

Jan. 31, 1967

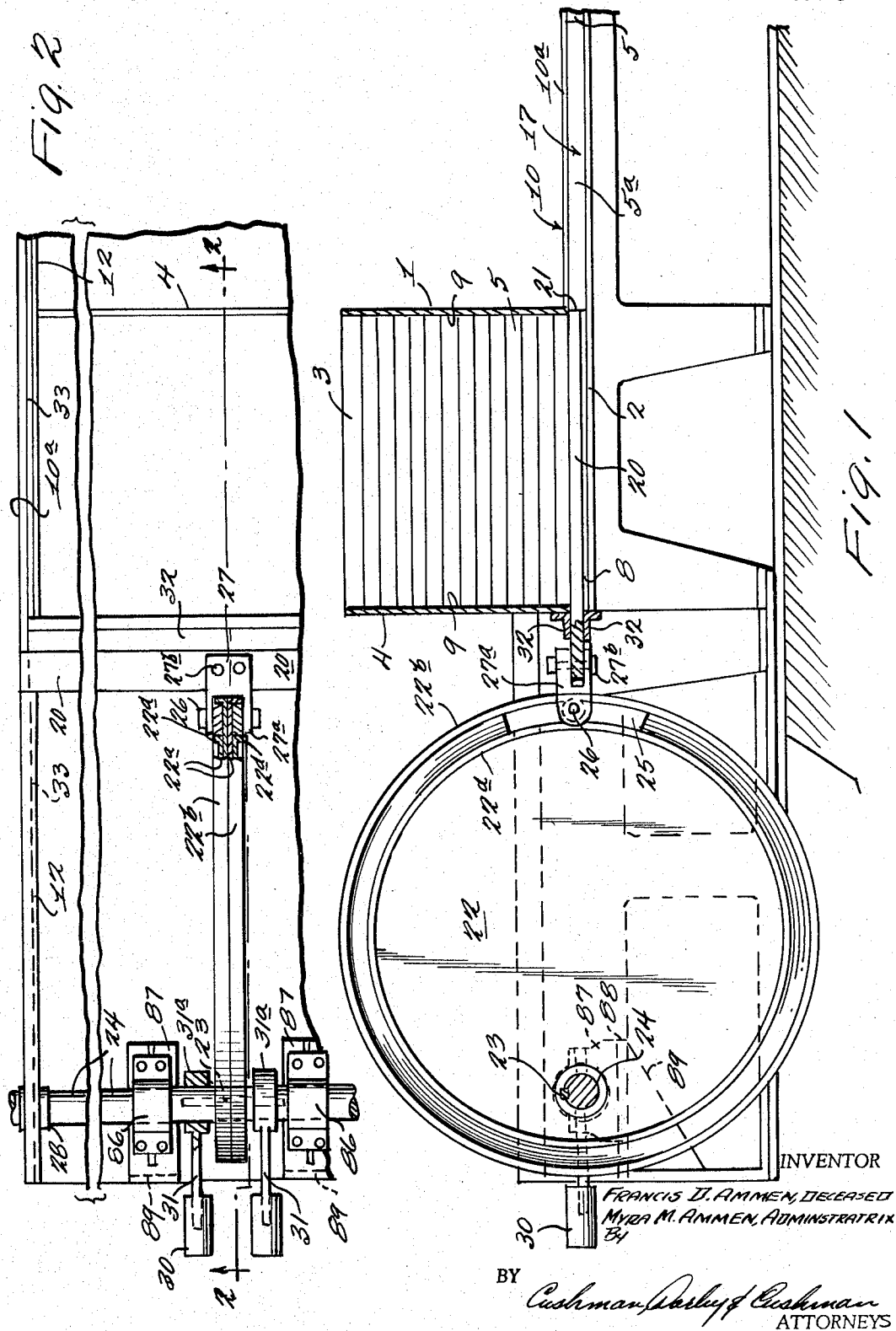
F. DU PONT AMMEN

3,301,398

MAIL SORTING MACHINE

Filed Sept. 9, 1963

6 Sheets--Sheet 1



Jan. 31, 1967

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MAIL SORTING MACHINE

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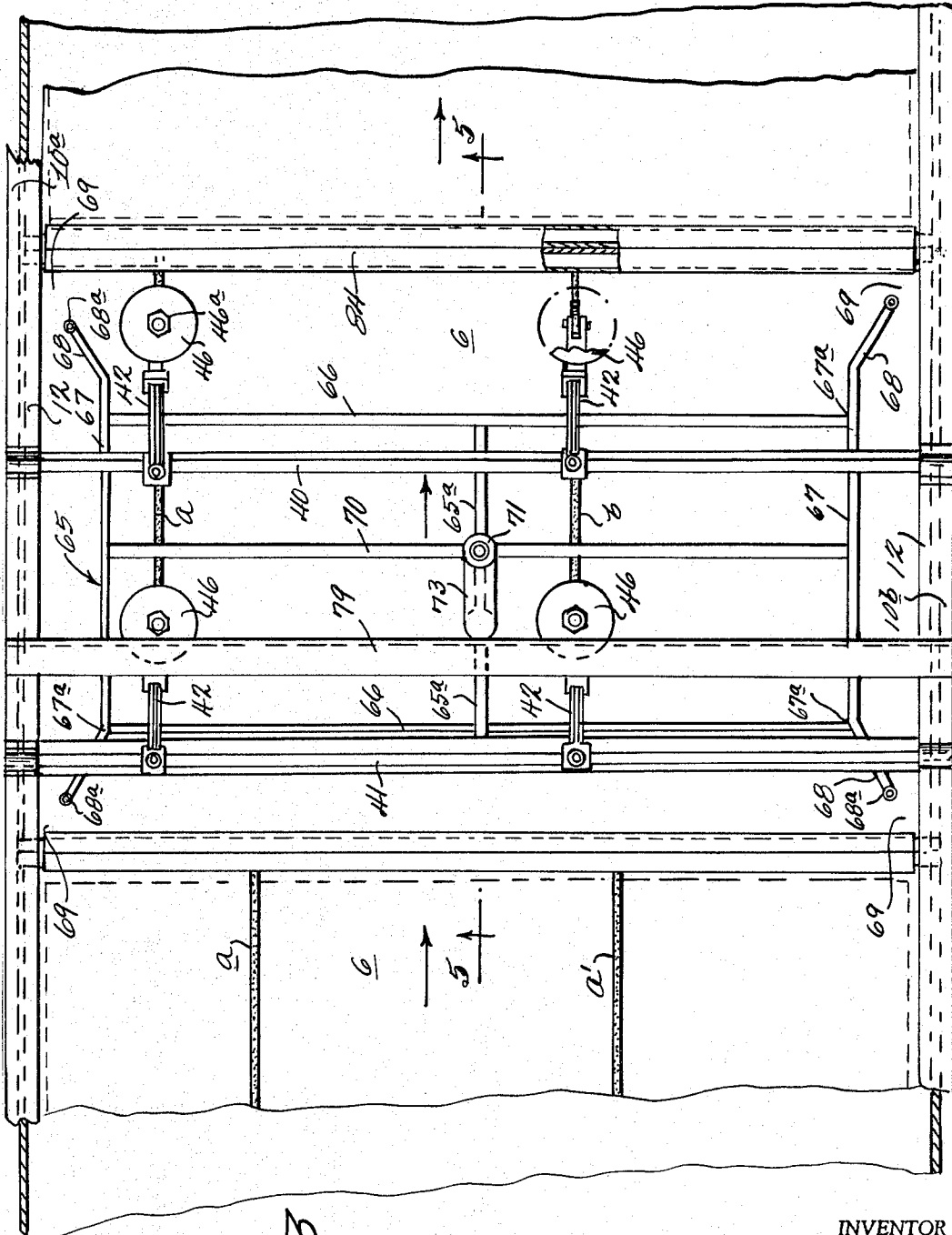


