

Aug. 28, 1956

R. S. GOEBEL ET AL

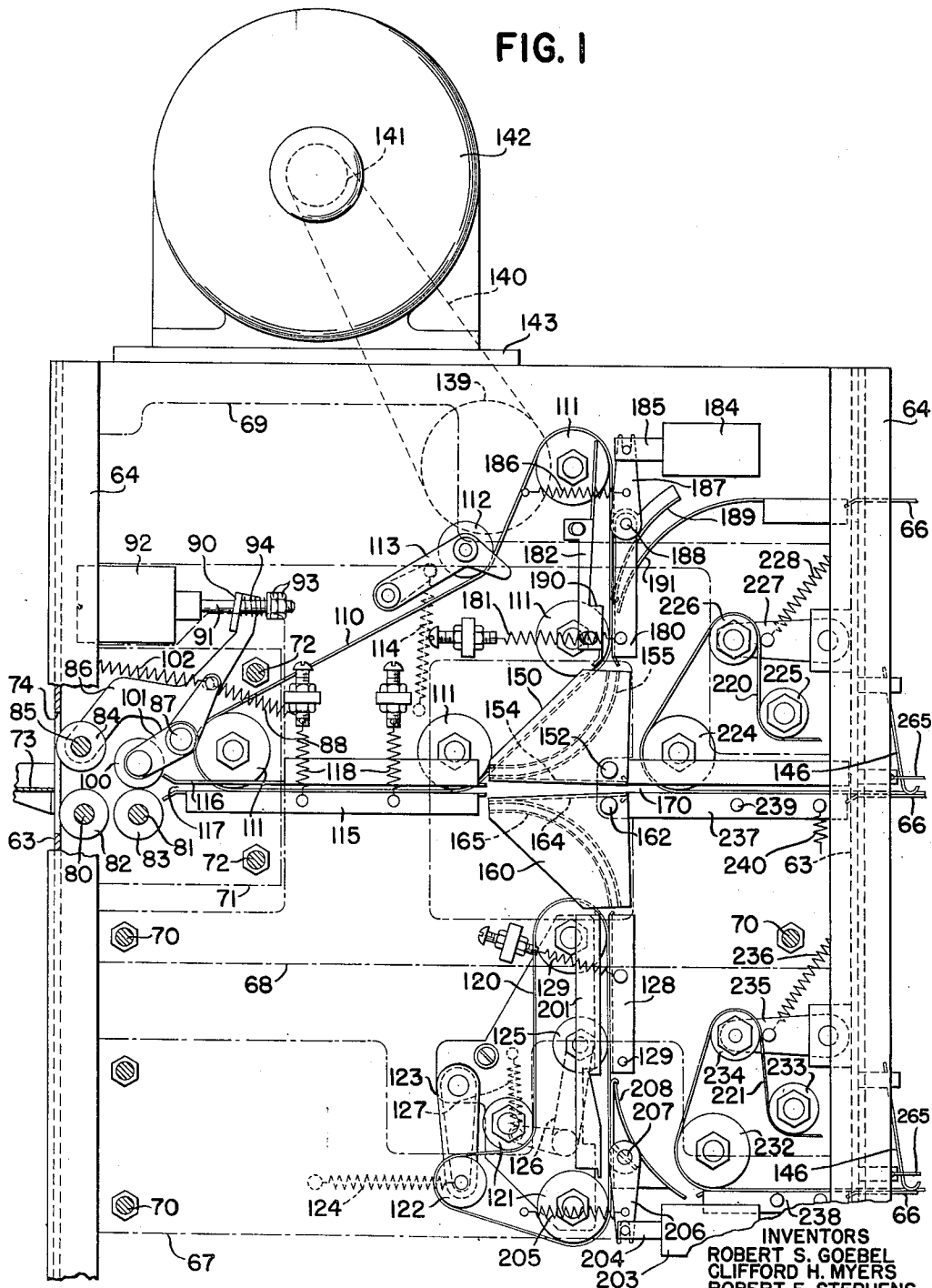
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SORTING MACHINE FOR PAPER FORMS

