(No Model.) 4 Sheets—Sheet 1

G. W. HEY.

LETTER FEEDING AND SEPARATING APPARATUS.

No. 454,405. Patented June 16, 1891.

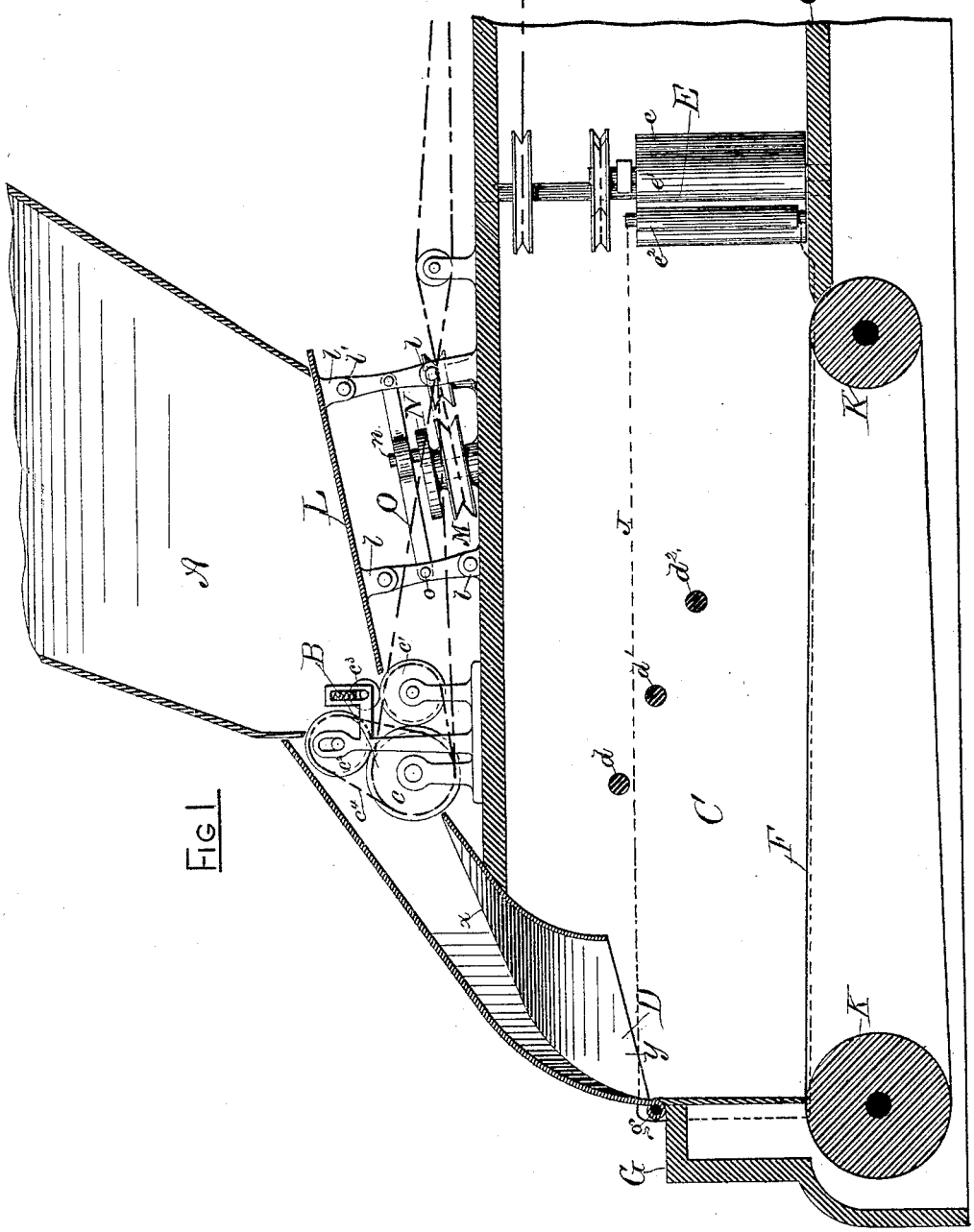

FIG 1

Witnesses.
W. A. Smith.
Irving A. Weston

Inventor.
Geo. W. Hey

(No Model.) 4 Sheets—Sheet 2.