Fig. 3

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6 Sheets-Sheet 4

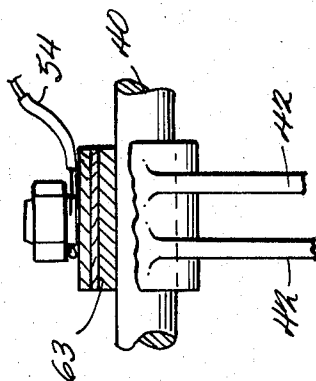


Fig. 7

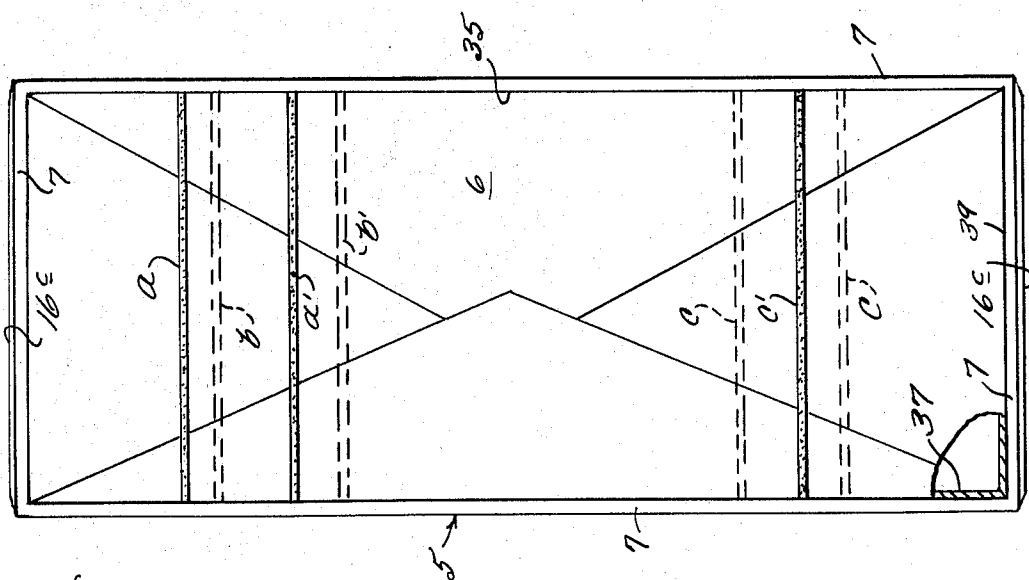


Fig. 6

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6 Sheets-Sheet 5

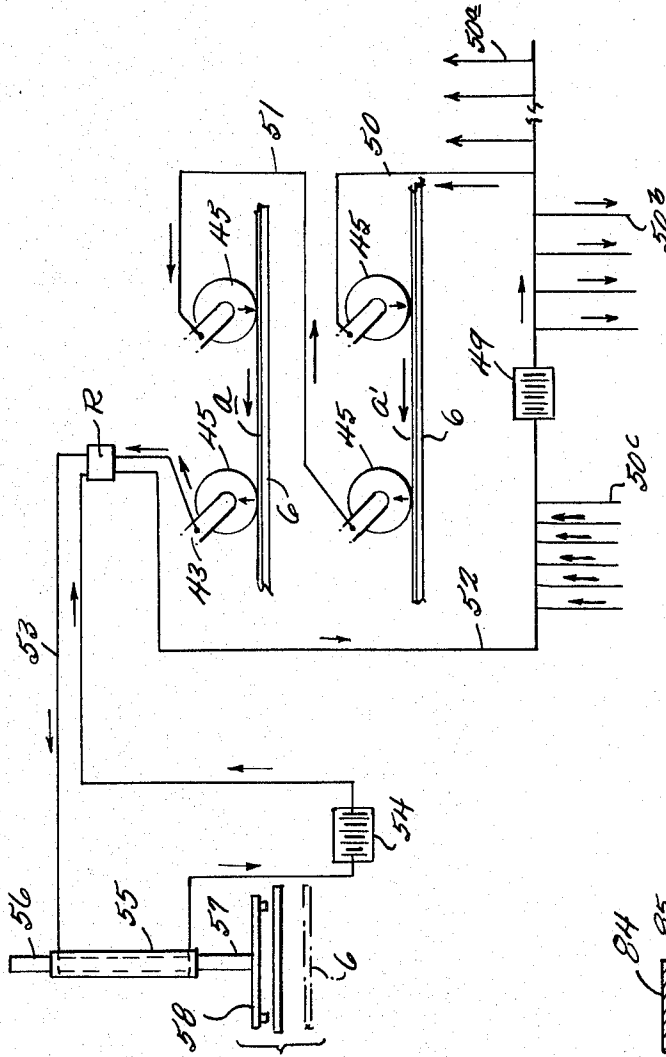


Fig. 8

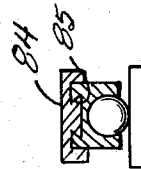


Fig. 9

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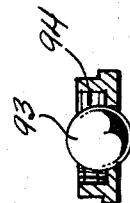
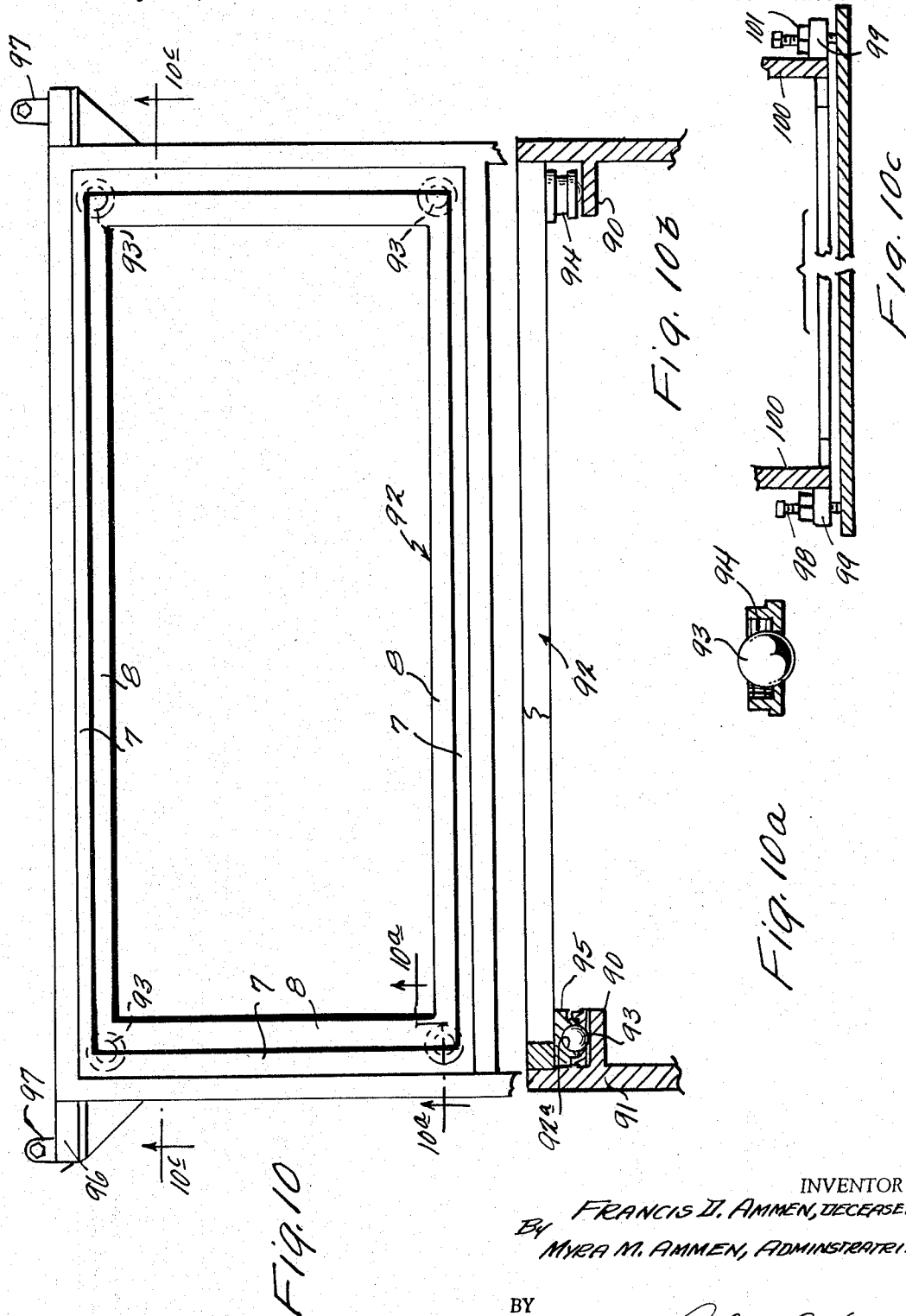
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6 Sheets-Sheet 6



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3,301,398

MAIL SORTING MACHINE

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Filed Sept. 9, 1963, Ser. No. 307,384
16 Claims. (Cl. 209—81)

This invention relates to apparatus the function of which is to sort postal mail, particularly envelopes of the size used in regular business correspondence and commonly called long envelopes.

An object of this invention is to provide an improved machine for automatically sorting mail in accordance with distinctive indicia carried on a face of each envelope. The improved machine is capable of advancing the indicia-carrying envelopes along a path for ejection, by a novel mechanism, into a station corresponding to the state or city which is the designated destination on the envelopes.

The apparatus includes a supply hopper in which a stack of carrier plates each carrying an envelope, are held in a stack from which they are fed one by one automatically from the bottom of the stack; one of the objects of the invention is to provide simple means for replenishing the quantity of carriers stuffed with their envelopes. A problem arises in doing this, by reason of the fact that the carriers fill the entire cross section of the supply hopper in a horizontal plane, and they cannot be dropped down from the top but must be placed gently into position on the topmost carrier in the stack that is at the moment present in the hopper.

Another object of the invention is to provide simple indicia means distinctive to each envelope which is capable of effecting the closing of a controlled circuit through the agency of such means for effecting the ejection at each station of any envelope that should be ejected at that station to which the indicia corresponds, while permitting all envelopes carrying different indicia to be moved freely past that station.

A further object of the invention is to provide such envelopes with at least two distinctive strips or stripes of conductive material disposed in a distinctive location on each envelope, and also at a distinctive distance from each other, which are capable of cooperating with two correspondingly spaced apart contacts to close the local circuit that will effect a discharge of the envelopes from their carriers at their proper stations.

These spaced contacts used at each station for closing the local circuit are preferably yielding flat "brushes" of narrow flat form to enable them to track across the envelopes and also to accommodate themselves to the edges of the carriers over which they have to pass when moving into contact with the envelopes and passing out of contact with the same as they leave. Even better than yielding brushes are small contact wheels carried on small arms, that is, each one on its own arm and constrained downwardly by a weight on the arm or a spring which would enable the arm to yield upwardly, and capable of exerting enough force to establish an efficient contact for closing the control circuit.