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9 Sheets-Sheet 1

FIG. 1



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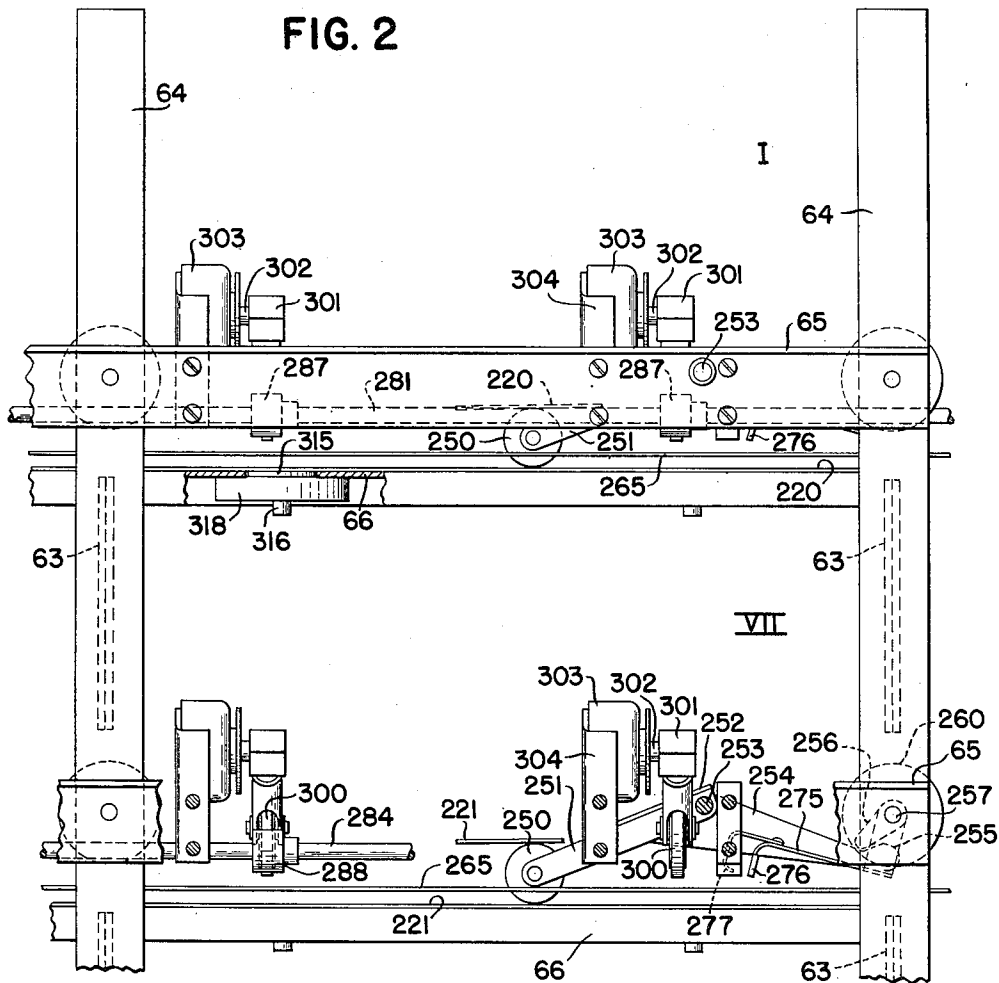
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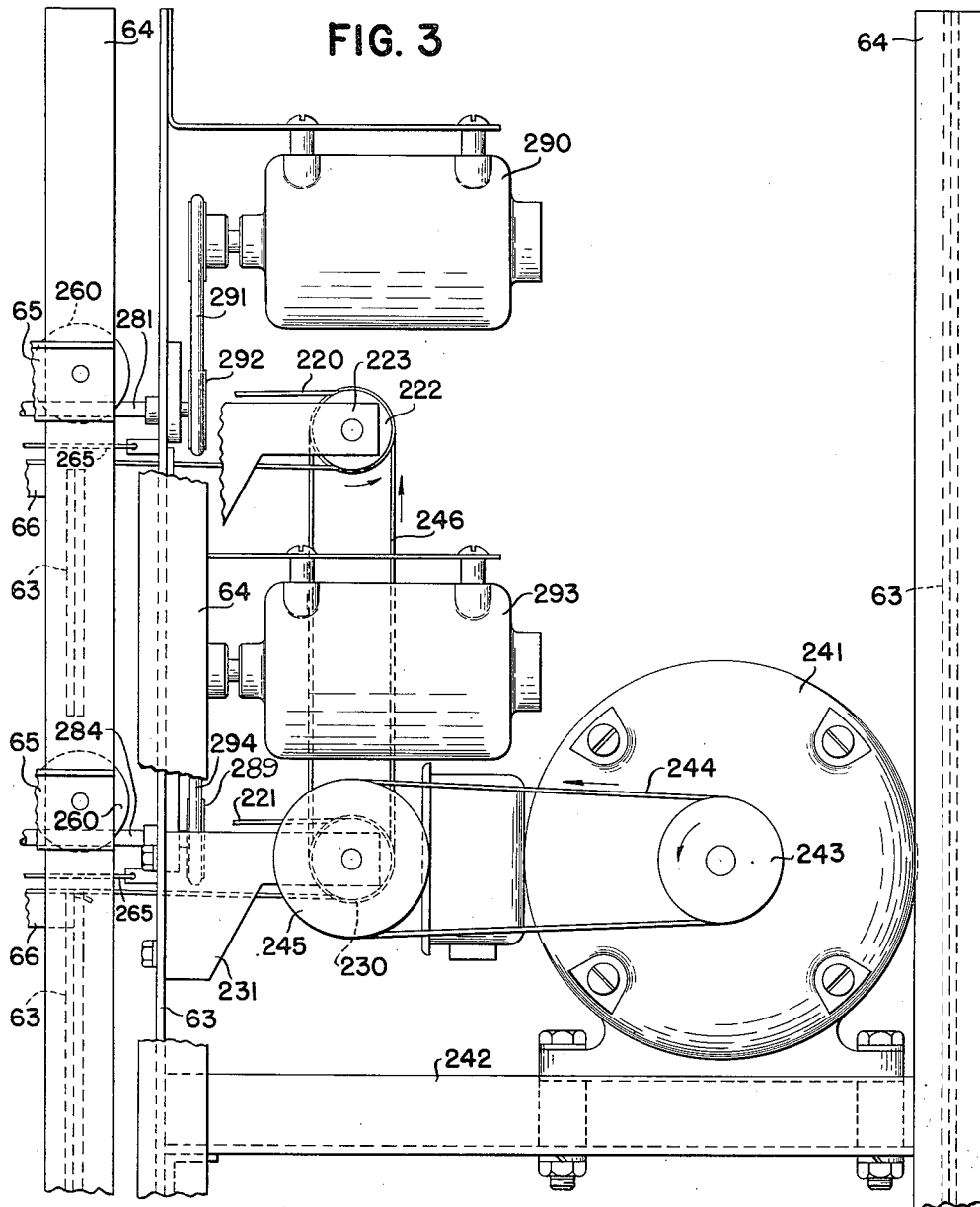
