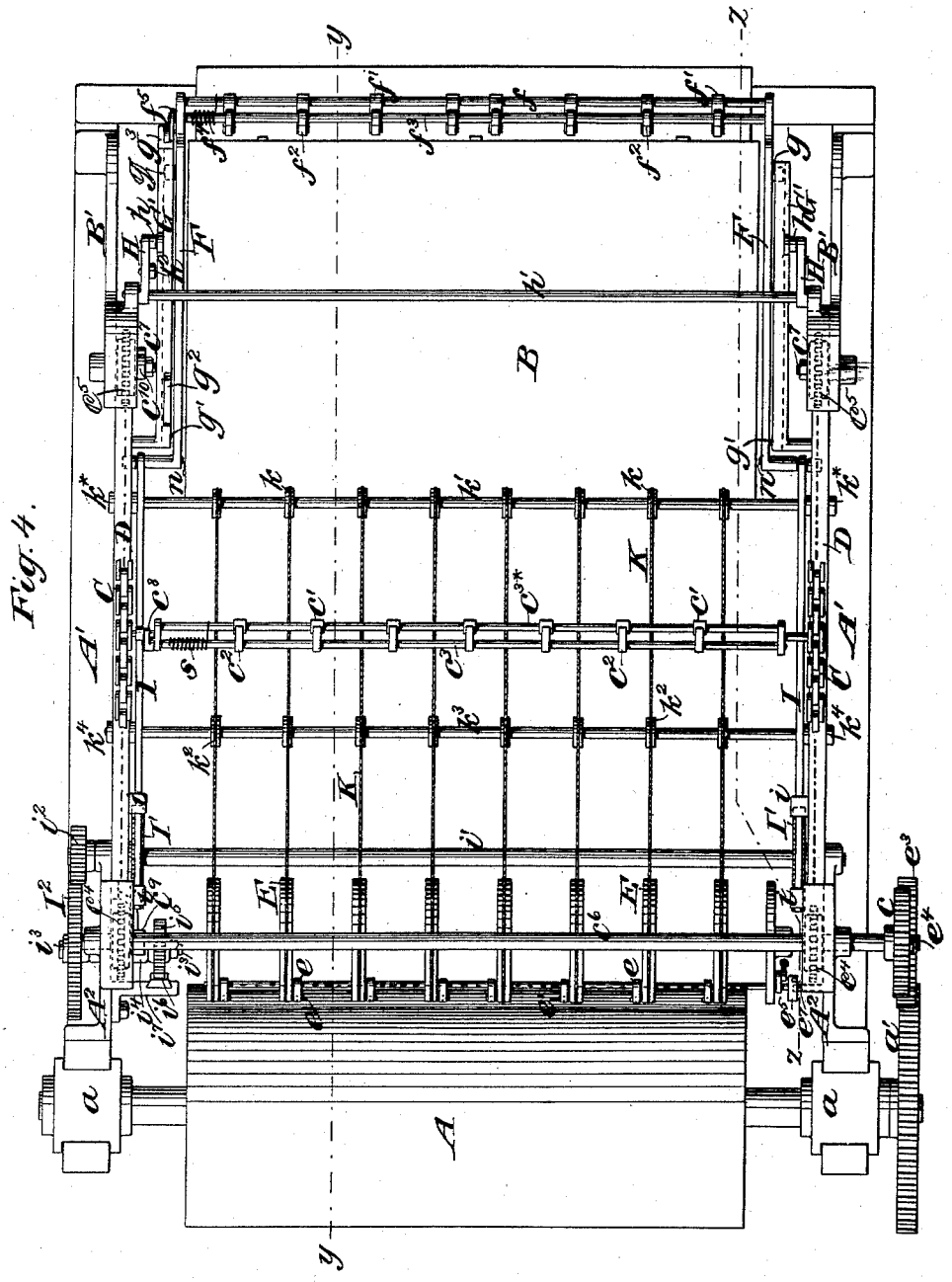
Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 5.

