

Feb. 9, 1926.

1,572,809

C. F. RATCLIFF ET AL
MACHINE FOR SORTING DOCUMENTS

Filed Feb. 25, 1925

4 Sheets-Sheet 1

Fig. 1

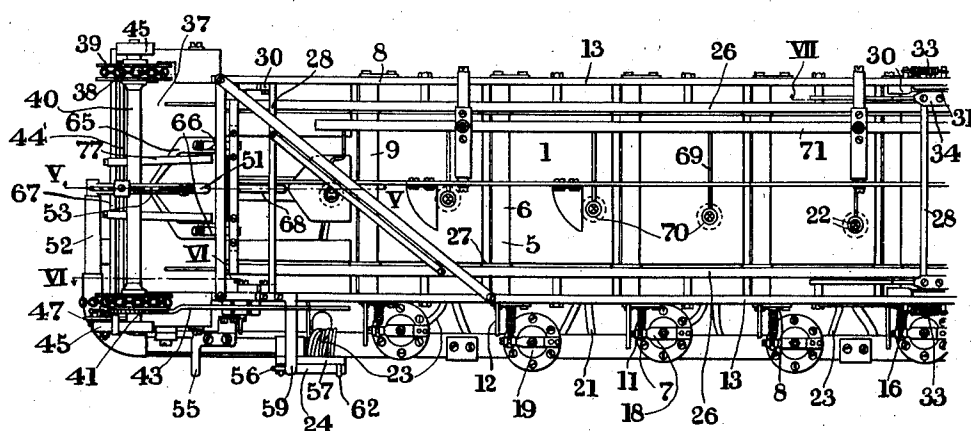
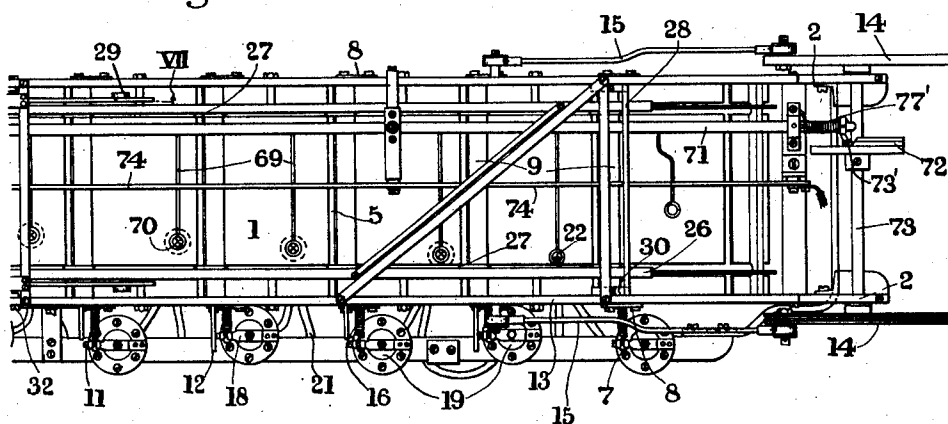


Fig. 1.^a



Inventor
C. F. Ratcliff
D. Macadie
by J. J. Quinn
ATTY

Feb. 9, 1926.

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C. F. RATCLIFF ET AL

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4 Sheets-Sheet 2

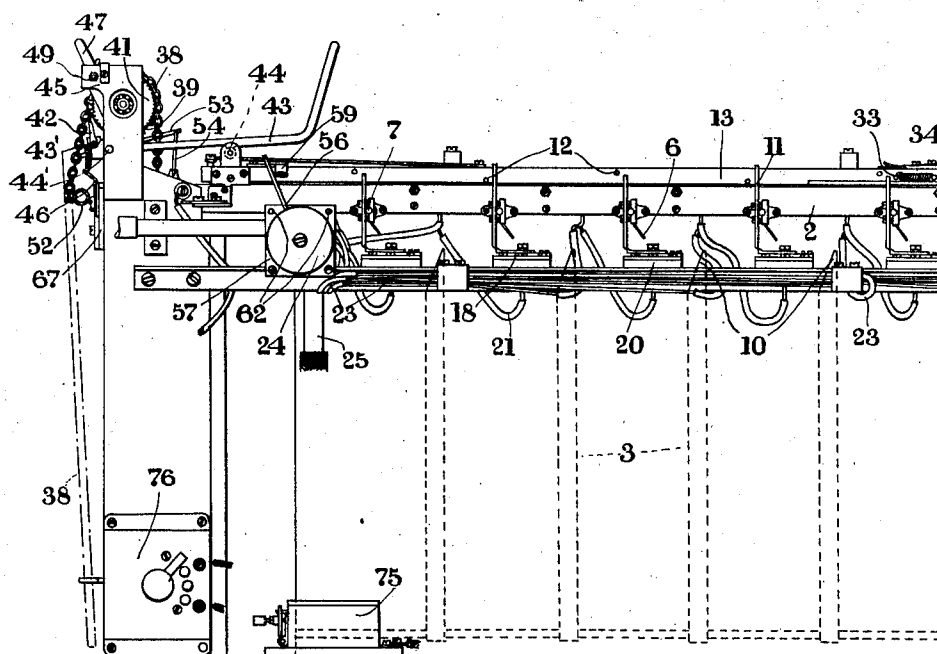


Fig. 2.