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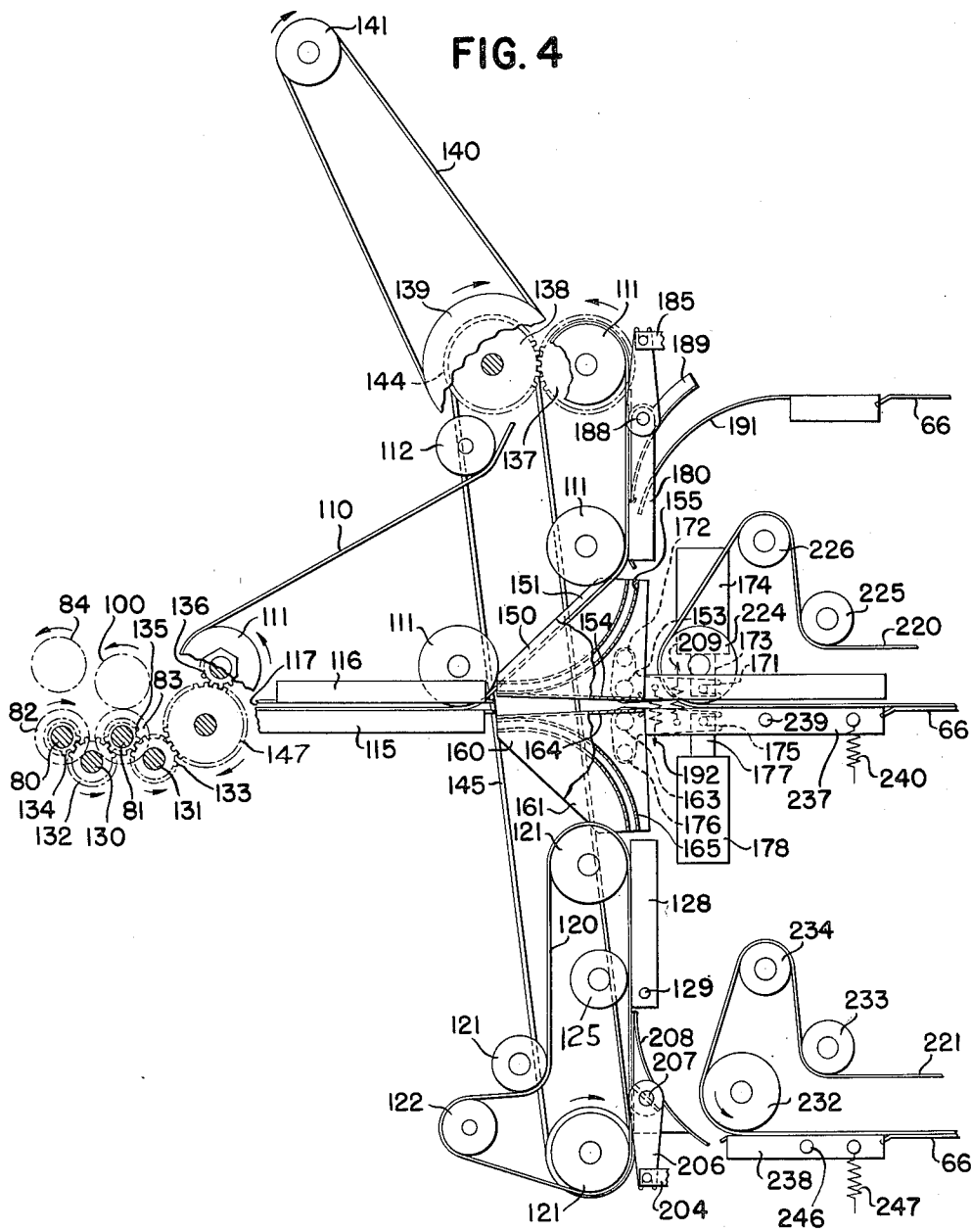
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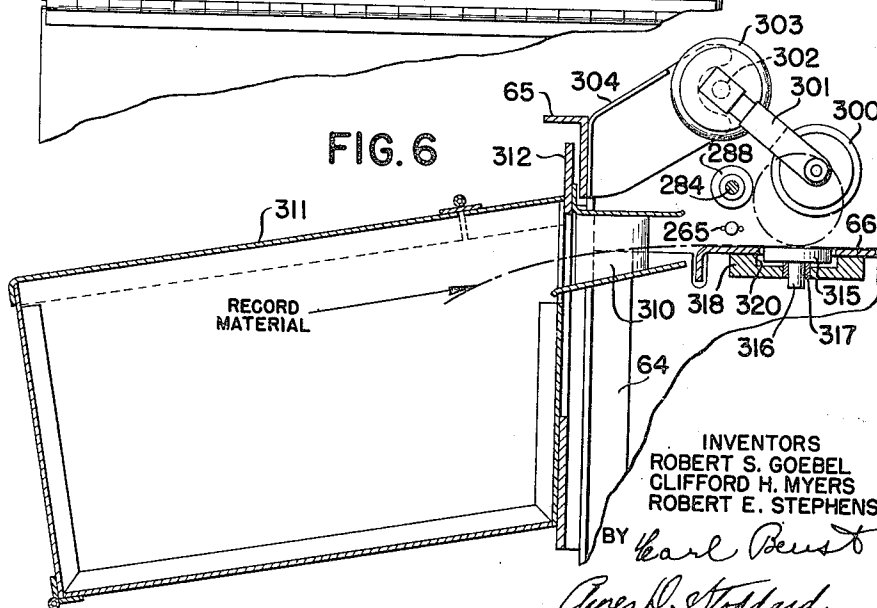
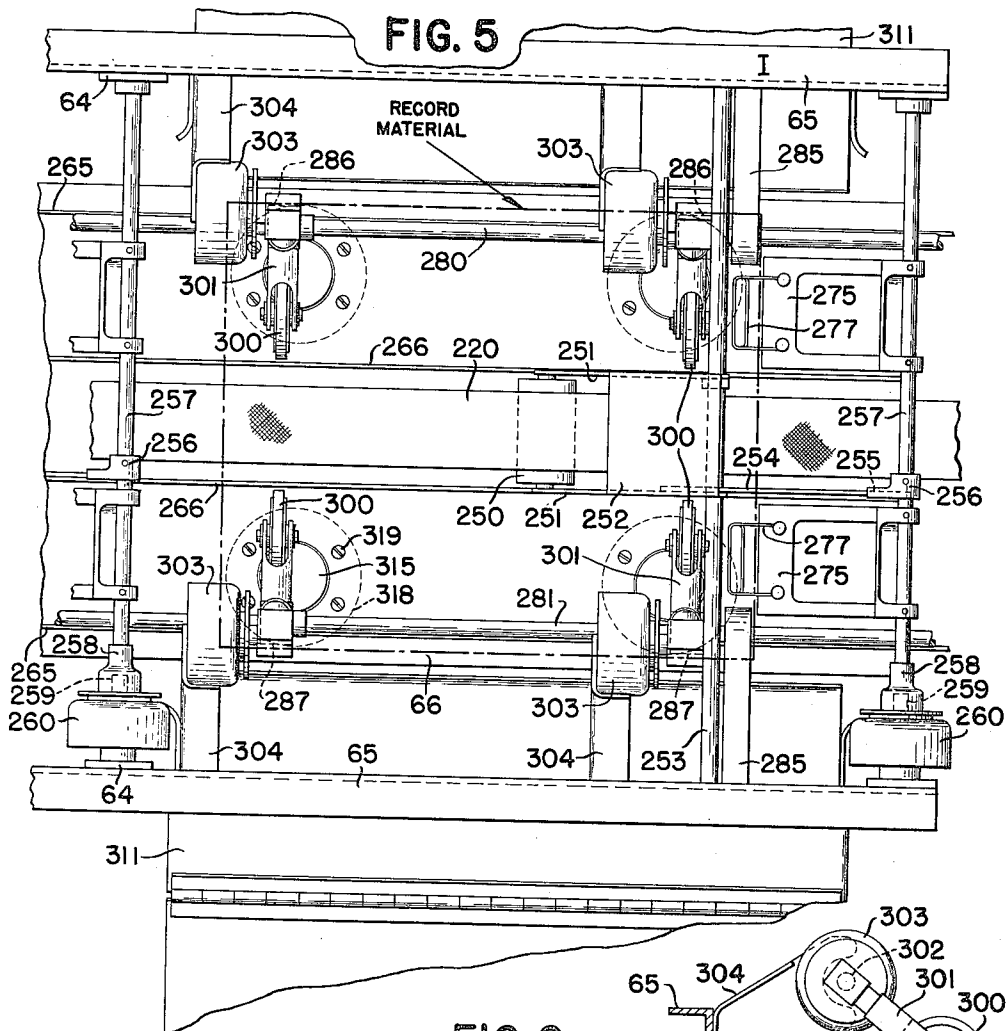
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FIG. 7