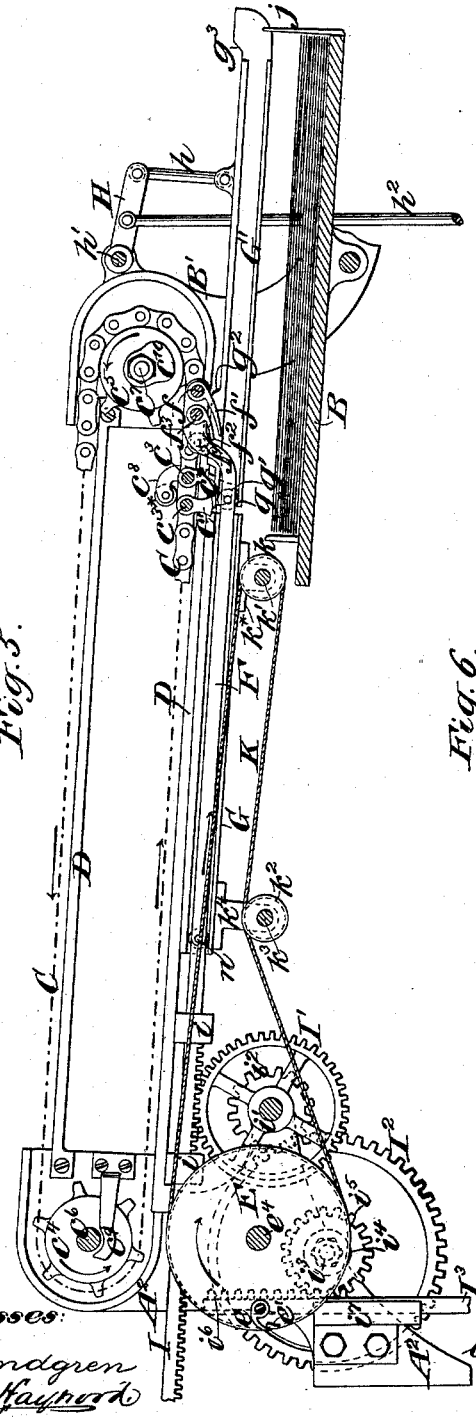
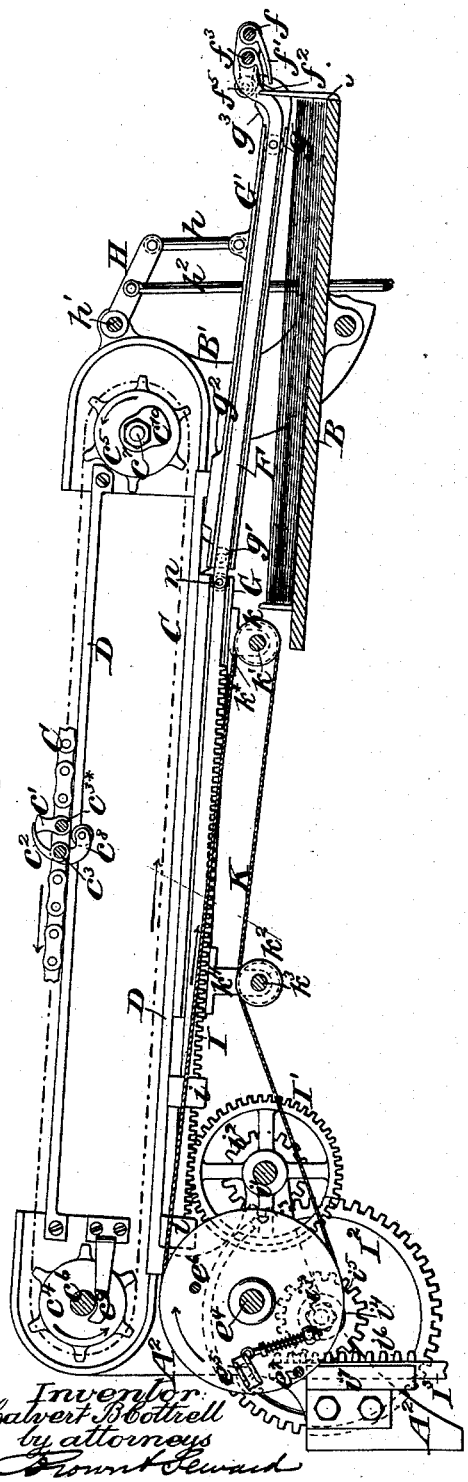


Fig. 6.