Another object of the invention is to provide a secondary circuit or relay circuit to be closed by each control circuit, and to provide electro-mechanical means in the relay circuit to promptly effect the downward pushing of the envelopes, preferably at their corners, to dislodge them from the ledges of the carrier frames to permit them to fall by gravity into the individual hoppers that lie below the ejecting mechanism at each station.

Another object of the invention is to provide a construction for this machine that will enable the track along which the carriers pass the station to be accurately adjusted to a slight upward grade of a few degrees. This

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precaution is necessary to assure that there will always be developed a resistance to the advance of the train or carriers for the pieces of mail. For it is obvious that a slight down grade of the track towards its direction of advance might develop gaps between the ends of the carriers of the envelopes, which might be sufficient to interfere with proper positioning of the carriers so that they will be touching continuously throughout the train. Such gaps between any of the carriers could also interfere with a proper step-by-step advancing movement of the train of carriers.

In order to accomplish this object it is advantageous to provide adjusting means at the end of the machine toward which the train advances, for raising that end of the frame sufficiently to assure that a sufficient upgrade is established to insure that no gaps will occur in the train.

Another object of the invention is to provide a construction for the train of carriers for the envelopes that will reduce the friction load that is developed between the carriers or carriages for the envelopes and the track along which they advance.

Further objects of the invention may be evident from a careful reading of the following specification and careful study of the accompanying drawing.

The invention consists in the novel parts and combinations of parts to be described hereinafter, all of which contribute to produce an efficient apparatus for sorting posted articles for different destinations.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawings:

FIGURE 1 is a side elevation and partial section showing a supply hopper that is kept supplied with the platens that serve as carriages for the individual envelopes; and this view illustrates the means for moving the carriages in succession from the lower end of the hopper to deliver them in succession into a moving train through the agency of the delivery means.

FIGURE 2 is a plan of a driving means and showing its relation to the supply hopper. This view is broken away at one side, and shows some parts in section.

FIGURE 3 is a plan showing one of the units of the apparatus in detail located at one of the 50 or more stations, and illustrating the mechanism that cooperates to close the control circuit that activates the envelope ejector for that station.

This view also shows a portion of an envelope and its carriage adjacent to the same on each side: (a) toward which the train of carriages is moving, and (b) the side from which the train of carriages is moving; as indicated by the long arrow on this view. The ends of this view show envelopes the indicia on which carry distinctive conductive strips adapting them to be ejected at different stations.

FIGURE 4 is a longitudinal vertical section through the unit apparatus employed at each of the stations past which the carriages, each loaded with its one of the envelopes that will be deposited automatically by ejecting it down into the collecting hopper for that station, located on the floor below the apparatus.

FIGURE 4a is a typical section at one of the cross-bars in the machine at the hub of one of the pivoted arms that carry the contact roller-type brushes that roll along the conductive strips to establish the control circuit that effects the discharge of the envelope from its carriage at each station.

FIGURE 4b is a view similar to FIGURE 4a but illustrating a modification of this detail.

FIGURE 4c is a vertical section taken through the forward edge of one of the carriers broken away.

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FIGURE 5 is a fragmentary sectional view in a transverse plane passing down through one side of the machine, broken away and showing the details of a side of the long frame, the sides of which have grooves guiding the ends of the carriages as they pass along the guide frame that surmounts the body of the frame.

In this view the section is taken about in the plane indicated by the line 5—5 on FIGURE 4.

FIGURE 5a is also a fragmentary view, showing a detail of one of the joints that connect the sections of the guide frame end to end, and rendering the number of the units adaptable to the number of stations that are required in the machines being set up. This view shows a dowel that functions to insure that the ends of the guide grooves will align so perfectly that the carriers for the envelopes will always pass freely from one section to the next. FIGURE 5b is a vertical section showing the form of the side of the panels that carry the envelopes.

FIGURE 6 is a plan of an envelope as it will be riding in its carriage and it will be advancing in the machine past the other stations until it arrives at the station at which the envelope will be discharged into its proper hopper.

FIGURE 7 is a fragmentary view of an insulated connection with one of the conductive levers that carries a conductive contact which tracks over one of the conductive strips used on the envelope and shows a lead-off wire for the electric current in one of the primary control circuits in the machine.

FIGURE 8 is a diagrammatic view of the wiring circuits employed at each station and also indicating the lead-in wires from the electric supply main, and the lead-off wires from the control circuit to a return main.

FIGURE 9 is a vertical section through the long side edge of one of the platens, and illustrates an alternate design for effecting the insulation of the edges of the platens when made of conductive material.

FIGURE 10 is a plan of the last section of the main frame of the mechanism illustrating the adjusting means employed to assure that there will always be a slight upgrade of the track along which the train of envelope carriers moves. It also illustrates the use of antifriction supports for the carriers that roll along on a horizontal flange projecting in from the side walls of the framing of the machine.

FIGURE 10a is a vertical section through a threaded ball carrying cup, on the line 10a—10a of FIGURE 10. This improvement facilitates replacement of worn out antifriction units as may be necessary.

FIGURE 10b is a side elevation and partial section of one of the envelope carriages and showing the full length of it and also indicating how it is supported on the frame.

FIGURE 10c is a vertical section at the floor level, the middle of which is broken away. However, this view shows a slight modification in the placement of the vertical adjusting devices for obtaining a desirable slight upgrade of the track towards its rear, toward which the track moves.

Referring more particularly to the parts shown in FIGURE 1, the apparatus includes a supply hopper 1 of box form having a bottom 2 of plate form, but having an opening 3 at its upper end into which rectangular platens are placed.

Each of the platens is in the form of a frame which functions as a carrier 5 for an envelope 6, and the present apparatus is constructed to operate upon envelopes 6 of rectangular form, such as are commonly called "long envelopes" and may be approximately nine inches long and about four inches in width.

As illustrated in FIGURE 4, two of the carriers which are preferably of metal castings are broken away to show the section of the sides, which are of angle form presenting a vertical flange 7 and a horizontal flange

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8. The horizontal flanges function as ledges to support the edges of the envelope 6 because the envelopes fit snugly at all four of their edges that lie with small tolerance closely against the vertical inner faces of the vertical flanges 7.

The outer faces of these flanges also fit snugly against the inner faces 9 of all the walls 4 of the box form supply hopper.

In practice, the hopper 1, should be kept almost full of the carriers 5, which have already been "stuffed" by hand from above with their envelopes.