G. W. HEY.

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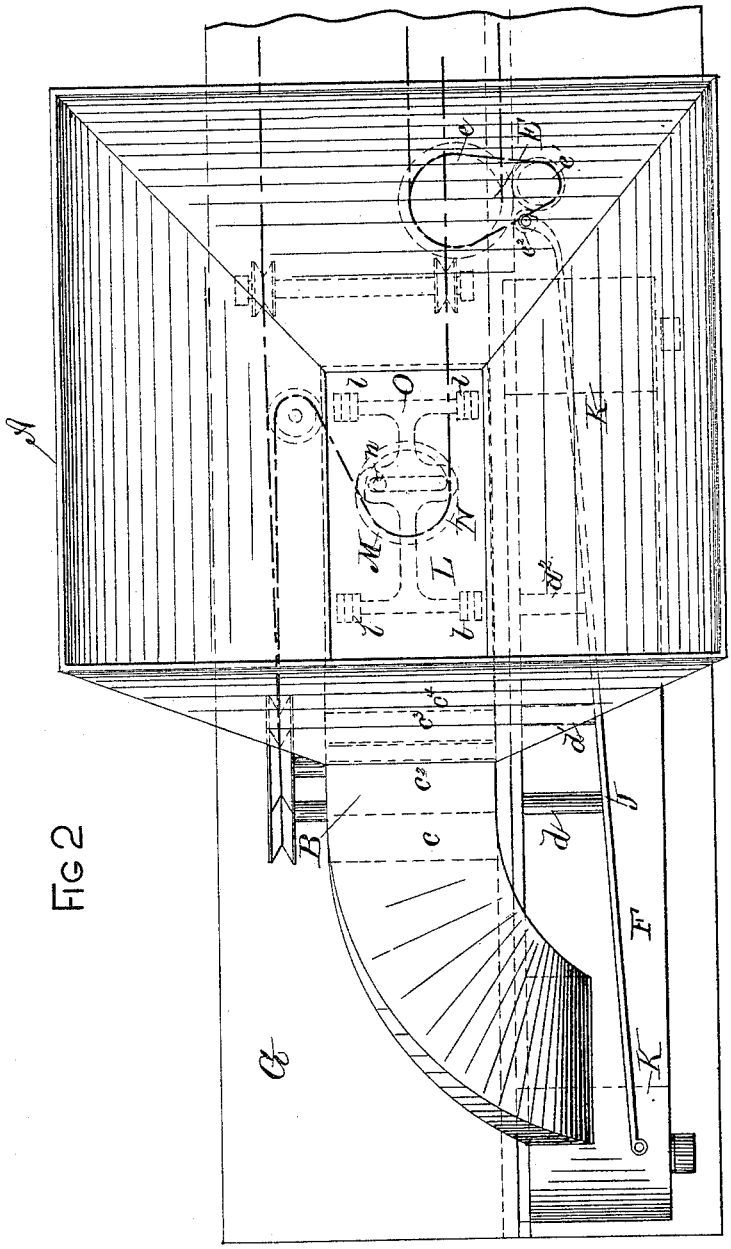

FIG 2

Witnesses.
W. A. Smith
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Inventor.
George W. Hey

(No Model.) 4 Sheets—Sheet 3.

G. W. HEY.

LETTER FEEDING AND SEPARATING APPARATUS.