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UNITED STATES PATENT OFFICE.

CALVERT B. COTTRELL, OF WESTERLY, RHODE ISLAND.

SHEET-DELIVERY APPARATUS FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 456,669, dated July 28, 1891.

Application filed February 14, 1891. Serial No. 381,442. (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 Sheet-Delivery Apparatus for Printing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention is represented in connection with the second impression-cylinder of a perfecting printing-machine, such as is illustrated and fully described in my United States Patent, No. 453,757, dated June 9, 1891, the said machine having a reciprocating type-bed carrying two forms, operating in combination with two impression-cylinders.

Figure 1 represents a side elevation of such parts of the machine as are necessary to illustrate my invention. Fig. 2 is a sectional elevation, taken at right angles to Fig. 1, in the line $x\ x$ of that figure, showing one end of the impression-cylinder, the corresponding side of the framing with parts of the delivery apparatus, and some of the gearing for driving the latter. Fig. 3 is a view taken at right angles to Fig. 1, and part of the mechanism for operating the delivery apparatus. Fig. 4 is a plan view corresponding with Fig. 1. Fig. 5 is a longitudinal vertical sectional view of the delivery apparatus on a larger scale than the preceding figures, taken in the line $y\ y$ of Fig. 4. Fig. 6 is a longitudinal vertical sectional view on a scale corresponding with that of Fig. 5, taken in the line $z\ z$ of Fig. 4.

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

A designates the impression-cylinder, supported in journal-boxes a in the framing A′ of the machine, and B a receiving-table supported between standards B′, erected upon the framing A′ at the front end of the machine—that is to say, the end farthest from the cylinder. Between the cylinder A and the table B, but at some distance above them, is the delivery apparatus proper, which in the example represented consists of a gripper-reel E, fitted with grippers $e\ e'$ of the kind known as "tumbler" grippers, which take the sheet from the cylinder, and two endless chains C and grippers $c'\ c^2$, carried by the said chains for taking the sheets from the grippers $e\ e'$ of the reel. Such delivery apparatus is well known, and will only be here described sufficiently to explain the combinations which constitute the present invention.

The gripper-reel E is driven from the cylinder-shaft by means of a spur-gear a' on the said shaft gearing with a spur-gear e^3 on the shaft e^4 of the reel, which works in bearings in the brackets A^2. The tumblers e^5 of the grippers e are operated upon in the usual manner for opening and closing the said grippers by passing over stationary pins $e^6\ e^7$, secured in the contiguous bracket A^2.

The chains C, which carry the grippers $c'\ c^2$, are supported by chain-wheels $c^4\ c^5$, the chain-wheels c^4, one for each chain, being fast upon a shaft c^6, journaled in brackets A^2, secured to the framing A′, and the chain-wheels c^5 turning loosely on fixed studs c^7, fast to the receiving-table standards B′. The said chains are supported between the wheels $c^4\ c^5$ by stationary tracks or ways D, and they are driven at the same speed as the cylinder by means of the gear e^3 on the shaft e^4 of the reel E, which gears with a gear c on the shaft c^6. The members c^2 of the grippers are attached to a gripper-bar c^3, journaled in the endless chains, and the members c' are carried by a rest-bar c^{3*}, which is fixed in the chains. In the example represented, which is for a two-revolution machine, there is only one set of grippers, and the length of the chain measured on the pitch-line of the points of the grippers is equal to twice the circumference of the cylinder, in order that the grippers may be brought in proper relation to take the sheet after every two revolutions of the cylinder. The grippers are represented as to be opened to receive sheets from the cylinder by the arm c^8, attached to the bar c^3, passing over a stationary cam c^9, secured to the framing, and to be opened again to deliver the sheet by the said arm c^8 passing over the fixed cam c^{10}, secured to the chain-wheel studs c^7. They are represented as having closing-springs applied to the bar c^3 in the usual manner.