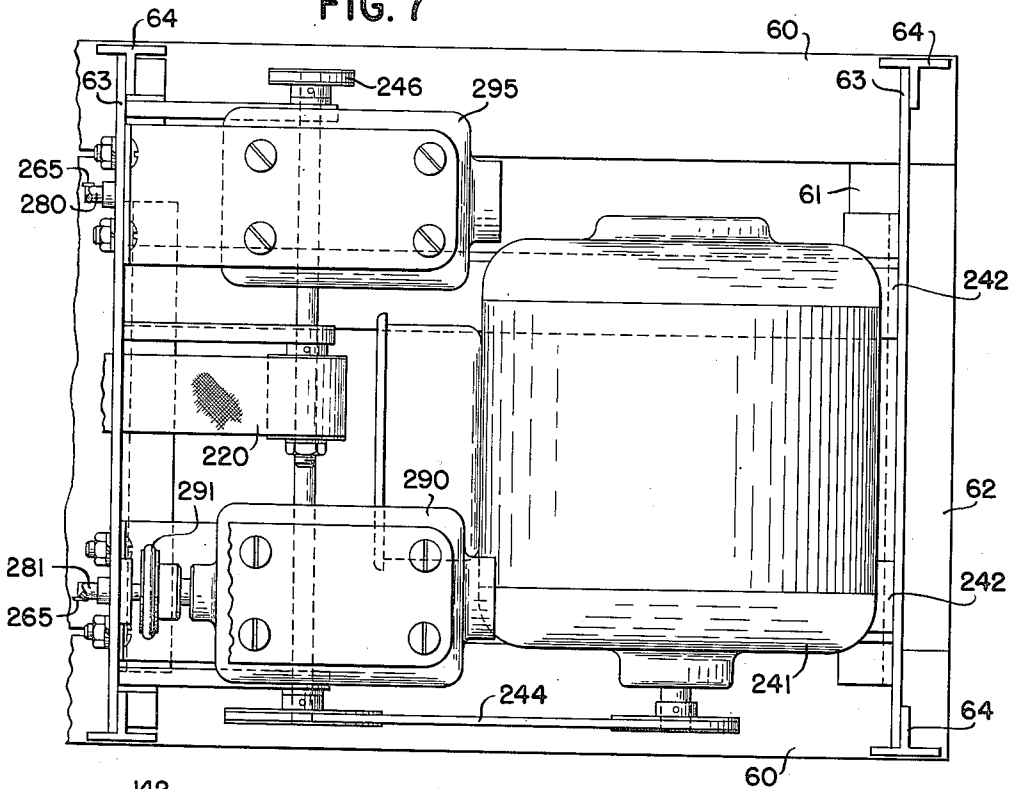
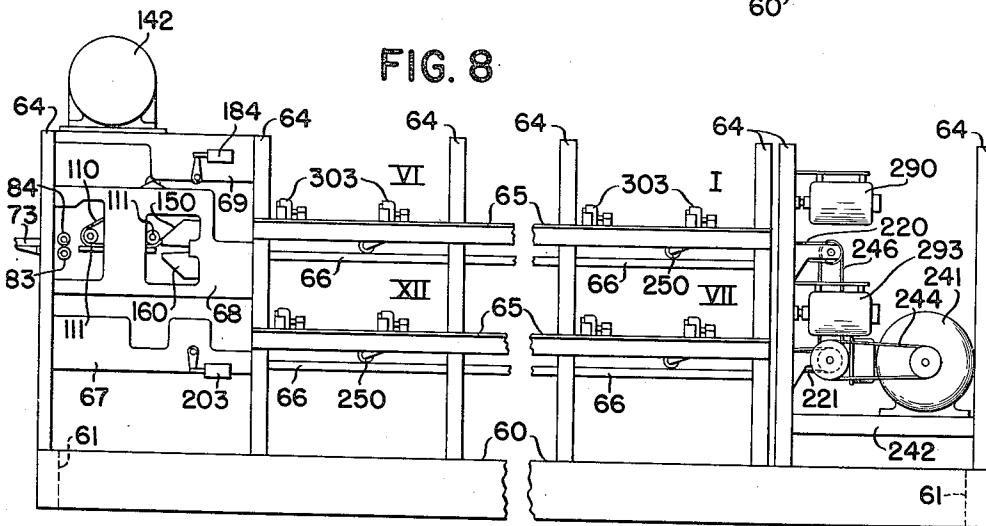