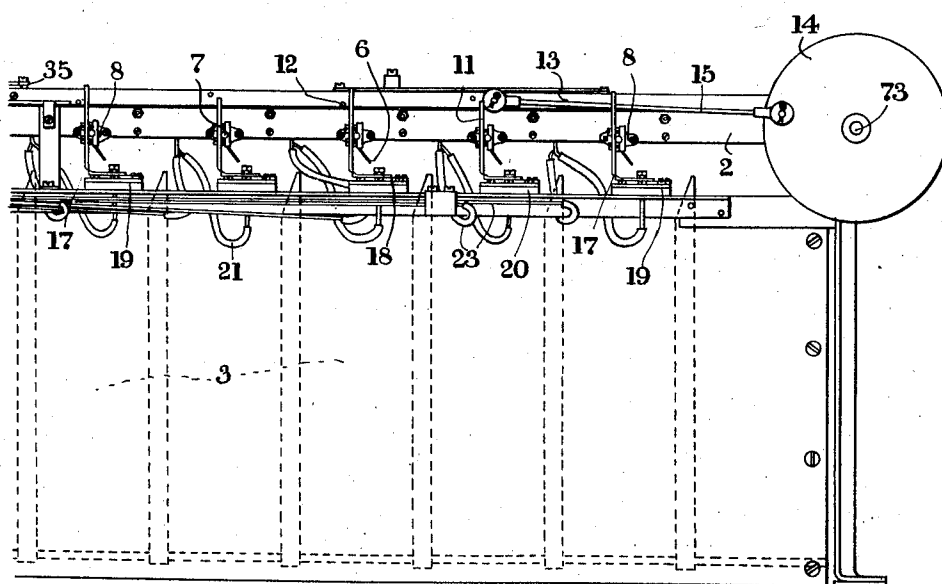


Fig. 2^a

Inventor
C. F. Ratcliff
D. Macadie

By J. J. Juwie
ATTY

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1,572,809

C. F. RATCLIFF ET AL

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4 Sheets-Sheet 3

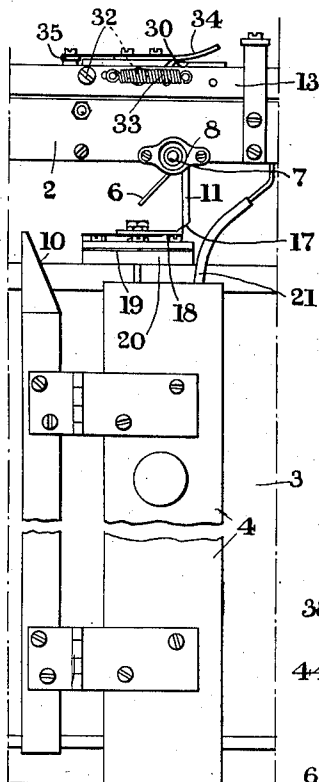


Fig. 3.

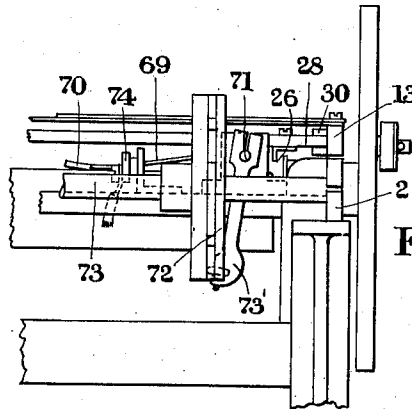


Fig. 4.

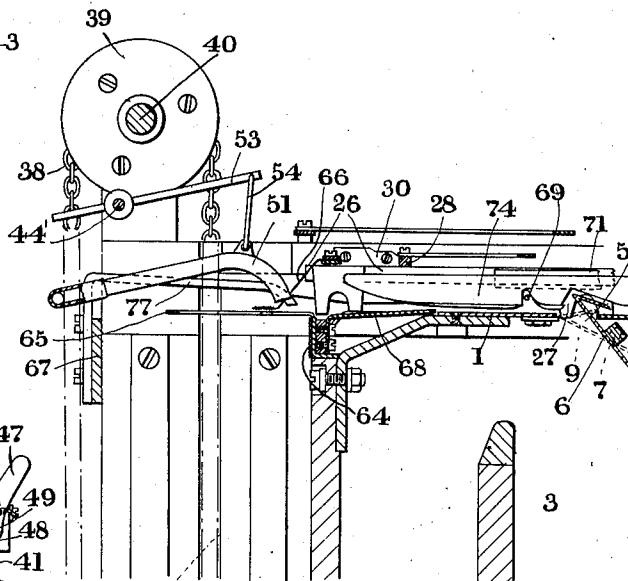


Fig. 5.