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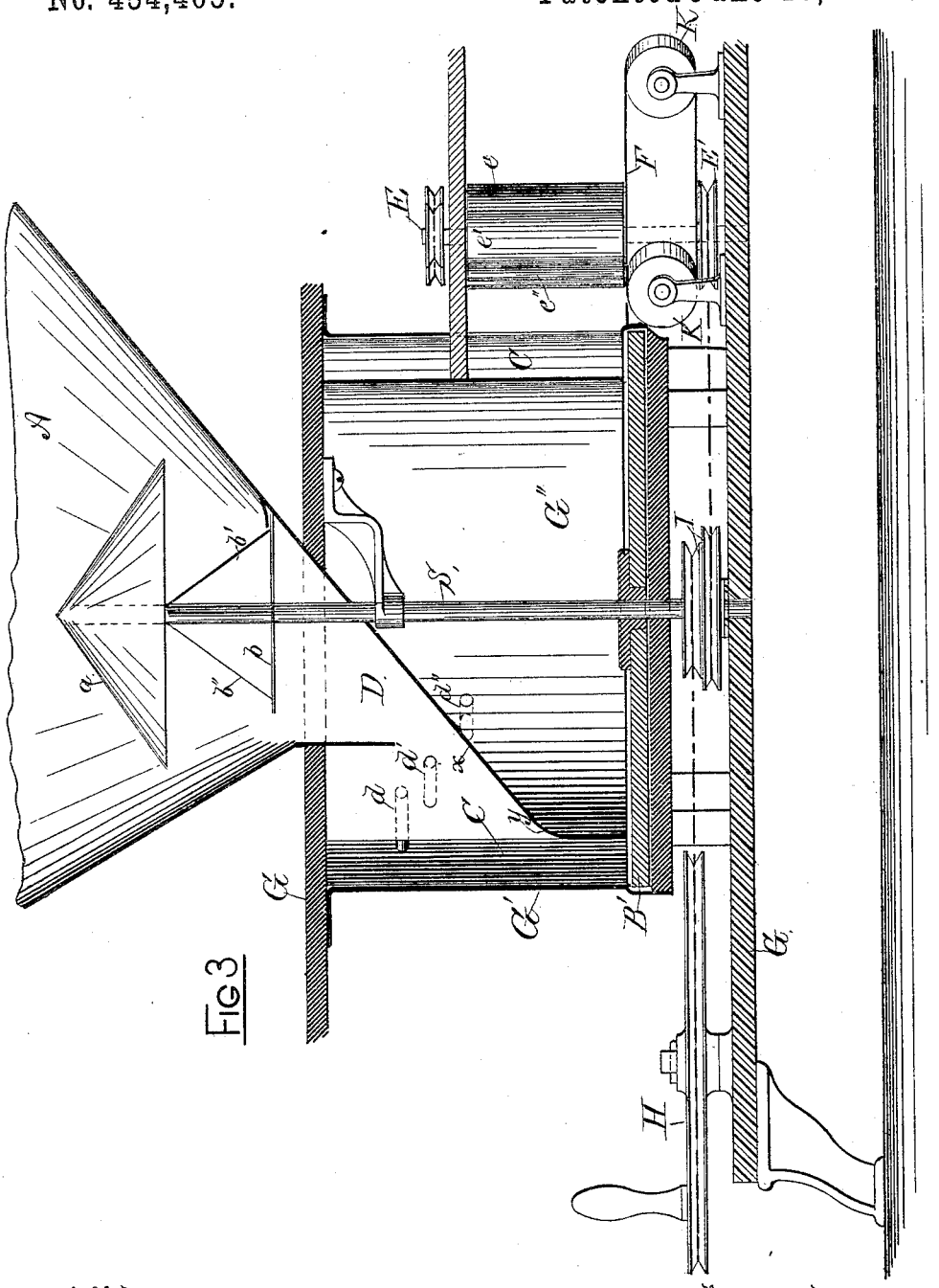

FIG 3

Witnesses.
W. A. Smith
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Inventor.
George W. Hey

(No Model.) 4 Sheets—Sheet 4.

G. W. HEY.

LETTER FEEDING AND SEPARATING APPARATUS.

No. 454,405. Patented June 16, 1891.