FIG. 8



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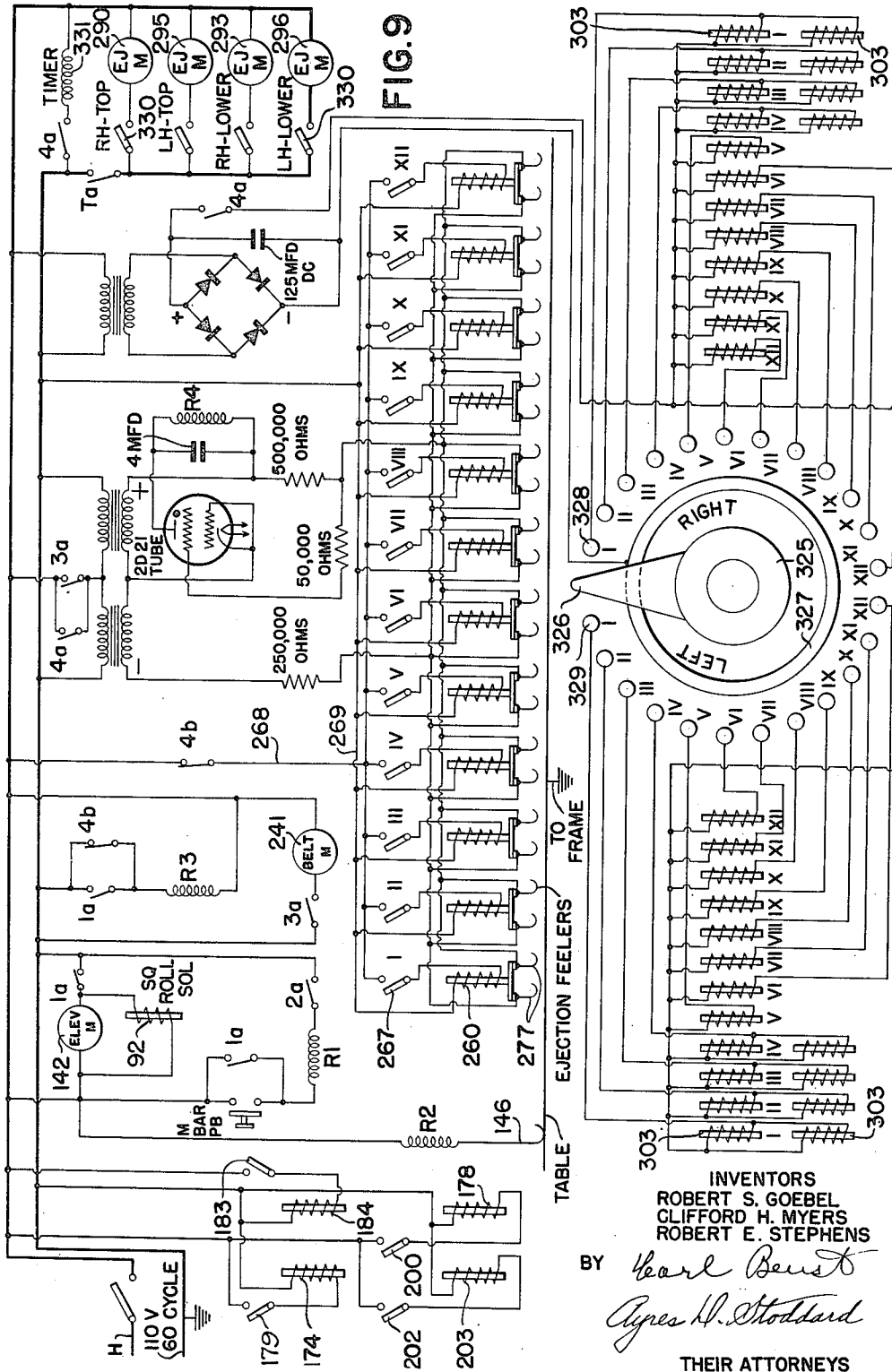
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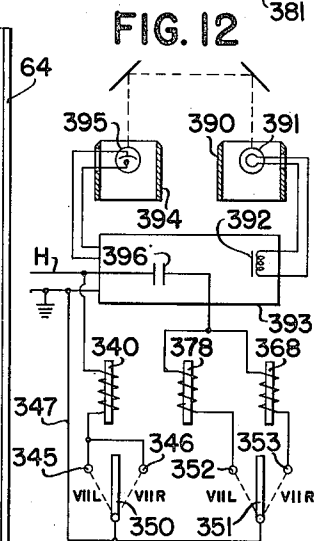
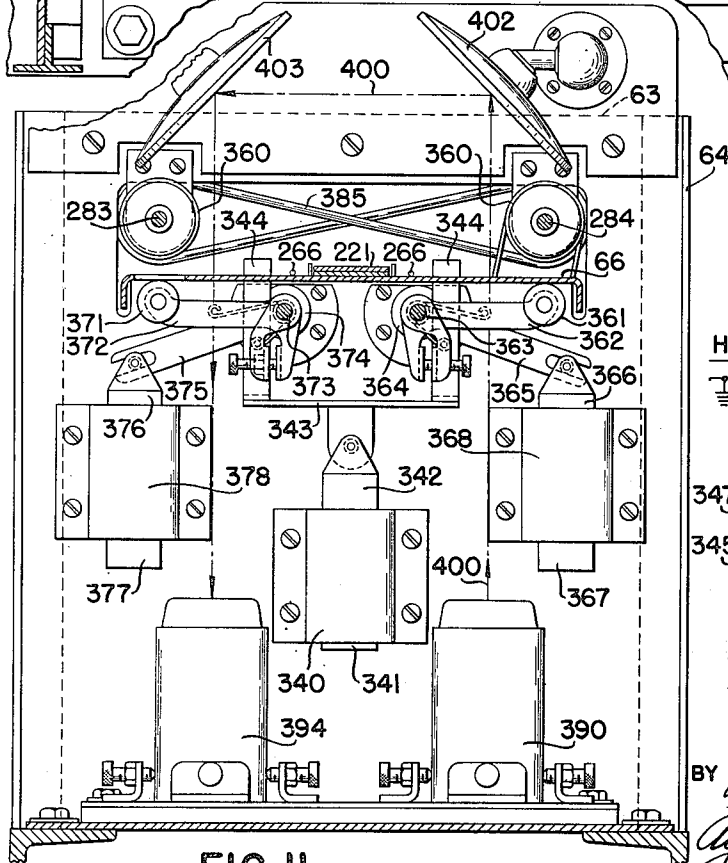
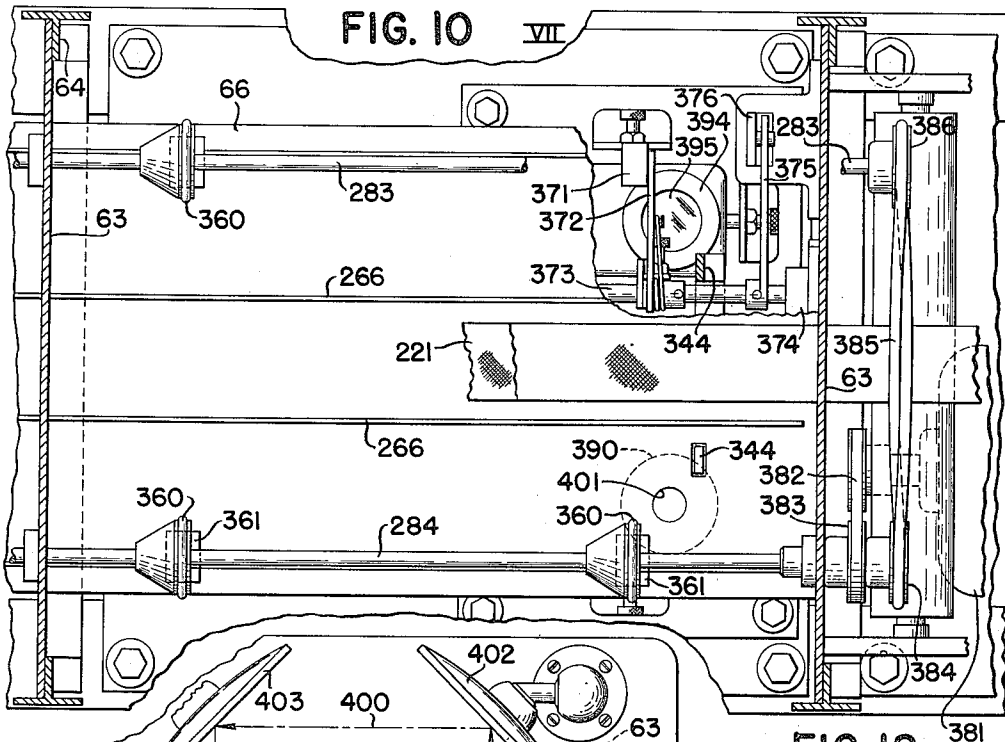
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FIG. 13