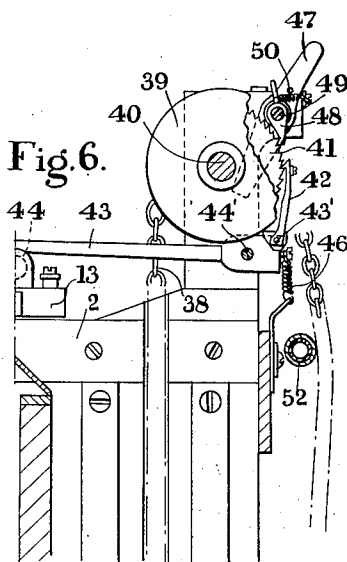


Fig. 6.

Inventor
C. F. Ratcliff
D. Macadie
by J. F. Fawcett ATT'Y.

Feb. 9, 1926.

1,572,809

C. F. RATCLIFF ET AL
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Fig. 7.

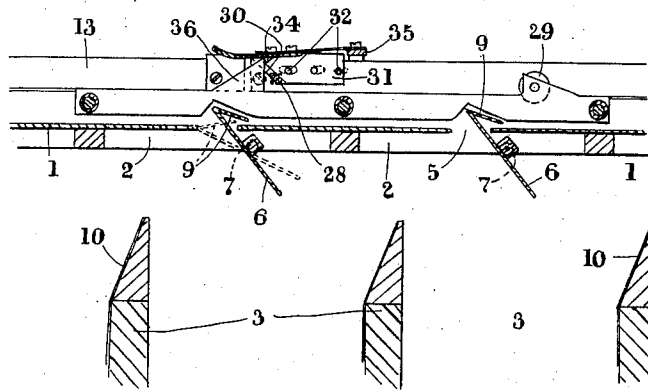


Fig. 8.

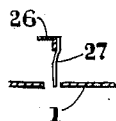


Fig. 9.

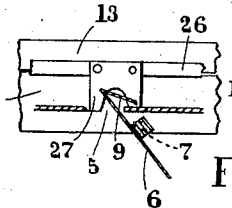


Fig. 10.

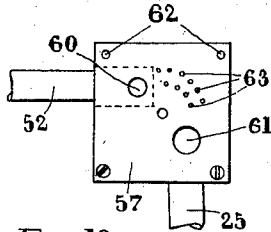


Fig. 11.

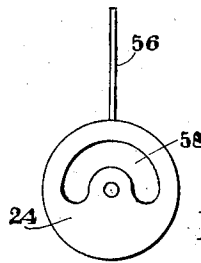


Fig. 12.

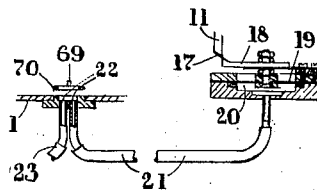
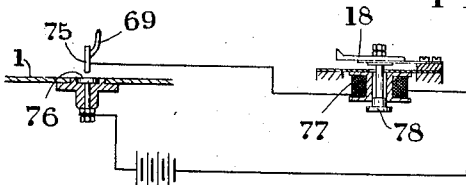


Fig. 13.



Inventor
C. F. Ratcliff
D. Macadie
By J. L. Lurie
ATTY.

UNITED STATES PATENT OFFICE.

CHARLES FREDERIC RATCLIFF, OF NORTH FINCHLEY, LONDON, AND DONALD
MACADIE, OF PALMERS GREEN, LONDON, ENGLAND.

MACHINE FOR SORTING DOCUMENTS.

Application filed February 25, 1925. Serial No. 11,594.

To all whom it may concern:

Be it known that we, CHARLES FREDERIC RATCLIFF, a British subject, residing at North Finchley, London, England, and DONALD MACADIE, a British subject, residing at Palmers Green, London, England, have invented certain new and useful Improvements in Machines for Sorting Documents, of which the following is a specification.

15 This invention relates to machines for sorting documents or the like which are punched with holes in certain positions corresponding to the order into which they are to be sorted.

20 The principal object of the invention is to sort automatically and rapidly documents such as cancelled pension warrants, postal orders or the like, which consist of thin paper slips that are numbered consecutively and have to be sorted into numerical order, although the invention is not limited in its use to this particular type of document or order of sorting.

25 Thin paper documents, however, present peculiar difficulties which are overcome by the invention.

30 According to the invention means are provided to feed the documents one behind the other along a track which is provided with a series of interceptors, movable out of and into operative positions, to allow the documents to pass along the track or to intercept them for the purpose of permitting or effecting their discharge from the track.

35 The feeding of the documents is preferably effected periodically, and means are provided to operate the interceptors, also preferably periodically and at the same periodicity as the feeding of the documents along the track, but each interceptor is adapted to be retained in the operative or intercepting position when a document brought adjacent to it has a hole which registers with a selecting spot in a determined position in front of the interceptor, the registration of the hole in the document and the selecting spot enabling a retaining device to come into operation to hold the interceptor ready to intercept that particular document and to permit of its discharge.