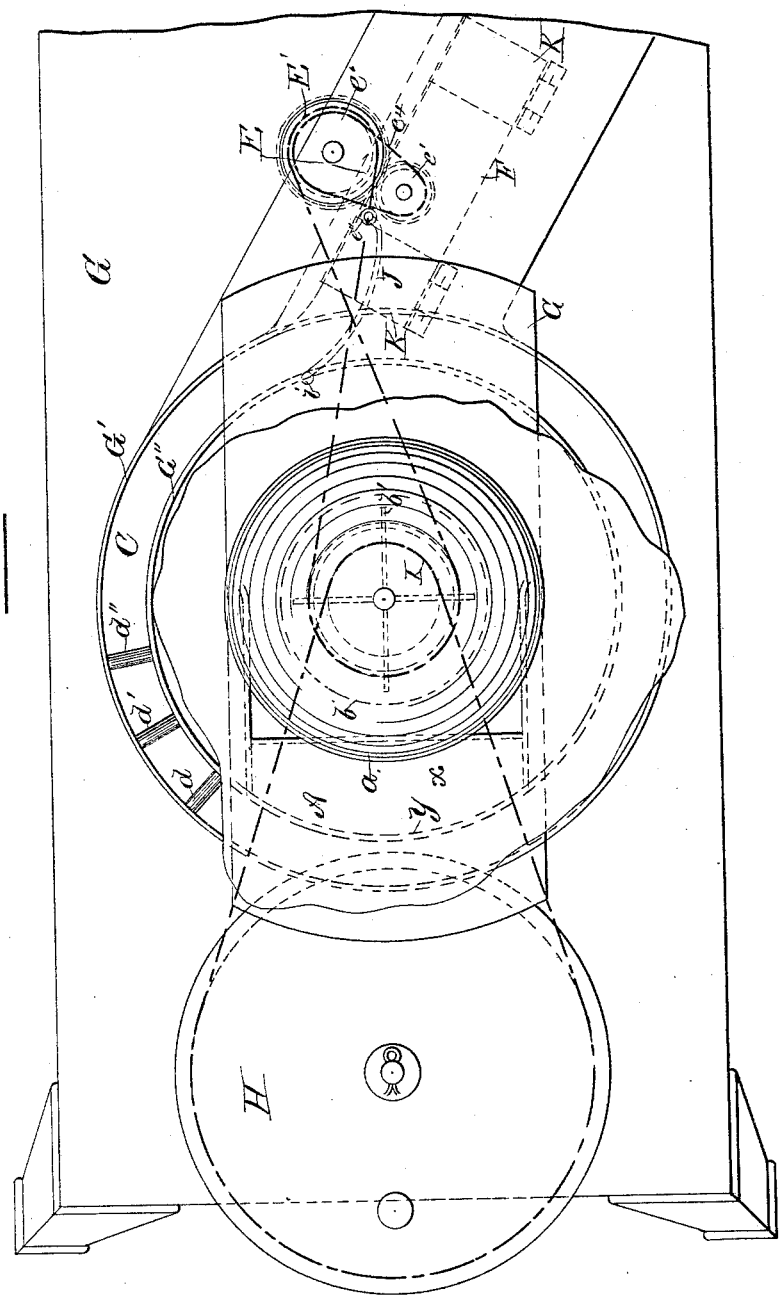

FIG 4

Witnesses.
W. A. Smith
Irving A. Nesbit.

Inventor
George W. Hey

UNITED STATES PATENT OFFICE.

GEORGE W. HEY, OF SYRACUSE, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE INTERNATIONAL POSTAL SUPPLY COMPANY OF NEW YORK.

LETTER FEEDING AND SEPARATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 454,405, dated June 16, 1891.

Application filed May 26, 1885. Serial No. 166,714. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. HEY, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Letter Feeding and Separating Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention has for its object the production of a simple and effective apparatus for separating and feeding traveling mail-matter, letters, postal-cards, &c., automatically and successively, without regard to the dimensions of the letters, to a marking device for impressing the said letters, postal-cards, &c., with the postal marks usually applied for the cancellation of the stamps, postmarking, &c.; and the invention will be described in connection with the accompanying drawings, and particularly pointed out in the claims.

Like letters indicate corresponding parts in all the figures of the drawings.

Figure 1 is a longitudinal vertical section showing the general arrangement of the complete feeding apparatus. Fig. 2 is a top plan view of the same. Fig. 3 is a longitudinal vertical section illustrating a modification in the construction and arrangement of the letter hopper or receptacle, conduit, and intermediate separator; and Fig. 4 is a top plan of the same.

The letter hopper or receptacle, which is denoted by the reference-letter A, is constructed of suitable dimensions to receive a number of letters, and may be of any desirable form, being, preferably, so shaped at its exit and inclined downward, as to cause the letters to feed or fall by gravity toward the first or intermediate separating device, and the letter-conduit, which serves to deposit the letters edgewise upon a traveling belt to feed the same to the letter-marker after they are finally separated.

At the exit of the hopper, I preferably locate the first or intermediate separator, which, according to the example of my invention illustrated in Fig. 1 of the drawings, is arranged in a horizontal plane, and consists of a series of rollers peculiarly located and arranged in their rotation relatively to each other, as will be presently described, the said rollers serving to separate or feed the letters one at a time from the hopper into the letter conduit or chute, which accomplishes the first step in the automatic arrangement of the letters preparatory to feeding them successively to the marking mechanism. I denote this first or intermediate separator by the reference-letter B, and it consists of a series of rollers of suitable size, as is best shown in the large sectional view Fig. 1, in which c c' c^2 indicate the separating-rollers, which are formed with frictionally-engaging faces, being provided, if desired, with a facing of india-rubber. The rollers c c' are mounted in fixed bearings in close proximity to each other, and both rotate in the same direction. The roller c^2 is mounted in a vertically-slotted bearing over the roller c, and preferably turns in the same direction as the roller c. The roller c^2 is yieldingly supported with its periphery in close proximity to but not in direct close contact with the periphery of c by a spring-belt c^4, which connects the rollers c and c^2 and also serves to communicate motion to the roller c^2. It will be observed that the roller c^2 is of smaller diameter than the feed-roller c, and is journaled a little in advance thereof.