The framing of the machine includes an elongated main frame 10 composed of two parallel side stringers 10a and 10b spaced apart, made up of sections with joints connecting the same, (see FIGURE 4). As shown in FIGURE 5 each side stringer is surmounted by a superframe 11 composed of a guide rail 12 with a bottom flange 13 bolted onto a top flange 14 on the main frame. The guide rail 12 is composed of connected sections 12a and 12b, etc. (see FIGURES 5a), jointed together with two dowels 15. In order to insure easy passage of the forward ends of the carriers from one section into the next one beyond, notches like the notch 16 are cut into the inboard side of the guide rail 12 just above the frame 14 to receive a contact guide 16a.

As shown in FIGURE 5b, each one of the contact guide sections 16a has a groove 16b cut horizontally high up on its forward face to receive a horizontal tongue 16c on the end face of every carrier 5. As the train 17 of carriers is advancing past the stations, for example, the stations for Baltimore and Washington where the receiving hoppers 18 and 19 are located, as shown in FIGURE 4, a toe flange 16d projects under the ledge in each carrier that supports the envelope it carries. A dowel 16e connects each section with its adjoining section of the main frame.

In the operation of this apparatus the carriers for the envelopes are fed one at a time from the supply hopper 1 into the guide grooves 16b that guide their ends; and the force that advances them in continuous train 17 past the stations is exerted by a reciprocating slide 20 that lies on the bottom 2 of the supply hopper.

In FIGURE 1 the pusher slide 20 is shown in the last phase of its forward stroke. In that extreme position the forward edge will have moved the rear edge 21 of a carrier 5 far enough to clear the space at the point below the next bottom carrier 5, so that when the pusher plate has receded to its extreme rear position, that carrier can descend down onto the bottom 2 of the supply hopper.

Any suitable means may be provided for reciprocating the pusher plate. For this purpose FIGURE 1 shows a large cam 22 with a driving connection through a spline 23 (see FIGURE 2), from a shaft 24.

As shown in FIGURE 2, the shaft 24 has two bearings 28 on each of the side guides 12 of the machine frame.

Two counterweights 30 carried on radial arms 31 from the shaft, balance the weight of the body of the cam. They are integral with their hubs 31a.

On the left side wall of the supply hopper 1, as shown in FIGURE 1, are angle irons with a wide horizontal flange 32. The flanges are extensions projecting forward from the side of the hopper to operate as a guide for the pusher plate 20.

Referring now to FIGURE 4, a vertical section through the mechanism at a station, taken in a longitudinal plane parallel with the side guides 12 along and between which the carrier plates pass in a continuous train, being pushed along by the pusher plate 20 as it is adding another envelope carrier to the back end of the train; for it should be understood each added envelope carrier advances the train by exactly the width of the envelope carriages, and, of course, as the pusher plate recedes from the advanced position in which it is shown in FIGURE 1, every en-

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velope in the train is lying stationary under the ejector for the envelope that is lying at that station.

The cam 22 is composed of four steel plates of about 1/8 inch in thickness, including two core plates 22a that give the overall diameter to the cam. Each of these plates has a peripheral flange 22b that projects at right angles to the plane of the plate; two cover plates 22c of smaller diameter cover most of the area of the core plates 22a and they also have integral flanges 22d projecting outwardly at right angles to the plane of the plates 22a. All four of these plates are riveted through, and the spaces between the outer and inner flanges function as a guideway at the sides for two curved shoes 25 mounted on their respective pins 26 that project inward from the forks 27a of a drawhead 27. They conform to the curve and radius of the flanges.

The drawhead is a steel casting having a body with a socket at its rear side that receives the adjacent edge of the pusher slide 20.

Two rivets 27b secure the edge of the pusher slide 20 to drawhead 27.

At each forward rotation of the cam 22 the train composed of the abutting carrier platens is advanced so that every platen in the train advances from its present location to the next position it will have at the next station in the machine.

And if it is the proper station to receive that envelope, electric circuits will be closed that will effect the discharge of the envelope down from the frame-form carrier 5 that is supporting the envelope on ledges 8 formed in the carrier.

FIGURE 6 is a plan of a single carriage 5 or carrier for an envelope, that is, an envelope that would be considered a long envelope, as envelopes go. It is in an inverted position, resting on a metal carriage such as illustrated in FIGURE 1. This envelope fits closely into the rectangular opening 35, surrounded by the four side bars of the frame that is formed by the carriage which is the carrier for its envelope 6 shown lying upon the ledge 8 that runs around the inner sides of the side bars and end bars 7 of the carriage 5.

Although the envelope on this carriage has indicia consisting of conductive strips extending across its reverse side as shown, they are preferably applied on the address side of the envelope as well as the reverse side. This procedure enables the indicia to cooperate in the sorting operation with the "brush" contacts at the stations regardless of whether the envelopes lie in their carriages with their address side up or not.

If the contact strips are placed on both sides of the envelopes, less time will be required by the persons who stuffed them as they come, without having to turn them over.

The indicia strips shown in FIGURE 6 may include any one of a number of two sets each of strips; that is to say, they could include two strips located according to the code position of the *a* and *a'* strips, or they could be located as indicated by the two coded strips *b* and *b'*; or they could be located according to the two *c* strips, etc.

According to this illustration these three pairs of strips would correspond to three different destinations, and would cooperate to develop circuits at the proper stations to deliver the envelopes individually addressed respectively to those stations.

These features will be referred to again in this specification in describing the cooperation of these strips, and explaining how they function in establishing the control circuits at each station that correspond to the particular code setting of two such strips.

Referring now to FIGURE 4, the middle portion of which illustrates the mechanism associated with a station, two cross-bars 41 and 40 are shown supported on two pairs of oppositely disposed columns 41a and 40a that are stepped at their lower ends on the guide frame 12

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already referred to, that extends the full length of the machine at each side.

The cross-bars 41 and 40 each operate to pivotally support the hub end of levers 42 that, as shown here are of arcuate form with forked ends 43 that carry a pivot pin 44 for a contact brush in the form of a disc, wheel, or roller 45. Each of these levers is biased downward by force that results in pressing the contact wheel against the upper side of a strip on the upper face of an envelope. In the present instance the means for developing this bias is in the form of small weights 46 that have central eyes to fit over a retaining long bolt 46a or rod, the base of which is secured in a circular base-plate 47 of a bracket 48 that is bolted or riveted to the body of the lever 42.