The retaining device may continue to hold the interceptor in its intercepting position so long as documents having similar holes

are fed to it, or if no documents are fed— 55 that is should the machine continue to work during a temporary cessation in the supply of documents—but immediately a document not having a hole which will register with the selecting spot approaches the interceptor 60 the latter moves to allow the document to pass on.

The operation of the retaining device is preferably controlled pneumatically, the hole in the document when registering with the selecting spot in front of its corresponding interceptor exposing air ducts connected to pneumatic means controlling the retaining device, and to a source of exhausted or compressed air, so that the device 70 holds the interceptor in its operative position, but when a document covers the selecting spot the controlling means releases the interceptor and allows it to move into its inoperative position. 75

The operation of the retaining device may be controlled electrically, for instance, by a solenoid energized when the registration of a hole in a document with a selecting spot permits a contact maker to close the circuit 80 for the solenoid.

The invention also includes means for automatically moving a pile of unsorted documents into a feeding position and means for transferring the documents from the pile to the sorting track, these transferring means preferably comprising a pneumatic device for separating or picking up the documents one at a time from the pile ready to be seized by reciprocal grippers by which they are transferred to the track and thence fed mechanically along it.

The invention further comprises means for automatically stopping the machine in the event of a crumpled or other defective document being fed on to the track and not capable of being passed right through and out of the machine and likely to catch and form an obstruction and to interfere with 100 the sorting operation.

The interceptors may be in the form of shutters controlling discharge openings in the tracks leading to separate compartments below the shutters not only intercepting the documents as required but, in conjunction with the feeding means being adapted to deflect the documents into the discharge 105

openings. A machine embodying interceptors of this form, particularly suitable for the sorting of pension warrants or postal orders into numerical order will now be described by way of example with reference to the accompanying drawings in which:—

Figures 1 and 1^a together form a plan of the machine.

Figures 2 and 2^a together form a side elevation.

Figure 3 is a side elevation of part of the machine as seen from the opposite side to that shown in Figure 2.

Figure 4 is an elevation of part of the rear end of the machine.

Figure 5 is a side sectional elevation of the lift on V—V Figure 1.

Figure 6 is a side sectional elevation on VI—VI Figure 1 showing part of the elevating gear.

Figure 7 is a side sectional elevation of a detail, the section being taken on VII—VII Figure 1.

Figures 8 and 9 are two sectional elevations of a pusher finger.

Figure 10 is an elevation of the main cut-off valve box the valve being shown separately in Figure 11.

Figure 12 is a sectional elevation of one of the diaphragm devices for controlling a shutter, the connection to a selecting spot being indicated diagrammatically.

Figure 13 is a diagrammatic view of an electrical device for controlling a shutter detent.

In the machine illustrated a flat track 1 is supported on a stationary framework 2, over a series of compartments 3 for the reception of the sorted warrants, the compartments having hinged gates 4, Figure 3, to facilitate removal of the warrants.

The track is provided with a series of slots 5 corresponding in number to that of the compartments and each slot is controlled by a shutter 6 comprising a plate mounted on a spindle 7 carried below the track in ball bearings 8 in the sides of the stationary framework 2, the plate having on its upper edge a rearwardly inclined flap 9. When a shutter 6 is in its closed position this flap 9 closes the corresponding slot 5 in the track 1 and presents a slight incline rearwardly so as to guide the warrants passing along the track well over the rear edge of the slot. When the shutter 6 is raised it presents the under face of the plate to the approaching warrant which on the next feeding movement is forced against the sloping underside of the plate and thereby guided into the compartment 3 below. In order to ensure that the warrant shall fall flat in the compartment 3, one wall of the compartment against which the forward edge of the warrant strikes is provided with a sloping surface 10, Figure 7, coated with frictional

material such as sand paper which delays slightly the falling of the forward edge of the warrant, so that the warrant assumes a more nearly horizontal position before settling down in the compartment. Each gate 4 does not completely close its compartment 3, a space being left on each side of the gate to allow and regulate the escape of air from beneath the falling documents, thus causing them to pile in a regular and orderly manner.

Each shutter spindle 7 is provided with a lever 11, Figures 1 and 2, which is struck periodically by a pin 12 carried by a reciprocatory frame 13 sliding on ball races on the upper edges of the sides of the stationary framework 2, the frame 13 being operated by crank discs 14 and connecting rods 15 arranged at the rear end of the machine, the discs 14 being rotated continuously, for instance, by an electric motor, one disc being conveniently grooved to form a pulley for a belt from the motor. All the levers 11 are struck by their pins 12 simultaneously on each alternate or feeding stroke of the reciprocatory frame 13 so that the shutters 6 are all opened together. In the example shown the pins 12 are alternately of different lengths and arranged at different levels. The levers 11 are also alternately of different lengths. This is due to the fact that the stroke of the frame 13 is such that on the return stroke the pins have to pass back beyond the adjacent levers and must pass clear of these levers.