Under the endless gripper-chains C, between them and the receiving-table, there is a longitudinally-reciprocating gripper-car-

riage F f, furnished at its front end with grippers f' f^2 for taking the sheets from the chain-delivery grippers c' c^2 and depositing them upon the receiving-table. The said gripper-carriage consists simply of two side bars F and a cross-bar f, which forms a rigid connection between them. The said gripper-carriage is furnished on each side with two rollers g g, which run in ways G G' on each side of the machine. These ways are each in two sections, the rearward section G of each being rigidly secured under the chainways D and its forward section G' being pivoted at its rear end, as shown at g' in Figs. 1 and 6, to the corresponding lower chainway D. The forward way-sections G', which are at the sides of the receiving-table, are suspended near their rear ends by rods h from two levers H, which are fast on a horizontal rock-shaft h', which works in bearings secured on the standards B'. One of these levers H is connected with the upper end of a rod h^2, the lower end of which is forked, as shown in Fig. 3, to fit the side shaft H', and is furnished at its front end with a cam H^2, which acts upon the said rod h^2 and through it on the levers H to give the way-sections G' a rising-and-falling motion. The side shaft H' may be the same side shaft commonly employed in printing-machines, arranged lengthwise thereof. The rod h^2 is represented in Fig. 1 as made of two lengths connected by a turn-buckle for the purpose of adjusting the way-sections G' to a proper height relatively to the receiving-table or to the height of the pile of printed sheets thereon.

For the purpose of producing the longitudinal reciprocating movement of the gripper-carriage F f, there are attached by pivots n to the rear ends of its side bars F two toothed racks or drivers I, which slide in guides i under the lower chainways D, and which are geared with spur-gears I' on a horizontal shaft i', which works in bearings in the brackets A^2. This shaft i' is furnished with another spur-gear i^2, which gears with a spur-gear I^2, which is fast on the outer end of a short shaft i^3, which runs in a journal-box i^4, secured to one of the brackets A^2, and on the inner end of which is another spur-gear i^5, gearing with a toothed rack i^6 on the upper part of an upright bar I^3, which slides in a guide i^7 on the contiguous bracket A^2. The lower end of this bar I^3 is forked, as shown in Fig. 2, to fit the side shaft H', and is furnished with a roller to work in a cam I^4 on the side shaft. The rotation of the cam I^4 produces a vertical reciprocating motion of the rack-bar I^3 and its rack i^6, and by this means an oscillating motion is given through the gear i^5 to the short shaft i^3 and the spur-gear I^2 thereon, and through the latter gear rotary motion in opposite directions alternately is given to the spur-gear i^2, the shaft i', and the spur-gears I', of which the last-mentioned produce the longitudinal reciprocating motion of the racks I and the gripper-carriage F f to draw back the grippers f' f^2 to the position shown in Fig. 5 to take the sheets from the chain-grippers c' c^2 and move them forward to the position shown in Fig. 6 for depositing the sheets upon the receiving-table. The pivotal connections n of the rear ends of the side bars F of the carriage, with the sliding racks I, permit the said carriage to swing up and down with the way-sections G'.

The lower members f' of the carriage-grippers are rigidly attached to the cross-bar f of the carriage itself, and their upper members f^2 are carried by a bar f^3, which is pivoted in the side bars F of the carriage. A spring f^4, coiled around the said bar f^3 and having one end connected with said bar and the other bearing on the cross-bar f, exerts a constant tendency to close the said grippers. On one end of the bar f^3 is secured an arm f^5, furnished with an anti-friction roller to run on cams g^2 g^3 on one of the way-sections G' for the purpose of producing the opening movements of the grippers f' for receiving the sheets from the delivery-grippers c' c^2 and for depositing them on the receiving-table. On the front end of the table B' there are upright projections j for the purpose of arresting the sheets after the second opening of the grippers f', and permitting the said grippers, as the carriage completes its forward stroke to the position shown in Fig. 6, to pass clear of the sheet.