When the train of carriages for the envelopes 6b are "tracking" across the upper side of each carriage, and particularly as each long side bar of a carriage is passing under a contact disc 45 from the left toward the right, as viewed in FIGURE 4, the wheels or rollers which are of brass or other good conductor will drop down onto the upper face of the envelope. And the discs 45 that are in line with each other will be simultaneously in contact with the same one of the indicia strips or stripes, *a*, *a'*, or *c*, etc., and if they are in line this way they will close the control circuit for that certain station. And how that control circuit will be instrumental in effecting the ejection of the envelope in that carriage down into a hopper 13 that is below, will now be described.

Referring now to FIGURE 8, that diagrammatically shows the wiring plan; a main source of current, for example, a battery 49 supplies current for a primary circuit 50 that connects one of the conductive strips, for example, *a'* through its code aligned contacts 45, in series through a conductor 51 and the strip *a*, and its disc contacts 45 to a relay R, and through a return conductor 52 to battery 49. The relay R is part of an activating circuit 53 that is served by another source of E.M.F. such as a battery 54. This secondary circuit has an ejector with a solenoid coil 55 that draws down a core 56 above it, and that is attached to the upper end of a plunger 57 that carries an ejector head 58 that descends far enough to push the envelope down and out of its carriage 5, causing it to fall by gravity into the hopper 13 below it.

The number of stations supplied with apparatus to deliver the "right" envelope is indeterminate. For example, it would seem that a capacity of fifty stations would be practicable to be free from frequent "shut downs" of the machine.

The lower the capacity of the machine, the wider the code-strips can be, and the easier it would be to attain perfect cooperation between the brush rollers. They would always align properly.

Still referring to FIGURE 8, it should be noted that the wires 50a, 50b, and 50c indicate sets of these wires which would be used to complete the primary circuits, the former pair of which would be outgoing conductors in completing the parallel primary circuits, and the last of which 50c, would be the return wires.

Referring to FIGURE 4, attention is called to the fact that the ends of the bars 40 and 41 are supported in metal blocks 59 that are separated by insulating blocks 60 (see FIGURE 5), from the columns 40 and 41 that support them.

FIGURE 4 illustrates stops 61 of insulation material carried on the undersides of the levers or arms 42, that cooperate with adjusting stop-bolts 62 carried in lugs 63a to limit the low level to which the bottom faces of the roller brushes can descend.

The body of each lug 63a is, of course, composed of insulating material.

In FIGURES 4a and 4b an alternate means for preparing an aligned proper mounting for the hub end of the arms is illustrated. This involves drilling a small diameter hole 64 at the top of the upper face of the hub

42a of the arm 42, and tapping it with thread to receive a set-screw 42b with a conical tip; and also milling a short channel 42c in a circumferential direction in the bar 40, or 41 that is carrying the hub. The milled channel should preferably have inclined side walls to conform to the inclination of the conical side of the conical tip of the set-screw. This procedure will obviate the use of an insulation block such as the insulated stops 61.

As illustrated in FIGURE 4b the contact disc 45 carried by the arm 42 is at its lowest level, and the slot 42c permits the arm to be swung up sufficiently by the disc 45 when the bars 38 of the carriages pass under the hanging discs.

Referring to FIGURES 3 and 4, the ejector head 53 that pushes the envelope 66 out of the carrier or carriage as shown in FIGURE 3 has a rectangular frame 65 with side bars 66 that extend longitudinally over the envelopes near its long edges 36 lying below it. The side bars 66 join end bars 67 to form corners 67a, and from these corners integral arms 68 extend out to points just above the corners 69 of the envelope 36 in its carrier.

Each of the arms 68 at its tip carries an adjustable threaded pin 68a located close to the vertex of the angle 69 existing at each corner between the ledges or shoulders that support the envelope at the corners. An alternative form for the parts 68a would include the use of a small steel ball peened into a socket fitting closely to it. The peening would retain the ball, enabling it to roll freely on top of the envelope without injury.

The ejector frame 65 also includes a main frame-bar 70 that connects integrally to the end bars 67, and at about the midpoint of its length this bar is widened out to form a circular boss 71.

The frame 65 is a casting, and the boss 71 has an integral vertical shank 72 with an integral horizontal arm 73. In order to enable this arm 73 to move down the ejector frame 65 the solenoid core 56 is attached to its underside by a wrist pin 74 that passes up through the arm 73 from below; its upper end is threaded to receive a clamping nut 75.

In addition to this shank 72 extends over and above a fixed cylindrical guide 76 in which slides a guide-bar 77, the upper end of which is secured to the adjacent end of the shank 72.

The side of the cylinder 76 is secured by bolts, to a horizontal cross-bar 78 of angle iron that is integral with two angle iron stanchions 79 developed by heating the angle stock and bending it while hot.

The level to which the ejector head 53 can be depressed in its ejecting movement can be regulated by a stop-ring 80 having a set screw for securing it fixedly to the core 56 of the solenoid coil 55.

When the ring 80 strikes the upper end of the solenoid body the downward movement of ejector 53 will be arrested.

A coil type returning-spring 81 resting on the upper end of the guide cylinder, surrounds the guide bar 77 and thrusts at its upper end against the underside of the arm 73.

The solenoid coil 55 is supported at its lower end on the foot 82 of a bracket 83 that is cast integral with the adjacent side of the guide cylinder 76.

Referring again to FIGURE 5 that shows the arm 42, the hub of which is insulated from the crossbar 41 by an insulating sleeve 5a that enables the upper face of the hub to lead current passing up or down the arm 42 to connect to a wire conductor w that leads up to an insulated terminal from which a conductor 53 leads to, or from, the solenoid coil 55 for the adjacent station.

The conductive strips employed can consist of thin narrow tape of latex which is pressure sensitive, as that will enable it to be rolled onto the envelopes with sufficient pressure to effect its automatic adhesion to the surface of the envelope; each strip having a top coating of conductive material.

The location of the strips for each destination of an envelope must be in accordance with the predetermined code, for one envelope only in accordance with the code.

Or, if desired, a narrow brush of a broad pen of about a sixteenth of an inch can be mounted over a guide for the envelopes moving across in a fixed path under the pen, so as to deposit a narrow stroke or strip of magnetic ink across the envelopes placed in accordance with a certain code to correspond respectively with the different destinations for the envelopes.

If desired, in practice the carriages may be composed of a nonconductive material molded to the form and size desired, but they could be cast of an alloy having a relatively low coefficient of expansion under changes of temperature. This would insure that if the envelopes are of relatively great length there would be no change of position of the conductive strips; that is to say, any such lateral movement would be insignificant.