On each return stroke of the frame 13 the pins 12 move away from the levers 11 and the shutters 6 are free to close under the action of gravity and springs 16. Each lever 11 has a lower extension or tooth 17 the end of which is bevelled or sharpened. As a shutter 6 opens or closes, the corresponding tooth 17 swings over a detent 18 which is connected to a controlling means comprising a diaphragm 19 closing a small air chamber 20, Figures 2 and 12. When the chamber 20 is exhausted of air the diaphragm 19 is depressed by the atmosphere and holds the detent 18 out of the path of the tooth 17, but when air is admitted to the chamber 20 the diaphragm 19 springs up and raises the detent 18 which arrests the tooth 17, so that the corresponding shutter 6 is retained in the raised or open position. The chamber 20 is connected by one pipe 21 to a recess 22 formed in the track 1 in a determined position or selecting spot in front of the shutter 6, and another pipe 23 connects the recess 22 to a valve 24 on a main suction pipe 25. So long as the recess 22 is covered by a warrant the corresponding diaphragm 19 is depressed and the corresponding shutter 6 is free to fall, but when the recess 22 is uncovered by a hole in a warrant the diaphragm 19 is raised

and the shutter 6 held up to intercept the warrant and to guide it through the corresponding slot 5 in the track 1 to the compartment 3 below.

5 The warrants are fed periodically along the track by what may be termed a pusher frame. The pusher frame 26 is mounted inside and carried by the before mentioned reciprocatory frame 13, so as to reciprocate therewith. It is provided with downwardly directed fingers 27, Figures 5, 8 and 9, which engage with the rear edges of the warrants and push them along the track 1. The pusher frame 26 has rising and falling motions as well as a reciprocating motion so that each of the fingers 27 is first raised, is next moved over and above the adjacent warrant, towards the feeding end of the machine, then lowered vertically close behind the rear edge of the warrant and finally moved towards the shutters pushing the warrant in front of it. The rising and falling motions of the pusher frame 26 are effected by the medium of three cross bars 28, one near each end of it and one at the center of the length.

As the pusher frame 26 nears the end of its feeding stroke the centre cross bar 28 engages with fixed stops 29, Figures 1 and 7. The outer reciprocatory frame 13 continuing to move, thrusts cams 30 or inclined planes under the ends of the arrested cross bars 28 and, consequently, raises the pusher frame 26. In order to prevent the bars 28 slipping down the inclines of the cams 30, plates 31 are pressed by springs 33 against the ends of the middle cross bar 28. The plates 31 are carried by screws 32 passing through slotted holes in the frame 13 so that the plates can slide slightly against the action of the springs 33.

In order to hold the middle cross bar 28 when on top of the cams 30, spring latches 34 are provided on a cross bar 35 of the frame 13. The latches 34 release the middle cross bar 28 when raised by the engagement with stops 36 (Figure 7) on the frame 2, which arrest the cross bar 28 near the end of the return stroke of the pusher frame 26, when the cross bars 28 are forced down the cams 30 and the pusher frame 26 falls with its fingers 27 accurately behind the rear edges of the warrants.

The warrants to be sorted are placed in an elevator comprising a plate 37 carried by endless chains 38 passing over sprockets 39 at the feeding end of the machine. The sprocket spindle 40 is carried in ball bearings in stationary uprights 45 and is adapted to be rotated intermittently by a ratchet wheel 41, Figures 1, 2 and 6, operated by a pawl 42 actuated by a rocking lever 43 engaging with a roller 44 on the reciprocatory frame 13, so that the top of the pile is maintained at an adequate level for feeding pur-

poses. The pawl 42 is pivoted at 43', Figures 2 and 6, to the lever 43 which is carried by a cross shaft 44' pivoted in the uprights 45, a spring 46 checking the fall of the forward part of the lever 43 when the roller 44 is moved forward. The pawl 42 may be disengaged by a hand lever 47 to permit of rapid adjustment when a new pile is being inserted. The lever 47 also carries a detent 48, the two being freely mounted on a fixed pin 49 and being controlled by a spring 50.

The pawl 42 is not operated constantly. It is only brought into operation automatically as it is required to raise the level of the pile. It is moved into and out of the driving position according to the extent of the movements of a pneumatic feeding arm 51, Figures 1 and 5, which picks up the warrants from the pile. The feeding arm 51 is a curved tube pivotally mounted in a fixed tube 52 and rocked by the aforesaid rocking lever 43 through the medium of the cross shaft 44' and a lever 53 overhanging the feeding arm and connected to it by a wire link 54. The cross shaft 44' controls the ratchet pawl 42. If the feeding arm 51 drops unduly, the pawl 42 is freed to drive the ratchet wheel 41 and as soon as the downward movement of the arm 51 is limited to a predetermined extent by the rising pile of warrants the pawl becomes inoperative. The feeding arm 51 is connected by the tube 52 alternately to the main suction pipe 25 and to atmosphere through the cut-off valve 24 which is oscillated by the reciprocatory frame 13, two fingers 55 and 59 on the frame 13 engaging with a lever 56 on the valve 24. The cut-off valve 24 as above mentioned also controls the before mentioned pipes 23 leading to the selecting recesses 22 in the track. The cut-off valve 24 is shown detached in Figure 11 from its valve box 57 shown in Figure 10.