The friction-roller c^3, which may be constructed of wood or metal, is mounted in slotted bearings over c', as shown in Fig. 1, and serves to guide the letters to the rollers c c^2 by the pressure which it exerts on the advancing letters. It is to be observed that the said roller c^3 is made to yield freely by a spring or other yielding connection secured on its journal-bearings, or it may be arranged to move up in the slotted bearings by pressure of the passing letters and to drop back by gravity by making the roller of metal and solid. This first or intermediate separator, as has been explained, is provided to feed the letters from the hopper into the letter conduit or chute D, and the arrangement of the rollers, as described, controls the feed from the hopper by letting out only one letter at a time, while the capacity of the feed is only limited by the speed at which the rollers are driven.

The operation of the illustrated construc-

tion of separator B is as follows: The two lower rollers *c c'* are driven positively by belts or gears in the same direction—*i. e.*, rotating toward the chute D—thereby propelling the letters forward into the chute as they are fed to the rollers from the hopper. At the same time the guide or friction roller c^3 guides the letters to and holds them against the periphery of *c'*, and thus insures the passage of the letters between the separating-rollers. The separating-roller c^2 is also driven by the spring-belt c^4 in the same direction as the feed-rollers *c c'*, whereby the adjacent peripheries of the roller c^2 and the rollers *c* and *c'* move in reverse directions, and the tendency or action of the rollers c^2 on the letter is contrary to the tendency or action of the rollers *c c'*. This contrary action of the adjacent peripheries of said rollers prevents more than one letter feeding from the separator B, and thus secures the desired result. The importance of this result—*i. e.*, the consecutive feed of the letters from the hopper—will be apparent when it is considered that the letters must be presented consecutively to the marking apparatus in order to secure the marking of each letter, and were it not for the provision of the separating device the letters would feed down the inclined side or bottom of the hopper in quantities, so that several letters would issue at the same time.

The arrangement of the contrary-acting roller c^2 in relation to the roller *c*, whereby the former is journaled a little in advance of the latter, adds greatly to its efficiency in preventing more than one letter at a time passing between the rollers, since the letters as they are fed forward toward the rollers *c* c^2 by the roller *c'* encounter the roller c^2 first, and the contrary or reverse rotation of its periphery tends to feed or hold back the advancing letters, if any are superimposed, or, in other words, if more than one letter comes simultaneously to the rolls the greater power of the feed-roller *c* forces the letter next to its peripheral surface between and through the rollers, while the contrary-acting roller c^2 drags or feeds backward the letter or letters next to its peripheral surface, thus allowing but one letter at a time to pass between the rolls.

The adhesive character of the rubber frictional surfaces of the rollers secures the necessary frictional hold on the letters, while the greater surface of the roller *c*, due to its larger diameter, enables it to force the letter next to its face past the contrary-acting roller c^2. From this description of the action of the rollers *c* c^2 in separating the letters it will be seen that if the rollers *c* c^2 were of the same diameter and rotated with the same speed and force their peripheral surfaces and frictional power would be the same, and their rotation in contrary directions would serve simply to neutralize their action on the letters. Hence in order to make the device effective to secure the desired result it is necessary that the frictional or propelling power of the feed and separator rollers shall be dissimilar, or in other words that the feed-roller *c* shall either be larger or be driven a greater number of turns than the drag or contrary-acting roller c^2, so that it may overcome or exceed the force of the separating-roller. It will thus be understood from a consideration of the foregoing-described action of the feed and separating rollers that the main essential for their successful action in separating letters is such a relative construction and arrangement as will produce a greater frictional or feeding power of the feeding-roller on the letter than that of the opposing or contrary-acting roller. As previously set forth in the present example of my invention, this result is accomplished with a minimum difficulty by causing the faces of the two rollers to act contrarily in relation to each other and with dissimilar frictional or feeding power. As shown and described, the feeding-roller is a little at the rear of the separating-roller, is of greater diameter, and revolves with greater frictional or feeding power than the separating-roller; but this same dissimilar frictional or feeding power is produced when both rollers are directly opposite and are of equal size, or the feed-roller of less diameter than the separating-roller, providing the force or rotation of the feeding-roller exceeds that of the separating-roller. It may also be obtained if the rollers are of equal diameter and driven the same number of rotations, providing the face of the feed-roller posesses greater frictional power than the face of the opposite roller, as would be the case were one faced with rubber and the other with a harder or smoother substance. It is evident, however, that even in this case the frictional power would be rendered more dissimilar were the feeding-roller revolved a greater number of turns than the separating-roller. Moreover, it is evident that if the two conjointly-acting rollers were driven in opposite directions and the feed-roller was caused to make a sufficiently greater number of rotations than the opposing roller the separation of the letters would also be effected, for the reason that the dissimilar frictional power of the two rollers would be maintained. It must be understood that when the letters are presented to the conjointly-acting rollers for separation two letters usually come to the rollers at the same time, and if the power of the conjointly-acting rollers is exactly equal neither will pass, or at least pass with any such degree of certainty or speed as will be either desirable or practical. The importance of the dissimilar frictional or feeding power of the rollers is manifest and is of the greatest consequence to the successful operation of the letter-separator.