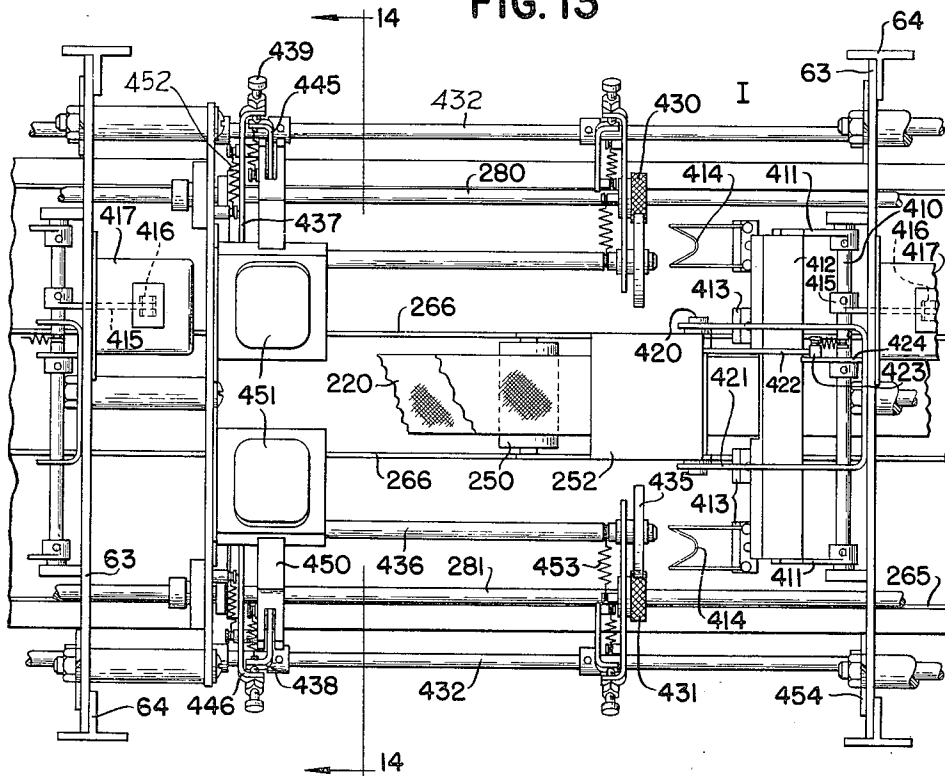
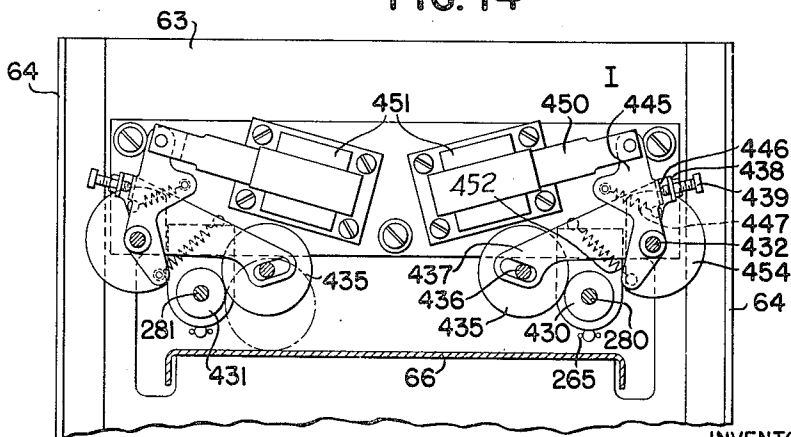


FIG. 14



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SORTING MACHINE FOR PAPER FORMS

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Application April 6, 1951, Serial No. 219,616

14 Claims. (Cl. 214—11)

This invention relates to sorting machines constructed to sort and/or distribute various types of paper forms having data thereon referring to various types of business.