The disc oscillates on a central pin or screw. It has an arcuate recess 58. The face of the valve box 57 has two large holes 60, 61, communicating respectively with the tube 52 and the suction pipe 25, and a number of small holes 63 each communicating with one of the pipes 23. When the valve 24 is oscillated it alternately uncovers and closes the suction opening 61 and accordingly connects and disconnects the pipes 52, 23, to and from the suction pipes 25.

The movement of the valve 24 is limited by stop pins 62. The fingers 55 and 59, Figure 1, are spaced apart so that the valve 24 remains in a position with the suction opening 61 cut-off during the initial feeding movement of the pusher frame 26 and therefore of the warrants, the valve 24 being operated to begin the uncovering of the suction opening 61 just as the warrants begin to cover the selecting spots on the track, the connection to suction remaining until the

frame 13 has made sufficient return movement for the pins 12 to leave the levers 11 so that the shutters which are not required open can close.

As the feeding arm 51 falls and rises it strikes the uppermost warrant in the pile and raises it by suction. As it makes an arcuate movement it either slides on or slightly bends the uppermost warrant which is prevented from moving forward by a guard 64, Figure 5. This action tends to separate the warrant from the one next below.

When the warrant is raised above the forward guard 64, a blade 65 carried by the reciprocatory frame 13 is thrust beneath it. At the same time two padded spring grippers 66 on the pusher frame 26 pass over it. The cut-off valve 24 is in the meantime operated to allow the warrant to be released by the feeding arm 51, fixed finger 77 pushing the warrant off the picker 51 should it tend to cling thereto. As the blade 65 completes its movement the warrant is carried against a plate or gauge 67 so that it is accurately set or adjusted on the blade 65 to correspond with the spacing of the shutters 6, the pusher frame 26 then falling so that the grippers 66 engage with and press the warrant on to the blade 65. On the ensuing feeding stroke of the pusher frame 26 the warrant is drawn on to the track 1. A central flat spring 68 is arranged to prevent the warrant sagging in the middle as it passes over on to the track.

As each warrant is fed to the track 1 it is left in front of the first shutter 6. If it has a perforation which registers with the selecting spot or recess 22 in front of the first shutter 6, the latter will be retained open and on the next feeding movement of the pusher frame 26, the warrant will be pushed by the first pair of fingers 27 under the shutter 6 and into the collecting compartment 3 below. On the contrary if it closes the recess 22 the shutter closes and the warrant is passed on to the next shutter, and so on step by step until it reaches its appropriate shutter and is discharged into its proper collecting box, or if it is not required in any of the boxes it passes over right out of the machine.

Each warrant is held down on the track in front of the adjacent shutter 6 by a spring wire lever 69 having a circular loop 70. Each loop 70 is arranged to surround the selecting recess 22 in the track 1 in front of a shutter 6 so that if a warrant has not a hole registering with the recess 22 the loop 70 holds the paper down firmly over the recess 22 to ensure a fairly air-tight fit, but on the contrary if the warrant has a hole registering with the recess the loop 70 merely surrounds the hole and does not close it. The wire levers 69 also retain the warrant on the track during the return

of the pusher frame 26. The wire levers or pressers 69 are carried by a rock shaft 71 extending above and longitudinally of the track 1. The shaft 71 is rocked in one direction by a cam 72 on the main driving shaft 73 at the rear end of the machine, the cam 72 rocking a lever 73' fixed on the end of the shaft 71. A spring 77' rocks the shaft in the other direction. The wire levers 69 and shutters 6 are also used to effect automatic stopping of the machine in the event of a crumpled or otherwise defective warrant failing to pass along the track 1. Should such a warrant engage with a wire lever 69 or a shutter 6 it deflects it and moves it into contact with a contact bar 74 extending along and above the track 1. The bar 74 is insulated from the framework of the machine and the two form parts of an electric circuit which when closed by one of the wire levers 69 or shutters 6 causes a solenoid 75 to come into circuit and thereby to open the circuit of the motor which drives the machine or otherwise to control the means by which the machine is driven. The defective warrant can then be removed and the machine restarted. A rheostat 76 is provided to vary the speed of the motor.

The warrants may have several perforations in adequate positions so that on one passage through the machine they are sorted into definite lots and then each sorted lot may be again placed in the elevator but in a different relative position so that another perforation becomes operative as the warrants pass through the machine to effect a second sorting and so on.