However, the carriage can be cast of iron or steel, in which case the longitudinal edges of all carriages should be covered with insulating strips 84 of insulation applied to them. Such strips would preferably be composed of slightly compressible rubber that would be forced down into slightly undercut channels 85 cast or machined into the longitudinal edges for the entire length of a carriage (see FIGURE 9).

Broadly this invention employs means for assembling a train of rectangular carriages, or frame-form carriages, and the opening in each carrier frame receives a piece of mail. This train is carried in a horizontal guide frame along which the train is guided. The train is moved along by a step by step movement occasioned by adding successively single carriers at the rear of the train and pushing the added carrier from behind so that it advances the entire train of carriers past stations corresponding respectively to the destinations of the pieces of mail which in the present instance are envelopes of a standard size.

The feature of using some means, for example, a ledge at the edge of the opening in each carrier frame is highly advantageous as it enables each envelope to be pushed downward instead of lifting it to remove it from its carrier.

While, for example, the functioning of the invention as described involves the use of two parallel conductive strips in the code system, it is nevertheless true that by using a third line the capacity of the machine can be greatly increased.

Referring again to FIGURE 2, the driving shaft 24, is carried in two bearings 86 located adjacent to the counter-balance weights 30, and each supported on its own bracket 87 seated on a horizontal plate 88 that may be integral with the two adjacent upright end plates 89 on the main frame of the machine.

Referring again to FIGURE 6, that shows the guides 16c it should be understood that it is important that the tips of the guides for the ends of the carriages 5 must be tapered. This is to insure that the carriages will always pass from one section to the next at the joints between the sections.

If desired, and as shown in the alternative construction of FIGURE 10 the machine illustrated may be constructed so as to reduce as far as possible the friction that is encountered in the movement of the entire train of carriages as they move along their supporting guide flanges 90. The means for accomplishing this may be mounted in a bracket cast integrally with the side walls 91 of the machine frame. Of course, this would economize on the horsepower necessary to drive the machine.

At the four corners of each carriage 92 for an envelope hemispherical sockets 92a are broached into the undersides of the carriages to receive a hardened steel ball 93 that rolls freely on the upper surface of the two flanges 90 that form a track for them. Each ball is held in its socket by an annular retainer of cup shape which maintains each ball with slight clearance in its socket.

As shown in FIGURE 10a, each retainer has a tubular body 94 that carries an internally threaded socket for matching similar threads on the underside of the carriage. When the retainers are screwed up tight the upper end face of each "cup" seats against an annular shoulder 95 on the underside of the carriage, and in this position the ball has enough clearance to roll freely.

As mentioned heretofore, it is desirable to provide the machine with adjusting means for assuring that slight up-grade toward the rear will always be present. In other words, every carriage must always be in contact with the adjacent ends of the carriages between which it is advancing, that is, moving along with the train.

In order to accomplish this at the extreme end of the frame of the machine, toward which the train of carriages advances, two adjustable brackets 96 are provided with set screws 97. They are mounted with their axes in a vertical position and their tips at their lower ends rest upon the floor or a base plate on a solid floor.

FIGURE 10c illustrates an alternate form for two of these set screws 98. In this form a simple flat lug 99 projects laterally from the side of the frame side bar 100. And of course, the complete device preferably has a check-nut 101 which can be tightened up against the upper face of the lug to lock the set screw against any movement from the proper position to which it has been adjusted.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

I claim as my invention and desire to secure by Letters Patent:

1. In mechanism for sorting rectilinear addressed envelopes composed of material that is nonconductive to electric current, and designated to a plurality of different destinations; and in which each of the said envelopes carries on its face a conductive means disposed in a line extending laterally across each envelope, said line of conductive means being relatively narrow and disposed perpendicularly to the longitudinal axis of the envelope carrying it, each conductive means also having a location on its envelope distinctive to that envelope and its corresponding destination; the combination of a plurality of carriages each capable of carrying a single one of said envelopes in position that holds its said conductive means disposed on the upper face of the envelope, each of said carriages comprising a frame means for supporting the edges only of an envelope so that the envelope can be initially received into the frame for being automatically sorted and then subsequently removed from the frame means by ejection therethrough, means for advancing a series of said carriages each loaded with an envelope along a path in a sidewise direction with respect to the longitudinal axis of the carriage, and so that the direction of advance is parallel with the direction in which the said conductive means extend; a plurality of delivery stations extending along said path, corresponding respectively to the designated destinations of the addressed envelopes, individual ejectors located respectively at said stations for ejecting the envelopes corresponding to the different stations, actuating means for each ejector at each station, and all stations; including a pair of contacts aligned with each other in the path of movement of the conductive means on the proper envelopes for that station, and means for maintaining an activating circuit for each actuating means for the ejector, said circuit having the terminals for said aligned contacts so that only the proper envelopes for a certain station can operate that station's ejector.

2. Mechanism for sorting rectilinear envelopes, according to claim 1, in which the carriages are of metal with insulation covering their edges; and the contacts at the said stations have pivotal mounts, and have arcuate perimeters enabling the same to ride up and over the insulated edges of the said carriages, without shorting the said circuits into the metal carriages.

3. Mechanism for sorting rectilinear envelopes, according to claim 1, in which the contacts at the said stations include pivotally mounted arms supporting contact rollers, said pivotally mounted arms enabling the rollers to rise and track across the forward insulated edges of the advancing carriages, before the rollers drop down off said edges and land onto the said conductive means on the envelope carrying the conductive means that will align with them.

4. Mechanism for sorting envelopes, according to claim 1, in which the said carriages are composed of conductive material, and including insulation applied on the edges of the carriages and located in alignment with all the contact rollers, to prevent shorting of any of the activating circuits for the ejectors employed in the mechanism.

5. In apparatus for sorting rectilinear envelopes, in which each of the envelopes is provided with a transverse line of conductive material extending perpendicularly to the longitudinal axis of the envelopes, said conductive lines lying at a location along the length of the envelope distinctive to that envelope, and to a certain destination named in the address on that envelope, a carriage for each envelope for holding the envelope in a fixed alignment, means for advancing and guiding the carriages loaded with their envelopes along a fixed path having delivery stations spaced along said path and corresponding to the different destinations, electromechanical ejectors located respectively at the stations, two contacts spaced apart at each station and located in line with the lines of conductive material, and means for maintaining an activating circuit for each station normally open, but with terminals at the two said contacts for that station, capable of being closed by the presence of the said conductive lines when the station contacts are riding on the same, and thereby energizing said corresponding ejectors to dislodge the envelopes from their carriages at their proper stations, and wherein the said carriages comprise rectilinear frames with rectilinear openings therein slightly larger than the dimensions of the envelopes, receiving the envelopes respectively from above, and having means projecting under the edges only of the envelopes, so that when the ejectors are actuated they descend, engage the envelope and push it down through the said opening in its carriage.