In order to facilitate the passage of the letters from the hopper to the separator-rollers, the bottom of the hopper may be connected to suitable shaking or agitating mechanism, as shown at L in Figs. 1 and 2, although, if

sufficient incline is given to the bottom of the hopper, the letters will slide freely to the separator-rolls by gravity.

The shaking mechanism will be readily understood upon referring to Fig. 1. *l l l l* are lugs formed, respectively, on the hopper bottom and the frame G of the apparatus. In these lugs is pivoted a reciprocating frame O, carrying a slotted loop, which engages a crank-pin *n* on the face-plate N. When the plate N is revolved on its spindle, the bottom L is given a reciprocating motion, and as it stands in an inclined plane the letters are accordingly caused to fall rapidly to the separator-rollers. The rollers and agitating mechanism are driven by belts, as shown in the drawings, but gears may be substituted, if desired.

As stated, the separator removes the letters from the hopper one at a time; but the letters may come endwise or crosswise if they are thrown promiscuously into the hopper, and since in this event it is not only desirable that the letters shall be delivered consecutively, but they must be delivered in some definite position in order to feed them to the markers properly arranged to receive the impression of the die, it is therefore absolutely essential to the successful operation of the automatic process that the letters be delivered in a fixed position—*i. e.*, on their side edges when the marking-die is arranged in a vertical plane, or flatwise when the marking-die is arranged in a horizontal plane—and to this end I provide the letter conduit or chute D. This conduit or chute, as shown in Figs. 1 and 2, consists of a curved hood having a wide mouth arranged so as to inclose the exit of the separator-rolls in order to receive the letters freely from the separator and a narrow or tapering lower or exit end and having its lower side inclined steeply, as at *x*, and a curved swell, as at *y*. This conduit or chute I arrange either over or at one end of the letter passage-way or channel C, which has a conveyer F, consisting of an endless belt forming a traveling bottom running along the channel to the final separator, which will be presently described.

The office of the conduit or chute is to perform the first requisite in arranging the letters in the desired fixed position, such position, according to the example of my invention herein illustrated and described, being the side-edge position of the letter and the conduit or chute accomplishes the positioning of the letter by compelling it as it passes through the chute to fall into the channel at the bottom onto the traveling belt either on its end or side edge, for the reason that the letter-passage in the conduit is so narrowed at its exit that the letter can only escape in either of these two positions, while the incline *x* and swell *y* facilitate the escape of the letters and insure the desired result. If the letters drop on the conveyer F in the letter passage-way or channel C upon their side edges, they move along on the belt to the final separator without further arrangement, as they are in the desired position. If, however, they fall on end, another operation is requisite—*i. e.*, to turn them on their side edges. This I accomplish by placing pins *d d' d²* in the letter-channel at different heights in position to be encountered by the letters moving on end in said channel. The collision of the letter with the pins *d d' d²* or with either of them knocks over the letter on its side edge and completes the arrangement.

The conveyer F, as shown in Figs. 1 and 2, consists of a narrow belt running in the narrow letter passage-way or channel C, having its outer edge inclosed by a gate, so that the letters are compelled to remain on said belt on their side edges in passing onto the final separator.