For illustrative purposes, the present invention comprises a sorting machine to handle freight waybills from inter-line railroads whereby the inter-line freight waybills may be sorted and distributed to various sorting station receptacles according to, for example, freight, advances, and prepaids, from each of the several inter-line railroads, depending upon the railroad's point of origin or geographical section of the country from which the waybills originated.

The sorting machine embodying the present invention is constructed so that the sorting and distribution of the waybills are electrically controlled by means of solenoids which in turn are controlled by switches or keys.

This sorting machine is adapted to be used in conjunction with business and/or accounting machines adapted to record data from the waybills just prior to the sorting and distribution of them.

One type of business or accounting machine with which the sorting machine is adapted to be used is that type shown in the United States Patent No. 2,361,662, granted October 31, 1944, to Pascal Spurlino and Konrad Rauch. In a machine of this type, amounts and other data appearing on the individual waybills may be distributed into various totalizers, and printed records may be made on individual record tapes and on a master tape or record strip, such distribution and printing of data being controlled by the control keys of such a machine.

Said control keys, which in the present illustration of the invention are simulated by the manually-controlled selecting switches, select the proper sorting stations and control the distribution of the waybills to said sorting stations by electrically-controlled means.

It, therefore, is an object of this invention to provide a sorting machine to sort and distribute record material according to the will of the operator.

Another object is to provide such a sorting machine with means for selecting the sorting stations to which the record material is to be distributed.

Another object is to control said selecting means electrically.

A further object is to provide the sorting machine with a plurality of sorting stations arranged on different vertical levels, and means to distribute the record material to the different levels and to the different stations on those levels.

Another object is to provide electrically-controlled means to direct the record material to any selected level and feed it along said level and finally eject it into a selected sorting station receptacle.

A further object is to provide magnetically-controlled ejecting means for the record material at each of the sorting stations.

Another object is to provide magnetically-controlled means to stop the feeding of the record material at any of the selected sorting stations prior to the ejection of the

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record material from the selected station into a receptacle.

A still further object is to provide means, controlled by the record material when it reaches its selected station, to control an electric circuit to cause an operation of the record material stopping means at the selected station.

Another object is to provide normally separated ejecting means for the record material and means to cause the separated ejecting means to be brought into operative position relative to each other to effect ejection of the record material.

Another object is to provide a pair of electrically-operated ejecting means for each sorting station and a pair of means, operated by solenoids, adapted to be selectively brought into active cooperation with the associated pair of electrically-operated ejecting means, depending upon the sorting station selected to receive the record material.

Another object is to provide "electric eye" means to control the sorting of the record material.

A further object is to provide a feeding means for each station level to carry the record material to any selected sorting station on its associated station level.

A further object is to provide a plurality of manipulative means to control electric circuits to in turn control the sorting stations to which the record material is to be distributed and to also control the circuits to effect an operation of the ejecting means for the selected station.

Another object is to provide means to determine the particular sorting station level onto which the record materials are to be fed, and to select a particular sorting station on the level which has been selected.

A still further object of the present invention is to provide feeding belts on each of the several levels of the sorting machine to carry the record material along its respective level to a selected sorting station and also to provide selectively-operated means to guide the record material from an initial feeding belt to intermediate belts, which carry the record material from the initial feeding belt under control of the associated selecting means into positions to be picked up by the feeding belts on the various sorting station levels.

Another object of the present invention is to provide sorting station ejecting means arranged to eject the record material from the feeding belts on the various station levels, in the directions at right angles to the direction of movement of the feeding belts and from either side of the belt, depending upon the station receptacle selected.

A still further object of the invention is to provide at each of the sorting stations a plurality of normally non-rotating ejecting rollers mounted on rockable members and adapted to be rocked into contact with rotatable means, and at the same time with the record material which has been stopped at that particular station to cause the ejecting rolls to be turned through their contact with the rotating means to eject the record material from its feeding belt position into a station receptacle.

Another object of the present invention is to provide freely turnable disks located just below the ejection rollers, which are caused to turn by pressure of the ejection rollers when they contact the record material to eject the same to insure a more positive ejection of the record materials into their sorting station receptacles.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, preferred and modified forms of embodiment of which are hereinafter described with reference to the drawings which accompanying and form a part of this specification.

In said drawings:

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Fig. 1 is a right side elevation of the elevator section of the machine, showing how the record materials are delivered to the various sorting station levels of the machine.

Fig. 2 is a right side elevation of one of the sorting station sections of the machine with parts broken away to show the preferred form of record material or waybill ejectors.

Fig. 3 is a right side elevation of the rear section of the sorting machine, showing the drive motor for the station level feeding belts and also one of the motors for driving the waybill ejection line shafts.

Fig. 4 is a right side elevation taken inside the framework and shows the driving means for the waybill initial feed belt, the intermediate feeding belts which carry the waybill to the various station levels, and the deflectors for determining to which station level the waybill is to be fed.

Fig. 5 is a plan view of Fig. 2.

Fig. 6 is a detail of one of the waybill ejectors and illustrates the station receptacle into which the ejected waybill for that particular station is deposited, as it is ejected from the sorting station.

Fig. 7 is a plan view of Fig. 3.

Fig. 8 is a right side elevation, in reduced scale, of the sorting machine, showing two levels of sorting stations and two of the sorting station sections, the intermediate sorting station sections being omitted as indicated by the break in the drawing.

Fig. 9 is a wiring diagram of the electrical controls.

Fig. 10 shows one of the sorting stations and the ejecting means for that station and illustrates a modified form of ejecting control, using the "electric eye" principle.

Fig. 11 is an elevation view, partly in section, of said "electric eye" control of the ejecting means.

Fig. 12 is a wiring diagram of the "electric eye" control.