In order to keep up the tail end of the sheet while the chain-grippers c' c^2 and carriage-grippers f' f^2 are carrying it toward the receiving-table, I have represented tapes K, which run in grooves in the disks of the reel E and on pulleys k on a horizontal shaft k', which runs in bearings k^*, secured under the stationary carriage-way sections G, and are further supported by pulleys k^2 on a shaft k^3, which runs in bearings k^4, secured under the said carriage-way sections. The motion of these tapes is produced by the rotation of the reel.

It is hardly necessary here to mention that the shaft H', which carries the cams H^2 I^4, should make one revolution during every two revolutions of the impression-cylinder.

Having described the several details of the apparatus and their separate actions, I will briefly describe their combined operation.

The sheet having been taken from the cylinder by the grippers e e' of the reel E, is given by those grippers to the chain-grippers c' c^2 as the latter, in their continuous movement with their chains C, begin to move forward toward the receiving-table. During this forward movement of the chain-grippers, or at least during a portion of said movement, the carriage F f is stationary at the rear end of its stroke, as shown in Fig. 5, with its grippers f^2 held open by the cam g^2 on the way-section G'. When the chain-grippers arrive near the carriage-grippers, as shown in Fig. 5, the forward movement of the carriage com-

mences; but at first this movement is slower than that of the chain-grippers, and before the arm f^5 of the carriage-grippers passes the cam g^2 the chain-grippers overtake the carriage-grippers and place the front edge of the sheet within the latter, and the chain-grippers c^2 are opened by their arm c^8 passing under the stationary cam c^{10}. The arm f^5 of the carriage-grippers f^2, then passing off the cam g^2, allows those grippers to close and seize the sheet, which is then carried forward over the receiving-table, while the forward ends of the way-sections G′, and with them the forward end of the carriage F f and its grippers, are depressed by the action of the cam H^2, so that when the gripper-arm f^5 arrives at the cam g^3 to open the grippers f^2 the said grippers are brought very nearly to the level of the receiving-table or of the pile of sheets thereon, and the sheet thus liberated has a very little way to fall on the table or pile.

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

1. The combination, with an impression-cylinder and a delivery apparatus, of a longitudinally-reciprocating gripper-carriage having grippers at one end, and a reciprocating driver to which said carriage is pivoted at the other end to be capable of rising and falling during its horizontal reciprocating movement, substantially as and for the purpose herein set forth.

2. The combination, with an impression-cylinder, a delivery apparatus, a sheet-receptacle, and a longitudinally-reciprocating gripper-carriage having grippers at one end and capable of an upward-and-downward movement on a pivot at the other end, of ways for guiding said carriage, having rigid sections and pivoted sections, the said pivoted sections being movable upward and downward for the purpose of giving the said carriage a rising-and-falling movement from and toward the said receptacle while guiding it in its longitudinal reciprocating movement over said receptacle, substantially as herein set forth.

3. The combination, with the reciprocating gripper-carriage and its attached grippers and the reciprocating driver to which said carriage is pivotally connected, of the ways G G′ for guiding said carriage, consisting of two sections, one G of which is stationary and the other G′ of which is pivoted at a fixed point at one end and provided with cams g^2 g^3 for opening the said grippers, substantially as and for the purpose herein set forth.

4. The combination of the reciprocating gripper-carriage, its attached rack I, the shaft H′, the cam I^4 on said shaft, and the reciprocating rack-bar I^3 and its attached rack i^6, operated by said cam and gearing, substantially as herein described, between said racks, substantially as and for the purpose herein set forth.

5. The combination, with the pivoted reciprocating gripper-carriage and the pivoted way-sections G′, of levers H, from which said way-sections are suspended, and a rotary cam and connections, substantially as herein described, for producing the rising and falling movements of said way-sections and carriage, substantially as and for the purpose herein set forth.

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Witnesses:
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B. FRANK LAKE.