The final separator is a substantial duplicate of the letter-separator B, differing solely, however, in the fact that its contrary-acting feeding and separating rollers are arranged in a vertical plane, as shown at E, instead of in a horizontal plane, as shown at B. I provide this final separator E as an additional precaution to make the feed positive and to insure the successive feeding of the letters to the marking apparatus. The importance of this final separator will be readily perceived when it is understood that if three letters feed side by side to the primary separating device the one engaged by the separating-roller is restrained, but the central one, owing to the greater frictional or feeding power of the feeding-roller, is carried along side by side with the letter engaged by said feeding-roller. Consequently this interposed letter would not be marked were it not for the final separating device, which it is evident restrains this letter until the passage of the other.

Where the apparatus is constructed as shown in this example of my invention, in which it is adapted to feed and separate letters thrown promiscuously—that is, without prearrangement—into the hopper—the apparatus as a whole being designed to automatically accomplish the feeding and separating of the letters, the two separators B and E are necessary to the successful operation of the device; but I find, however, that the intermediate or first separator B may sometimes be dispensed with if the letters are placed into the hopper in the position in which it is desired to feed them to the marking apparatus. It may also be dispensed with, if desired, by giving a little more travel to the letter in the letter-channel, so that fewer letters come to the final separator at the same moment. In other words, the increased travel of the letters slows the feed or flow of letters to the separator and enables the separator E to do the work of both the intermediate and final separators.

At Figs. 3 and 4 I have illustrated, respectively, a sectional and plan view of the feed

arranged in this manner to dispense with the intermediate separator. I secure in this case the requisite amount of travel by forming the letter-channel underneath the hopper A of a circular disk B′, driven by a shaft on the pulley I. An inner and outer shell G′ G², connected to the frame G at the top and bottom, form the walls of the letter-channel. In this construction the conduit has a straight incline *x*, terminating in the curved swell *y*, as in my preferred construction; but the curved hood or top side is omitted entirely and the incline *x* forms a continuation of one side of the hopper, while in Fig. 1 the conduit curves from a horizontal to a vertical plane, and must therefore necessarily be inclosed at its top and bottom sides to divert the letter in the right direction to secure the desired result.

In the construction shown in Figs. 3 and 4 I provide a curved or funnel-shaped hopper and secure on the upper end of the revolving shaft the inverted-saucer-shaped shield *a*. This prevents too many letters falling at once to the exit and clogging the same. I also provide the angular wings *b b′ b²*, &c., secured on the shaft, to sweep letters that lodge opposite to the exit to the same, the shield and the angular wings thus forming an agitator by means of which proper delivery of the letters from the hopper is secured.

At a point *i*, Fig. 4, I hinge the gate *j*, which carries the friction-roller *e²* of the separator E. This gate connects the letter-channel C with the separator E in both constructions, the only difference being that it is shorter in this construction than it is in that shown in Fig. 2.

In the construction shown in Figs. 3 and 4 the conveyer-belt F, running over the rollers K K, simply constitute an elongation of the conveyer, while in that shown in Figs. 1 and 2 it constitutes the conveyer proper. In both forms of construction the letter-conveyers, it will be seen, have a continuous movement, and the letter channel or passage-way C must be provided with the pins or stops *d d′ d²*, &c., to knock over the letters.

The frame G of the apparatus may be of any desirable form or material, and the driving-crank pulley H may be arranged in a horizontal or vertical plane, as preferred.

The particular construction of letter chutes and conveyers may be considerably changed and varied from that shown or described, or may be even dispensed with entirely, it being understood that the main essentials of my invention are a bed along which the letters are fed, and which may be either stationary or movable, and feeding and separating rollers revolving with dissimilar frictional or feeding power, in order to feed the letters consecutively one by one to the letter-marking apparatus.

Since the precise construction, arrangement, and combination of the parts may be changed without departing from my invention, I do not restrict it in this respect to the illustrated and described form, which I set forth simply as an exemplification of an apparatus in which my invention may be carried out.

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

1. In a letter feeding and separating mechanism, the combination of a letter hopper or receptacle, a conduit or chute arranged, substantially as described, to deliver the letters edgewise on a conveyer from said receptacle, and a separator for feeding forward the letters successively, substantially as shown and specified.

2. A letter conduit or chute having a wide mouth and narrow exit and so curved and shaped that its mouth is located in a horizontal plane and its exit in a vertical plane and at right angles to its mouth, whereby letters fed flatwise from a hopper or other receptacle into the conduit or chute are delivered edgewise into a letter-channel, substantially as specified.