6. In a sorting machine of the kind described for mailed envelopes, the combination of rectangular envelopes addressed to different destinations, having two transverse strips of conductive material, located on the envelopes at locations according to a given code, and spaced apart according to a given code distinctive to the destinations to which the envelope is addressed, said strips being disposed parallel to each other and each strip capable of cooperating with two contacts resting on one of said strips and two contacts resting on the other of said strips simultaneously to close a circuit in which the said strips are connected in series through the agency of said pairs of contacts, and wherein each envelope rides in a carriage in the shape of a rectangular frame with a rectangular opening in the frame presenting a ledge supporting the envelopes at their edges, thereby enabling the envelopes to be dislodged by an ejector pressed downwardly onto the upper face of the envelope.

7. In a sorting machine for rectilinear envelopes addressed to diverse destinations, and having parallel adhering strips of conductive material on their faces, disposed on the same in accordance with a code, to effect their cooperation with a plurality of ejectors located at spaced stations, for collecting envelopes addressed to destinations designated in the addresses on said envelopes, and corresponding to said spaced stations, the combination of a plurality of carriages for the said envelopes, having openings in which said envelopes are seated, said carriages having means for supporting the envelopes in a position in which said strips are parallel with the end edges of said carriages, said machine including a hopper for re-

ceiving stacks of the said envelopes, carriages loaded with the said envelopes respectively, a machine having a guide frame beyond said hopper, means for delivering the bottom carriage of the stack into said guide, in a series, a plurality of delivery stations spaced along said guide, the delivery of successive envelopes into said guide operating to advance the envelope-loaded carriages past said stations, ejectors located respectively at said stations for dislodging the envelopes, activating means for the respective ejectors, and means for establishing and closing a control current at each station through the agency of said conductive strips for energizing the activating means for each ejector when the envelope addressed to the destination represented by said station, is passing that station.

8. A sorting machine for sorting rectilinear envelopes addressed to diverse destinations, according to claim 7, in which mechanism at each station for cooperating with the properly placed strips for effecting the activating of the ejector for a certain station includes a pair of contact rollers in alignment with each of the said strips on the envelope effects the establishment of the said control circuit.

9. A sorting machine for sorting rectilinear addressed envelopes directed to diverse destinations, according to claim 7, in which the said carriages have guide tongues on their outer end edges, and the guide frame has grooves for receiving the said tongues to effect the guiding operation.

10. A sorting machine for sorting rectilinear addressed envelopes directed to diverse destinations, according to claim 7, in which the said guide tongues have tapered ends and the guide frame is composed of sections jointed together, to assure that the carriages will pass through the joints in the said guide frame.

11. In a sorting machine for rectilinear envelopes addressed to diverse destinations and having transverse conductive strips distinctive to the respective addresses, said machine having spaced apart stations respectively representing the diverse destinations, and in which each of the said envelopes is supported at its edges in an opening in its carriage, the combination of a machine frame having means for feeding and guiding the said envelope-loaded carriages into the guide frame and past the said stations with an intermittent motion, including the arresting of the advance of the carriages at each of said stations, an ejector at each of said stations located above the carriages and envelopes carried thereby that have arrived at the station, and automatic means controlled by said conductive strips distinctive to the different stations for activating the ejector of the proper station to force the envelope down through the opening in its carriage to deliver the same at that station.

12. In a machine for sorting mail matter in accordance with the diverse addresses on the same, the combination of means for supporting and assembling a train of carriers each capable of holding a piece of said mail matter in a fixed position with respect to its carrier, each of said pieces of mail having at least two parallel strips of conductive material, one of said strips having a relative position on its carried mail piece distinctive to one of said destinations in accordance with a pre-determined code, the other of said two strips having a relative position spaced from the first named strip a distinctive amount corresponding to the said destination in accordance with

the same code, means for advancing the said train along a fixed path parallel to said strips, a plurality of delivery stations along said path corresponding respectively to said destinations, and a pair of contacts at each station aligned with each other located so that they align with and touch one of said conductive strips; and a second pair of contacts located so that they align with, and contact the other of said two strips, electro-mechanical means at each station for ejecting the mail piece from its carrier, and thereby closing an electric circuit through both of said pairs of contacts and said strips and through said electro-mechanical means eject the said piece of mail matter at the station corresponding to the distinctive location and spacing apart of said conductive strips for that station, and wherein the means for supporting and assembling the train of carriers includes a hopper open above to receive a stack of the carriers, each carrier having a piece of the mail matter carried therein, and in which the means for assembling the train composed of the carriers includes a guide extending laterally from the said hopper, and a pusher means located on the opposite side of the hopper for moving the bottom carrier in the stack into the guide, thereby assembling a train of the said carriers by the said pusher means forcing the latest, moved carriers from the hopper into the said guide in contact with each other to form the said train.

13. A machine for sorting mail matter according to claim 12, in which the said guide presents guide surfaces below the path of the carriers, and in which anti-friction rotatable members on the carriers and supported on the said surface reduce the frictional force that must be overcome by the pusher means when it advances the train.

14. A machine for sorting mail according to claim 13, in which the said adjusting means includes one or more threaded rotatable members having means for mounting the same in a practically vertical plane, and resting below on the floor that supports the machine, thereby enabling the level of the guide to be raised or lowered with the respect to the floor level.

15. A machine for sorting mail matter, according to claim 12, in which the said guide for the train is provided with means adjusting the grade of said guide capable of being set in a position that will assure that all of the carriers in the train are in constant touch fore and aft with the adjacent carriers to it in the train.

16. A machine for sorting mail according to claim 12, in which the said portion of the guide on opposite sides thereof presents a pair of laterally projecting lugs with a threaded opening therein, and a set-screw in each opening having its tip projecting down below the lug and resting on the floor below the machine, thereby enabling the path for the carriers to present a slight up-grade, and a proper transverse horizontal level.

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