For example, it is possible by reversing and inverting the pile to present warrants in four different positions relative to the track of the machine so that each warrant may have four perforations corresponding to the hundreds, thousands, tens of thousands and hundreds of thousands, respectively, but the invention is not limited to this particular number of sortings.

The documents may be perforated to denote other classifications than numerical, for instance, bank cheques may be perforated to denote district denominations or names of banks.

In a modification the control of the shutters may be effected electrically, the perforated warrants or other documents permitting or preventing circuits being closed as they approach the shutters and so controlling solenoids which directly control the shutters or operate detents similar to the detents 18 for the shutters, for example, as indicated in Figure 13, each wire lever 69 may have a point 75 adapted to make contact with a stud 76 when a document is in position with its hole in registration with the stud 76, so that a solenoid or electromagnet 77 will be energized and a core 78

will be drawn up and will raise the detent 18 to arrest the shutter lever 11 and so retain the shutter open.

We claim:—

5 1. A machine for sorting documents and the like provided with determinate perforations, comprising a track having a series of successive interceptors movable from an inoperative position to permit a document 10 to pass along the track over the interceptor or to an operative position to deflect the document and intercept its track travel, means for feeding the document successively along the track and simultaneously operating all interceptors to an operative position 15 and thereafter permitting them to move to an inoperative position, and pneumatically operated means to prevent an interceptor from returning to an inoperative position, the pneumatic control of such means being 20 governed by the position of the perforation in the document approaching the interceptor.

25 2. A machine for sorting documents in accordance with the position of perforations therein, comprising a track, a reciprocating feeding means for moving the documents in succession along the track, interceptors arranged in the path of travel of 30 the documents and movable during the operation of the feeding means to a position to deflect the approaching document from the track, a member operable to hold the interceptor in document deflecting position, and pneumatically controlled means 35 governed by the position of the perforation in the approaching document to operate said member.

40 3. A machine for sorting perforated documents in accordance with the position of such perforations, comprising a track for said documents, a series of interceptors arranged in the path of movement of the documents and adapted when open to deflect 45 an approaching document from the track, means for feeding the documents along the track and simultaneously operating the interceptors to an open position, and pneumatically operated means controlled by the 50 position of the perforation in the immediately adjacent document for maintaining the immediate interceptor in its open position throughout the succeeding feeding movement of the approaching document.

55 4. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings therein arranged one behind the other along said 60 track, a series of interceptors in the form of shutters for said openings, means for feeding documents one behind the other along said track, means for opening and closing said shutters for the purpose of intercepting 65 and discharging documents through

said openings and for allowing them to pass along the track over said openings respectively, each shutter having means for retaining it in the open position, a pneumatic device for operating each of said shutter 70 retaining means, a vent for each of said pneumatic devices arranged at a selecting spot in the track in front of and adjacent to its respective shutter so that it is covered 75 by a document fed into position in front of said shutter, or is uncovered by a hole in said document registering with said selecting spot, so that the shutter is accordingly allowed to close or to remain open, substantially as and for the purpose hereinbefore set forth. 80

5. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings therein arranged one behind the other along said 85 track, a series of interceptors in the form of shutters for said openings, means for feeding documents one behind the other along said track, means for opening and closing said shutters for the purpose of intercepting and discharging documents 90 through said openings and for allowing them to pass along the track over said openings respectively, each shutter having means for retaining it in the open position, comprising a movable member connected to the shutter, a detent movable into and out of 95 the path of said movable member, means for actuating said detent comprising a diaphragm and a small air chamber closed by said diaphragm, means for connecting said air chamber to a source of suction, a vent for said air chamber arranged at a selecting spot in the track in front of and 105 adjacent to its respective shutter so that it is covered by a document fed into position in front of said shutter, or is uncovered by a hole in said document registering with said selecting spot, so that said diaphragm 110 is accordingly depressed by the atmospheric pressure to withdraw the detent to allow the shutter to close, or retains the detent raised to arrest the shutter open, to intercept the document on its succeeding feeding movement, substantially as and for the purpose hereinbefore set forth. 115

6. A machine for sorting perforated documents in accordance with the position of the perforation, comprising a track along 120 which the documents are fed, a series of interceptors arranged in the path of travel of the documents and adapted when open to deflect the documents from the track, a series of openings arranged in relatively offset relation longitudinally of the track, 125 means for feeding the documents longitudinally of the track and simultaneously opening all interceptors, and pneumatically operated means inaugurated when the per- 130

formation of an approaching document registers with the track opening in advance of the interceptor to hold the particular interceptor open for the succeeding feeding movement of the document.

7. In a machine for sorting perforated documents in accordance with the position of the perforations, comprising a track along which the documents are successively fed, a series of interceptors deflecting the documents from the track at determinate positions lengthwise the same when the interceptors are open, means for mechanically and simultaneously opening all interceptors, and pneumatically controlled means governed by the position of the perforation in the document approaching a particular interceptor to hold that interceptor open for the succeeding feeding movement of the document.

8. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings therein arranged one behind the other along said track, a pivoted shutter for each opening, a reciprocatory frame for periodically opening said shutters and leaving them free to close, means for feeding documents periodically along said track, means for retaining each shutter open after release by said frame when required to intercept a document, said retaining means being dependent in its operation on the registration of a hole in a document fed in front of it with a selecting spot in the track in front of and adjacent to the shutter, substantially as and for the purpose hereinbefore set forth.

9. A machine for sorting perforated documents in accordance with the position of the perforations, comprising a track along which the documents are to be fed in successive step by step movements, a reciprocating feeding means for the documents, a series of interceptors arranged in the track and adapted when open to deflect the approaching document from the track, mechanism operated by the feeding means to simultaneously open all the interceptors, a pneumatically operated element for each interceptor adapted to hold the same in open position when pneumatically influenced independent of the position of the feeding means, and an opening formed in the track in advance of each interceptor adapted when disposed in the line of movement of the perforation of the approaching document to pneumatically influence said element to hold the adjacent interceptor open.

10. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings therein arranged one behind the other along said track, a series of shutters for said openings, means for periodically raising said shutters, pneumatically controlled means for retaining said shutters open when required to intercept and discharge documents, said pneumatic means being controlled by the documents co-operating with apertures in selecting spots on the track connected to said pneumatic means, one in front of each shutter, annular pads for engaging with the documents so as to ensure an air tight closure of any aperture when a document having no holes in registration therewith is fed on to it, substantially as and for the purpose hereinbefore set forth.

11. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings arranged successively lengthwise the track, interceptors adjacent each of said openings, means for normally opening said interceptors and permitting them to close while simultaneously feeding the documents along the track, pneumatically operated means controlled by the documents for preventing the closing of a particular interceptor in the approach thereto of a document having a predeterminedly positioned perforation, means for raising a pile of documents to the level of the track, and means for transferring the documents singly from the pile to the track, said means comprising a pneumatic picker for selecting the uppermost document and reciprocatory grippers for transferring the selected document to the track.

12. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings arranged successively lengthwise the track, interceptors adjacent each of said openings, means for normally opening said interceptors and permitting them to close while simultaneously feeding the documents along the track, pneumatically operated means controlled by the documents for preventing the closing of a particular interceptor in the approach thereto of a document having a predeterminedly positioned perforation, means for raising a pile of documents to the level of the track, and means for transferring the documents singly from the pile to the track, said means comprising a pneumatic picker for selecting the uppermost document and reciprocatory grippers for transferring the selected document to the track, and a gauge for adjusting the document to correspond with the spacing of the interceptors.

13. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings therein arranged one behind the other along said track, means for periodically feeding documents along said track one behind the other, an interceptor

at each discharge opening, means for periodically moving said interceptors into and out of operative positions to intercept or to allow said documents to pass, each interceptor having pneumatically controlled means for holding it in an operative position when a hole in a document brought in front of and adjacent to it registers with a selecting spot in that position, means for connecting all of said pneumatic means to a source of actuating medium, a valve adapted to close said connecting means during the feeding movement of the documents, substantially as and for the purpose hereinbefore set forth.

14. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings arranged one behind the other along said track, each of said openings having an interceptor, means for periodically moving said interceptors into and out of operative position, means for periodically feeding documents one after the other along said track, each interceptor having means for retaining it in operative position when a document is fed in front of and adjacent to it so that a hole in the document registers with a selecting spot at that position, electrical means for stopping the machine, and movable contacts above the track adapted to be operated by a defective document, substantially as and for the purpose hereinbefore set forth.

15. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings therein, a series of pivoted interceptors in the form of shutters for said openings, means for periodically opening said shutters and allowing them to close, means for periodically feeding documents one behind the other along said track, the periodicity of said shutter opening

means being the same as said periodic feeding means but in advance thereof, each shutter having means for retaining it open when required to intercept a document and to permit of its discharge through the opening beneath said shutter, said shutter retaining means being adapted to operate when a document brought adjacent to the shutter has a hole registering with a selecting spot situated in front of and adjacent to said shutter, substantially as and for the purpose hereinbefore set forth, electrically operated means for stopping the machine, and contacts arranged above the track and adapted to be actuated by a defective document to energize said electrical stopping means.

16. A machine for sorting documents and the like provided with determinative perforations, comprising a track having a series of discharge openings arranged one behind the other along said track, each of said openings having an interceptor, means for mechanically moving said interceptors into and out of operative position and simultaneously feeding documents one after the other along said track, each interceptor having pneumatically operated means for retaining it in operative position when a document is fed in front of and adjacent to it so that a hole in the document registers with a selecting spot in that position, compartments below said openings in said track having partitions provided with sloping retarding surfaces for the forward edges of documents intercepted by said interceptors and discharged through said openings, and gates for said compartments having openings to permit of escape of air during the fall of said documents, substantially as and for the purpose hereinbefore set forth.

In testimony whereof we have signed our names to this specification.

CHARLES FREDERIC RATCLIFF.
DONALD MACADIE.