3. The combination of two conjointly-acting feed-rollers rotating continuously in such directions in relation to each other that the surface of the roller touching the letter to feed it forward moves in the direction in which the letter moves, and the opposing face of the other roller moves in a contrary direction, one of said rollers being less in diameter than the other, substantially as and for the purpose set forth.

4. The combination of conjointly-acting feed-rollers arranged relatively to each other, so that one roller makes more rotations than the other, and their adjacent surfaces rotate continuously in contrary directions, substantially as and for the purpose set forth.

5. In a letter-separator, the combination, with a feed-roller, of a separating-roller, said rollers having their adjacent faces moving continuously in opposite directions, substantially as described.

6. In a letter-separator, the combination, with a feed-roller, of a separating-roller, said rollers having their adjacent faces moving in opposite directions, and a guide-roll for guiding the letters to the former rollers, substantially as specified.

7. In a letter-separator, the combination, with a feed-roller, of a separating-roller, said rollers having their adjacent peripheries revolving continuously with dissimilar frictional or feeding power, substantially as set forth.

8. In a letter-separator, the combination, with a feed-roller, of a separating-roller, said rollers having their adjacent peripheries revolving continuously in opposite directions and with dissimilar frictional or feeding power, and a guide for guiding the letters to the former rollers, substantially as and for the purpose described.

9. The combination of a feed-roller with a separating-roller mounted in advance thereof, the adjacent surfaces of the rollers moving

in opposite directions, substantially as described.

10. The combination of a feed-roller with a separating-roller mounted in advance thereof, the adjacent surfaces of the rollers moving in opposite directions and with dissimilar frictional or feeding power, substantially as specified.

11. The combination of a feed-roller with a separating-roller mounted in advance thereof, the adjacent surfaces of the rollers moving in opposite directions and with dissimilar frictional or feeding power, and a guide-roll for guiding the letters to the former rollers, substantially as set forth.

12. In a letter-separator, the combination, with a feeding-roll and a smaller separating-roll, the adjacent surfaces whereof move in opposite directions, and a guide-roll for directing the letters to the feed-roll, substantially as specified.

13. In a letter-separator, the combination, with a letter-chute, a conveyer, and a guide-roll, of a feed-roll and a separating-roll, the adjacent faces of which move in opposite directions, substantially as described.

14. In a letter-feeding mechanism, the combination of a conveyer with the letter-passage C and pins *d d'*, substantially as and for the purpose set forth.

15. In a letter-separator, the combination, with a feed-roller, of a separating-roller, said rollers having their adjacent faces moving in opposite directions, and an agitator in advance of the rollers, substantially as described.

16. In a letter-separator, the combination, with a feed-roller, of a separating-roller, said rollers having their adjacent peripheries revolving in opposite directions and with dissimilar frictional or feeding power, and an agitator in advance of the rollers, substantially as specified.

17. The combination of a feed-roller with a separating-roller mounted in advance thereof, the adjacent surfaces of the rollers moving in opposite directions, and an agitator in advance of the rollers, substantially as set forth.

18. A feeding apparatus consisting of a hopper or letter-receptacle having an agitator therein, rotating rollers, the adjacent surfaces of which move in opposite directions, and connections, substantially as described, between the hopper and the rollers, as and for the purpose set forth.

19. In a letter-feeding mechanism, the combination of a chute presenting the letters on edge, a passage-way or channel therefor, a continuously-moving conveyer, and feed-rollers, the adjacent surfaces of which move in opposite directions, substantially as and for the purpose set forth.

20. In a letter-feeding mechanism, the combination of a chute presenting the letters on edge, a passage-way or channel therefor, a continuously-moving conveyer, and a gate for maintaining the letters in position and properly directing them through and from the channel, substantially as and for the purpose described.

21. In a letter-separator, the combination, with a feed-roller and a separating-roller, said rollers having their adjacent peripheries revolving continuously in opposite directions and with dissimilar frictional or feeding power, substantially as specified.

22. The combination of a receptacle for the letters, a feed-belt for feeding letters from said receptacle, and conjointly-acting feed-rollers for successively feeding the letters, substantially as described.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 23d day of May, 1885.

GEORGE W. HEY. [L. S.]

Witnesses:
FREDERICK H. GIBBS,
WILLARD A. SMITH.