Fig. 13 is a plan view showing another modified form of the waybill ejecting mechanism.

Fig. 14 is a section on line 14—14 of Fig. 13, looking in the direction of the arrows.

GENERAL DESCRIPTION

Described in general terms, the machine embodying the present invention is adapted to sort and distribute record material, such as railroad waybills, and for illustrative purposes the machine is provided with twelve sorting stations. From each of these twelve sorting stations the waybills may be ejected either to the right or to the left, depending on the side of the station selected, into sorting bins or receptacles adapted to receive the ejected waybill.

While the specification calls for twelve sorting stations, and the wiring diagram for the electrical control of the sorting shows wiring for twelve stations and twenty-four sorting receptacles, it is to be clearly understood that the invention is not limited to twelve stations.

As a matter of fact, Fig. 1 of the drawings shows an elevator system for distributing the waybills to at least three levels of sorting stations. The number of sorting stations on each level also may vary. However, in this specification it is to be considered that there are six sorting stations on each of the various levels.

The entire mechanism is supported by a framework consisting of T-bars, angle irons, and braces of various kinds, which will be later described in detail. There is provided a belt or webbing feed mechanism for the waybills to carry them along the various levels to a selected station.

There is also provided means to determine to which of the levels the waybills are to be carried.

Also associated with each of the sorting stations is a pair of electrically-operated ejecting means to eject the paper or waybills to the left side of the station, and also a pair of ejecting means to eject the waybills to the right of the sorting station into sorting bins or receptacles.

The pairs of ejecting means associated with each of the

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stations are adapted to operate with ejection line shafts. These ejection line shafts are motor driven and are selected to be operated when sorting bin receptacles on that particular side of the station have been selected.

There is provided a separate motor for operating the initial feeding mechanism and also the elevator belts which carry the waybill off of the main level onto selected higher or lower levels.

There is also provided a motor for driving the feed belt webblings on each of the sorting station levels.

A general description of the sorter electrical system other than the elevator gates which are directly energized through toggle switches, which will be later described in detail, and are not interlocked with the conveyor system, is as follows:

Referring to Fig. 9, power is fed into the two top horizontal lines, the lower of which is grounded and the upper of which will be referred to as H.

Relay R-2 is energized from H through its coil through the feeler at the end of the elevator to the grounded table. Thus it is normally energized unless a paper insulates the feeler from the table.

A paper is placed in the elevator feed slot, and the motor bar PB is momentarily closed, energizing relay R-1 from H through motor bar PB through R-1 coil, through contact 2a back to the ground. Contact 1a, shunted around PB, holds relay R-1 energized when PB opens. The elevator motor and the squeeze roll solenoid are energized from H through another 1a contact to the ground.

The paper travels through the elevator, and, as it is about to leave it to travel on a horizontal track or station level, the feeler is separated from the table (as mentioned above), which releases relay R-2, which opens the holding circuit to relay R-1, thereby releasing R-1. The elevator and squeeze roll solenoid are thereby deenergized until the next cycle.

Relay R-3 is operated from H through either 1a or 4b contact. Thus, when the motor bar PB is operated, the relay R-3 operates and continues to operate until 4b opens, as will be described later. The belt motor is caused to run by a circuit from H through the belt motor, through contact 3a to the ground. This operation conveys the paper from the elevator down the selected horizontal track or station level. The paper is thus fed to one of the sorting stations on the station level.

Before the paper has been started through the elevator, its exact path to one of the delivery boxes or receptacles, either to the right or to the left side of the sorting station, has been determined. In the invention illustrated, this has been done by selecting one of the horizontal tracks or station levels by means of the elevator, one of the six possible stop points along the station level by means of the stop mechanism at that point, and finally by selection of a right or left ejection means, by means of RH or LH switches shown in the upper right-hand section of the diagram.

Since two levels are being shown, there is a right-hand top switch and a left-hand top switch, a right-hand lower switch and a left-hand lower switch, which are used to select the proper right-hand or left-hand ejection motors associated with the two station levels being shown in this application.

The paper-sensing feelers at a stop point are normally up, so that papers may pass that point if required, but, should a stop point be selected, the feelers at that station engage the ground table.

The ejection circuit consists of a "Thyratron" tube made by Radio Corporation of America under the type designation 2D-21, a center tapped transformer for grid and anode supply, and relay R-4 in the anode circuit. When relay contacts 3a and 4a close, the transformer is energized. Since the "Thyratron" cathode is connected to the transformer center tap, the grid is made negative with

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respect to the cathode (when both feelers contact the table) because the resistor values in the voltage divider are 250,000 ohms on the negative side and 500,000 ohms on the positive side of the center tapped transformer secondary. Therefore the "Thyratron" does not conduct, and relay R-4 is deenergized.

When a paper slides to a stop under one or both feelers, the "Thyratron" grid swings positive through the 50,000-ohm and 500,000-ohm resistor and causes the "Thyratron" to conduct, thus pulling in relay R-4.

Operation of relay R-4 causes either the RH or LH ejection solenoid to operate (whichever one was preselected by its switch), and this solenoid pulls the ejection rolls against both the table and the ejection line shaft.

Operation of relay R-4 causes contact 4b, shunted across 1a, feeding relay R-3 to open, thus releasing relay R-3 and stopping the belt motor.

The operation of relay R-4 causes the timer to be energized from line H through contact 4a to ground, and at the end of the time period (approximately one-fifth of a second) the timer contact Ta starts either the RH or LH ejection motor (whichever was preselected by its switch). The rotation of the ejection line shaft by the connected motor and associated ejecting means, causes the paper to be ejected sideways into the bin or receptacle associated with that particular station, and, when both feelers again contact the table, the "Thyratron" stops conducting; thus relay R-4 deenergizes, stopping the ejection motor and releasing the ejection solenoid.

The purpose of the 4a contact shunting the 3a contact in the transformer primary is to provide transformer voltage until the end of the ejection cycle, when relay R-4 is released.

The purpose of the transformer, the bridge rectifier, and the 125-microfarad condenser is to provide a source of direct current for the ejection solenoids.

DETAILED DESCRIPTION

Framework

The machine base consists of a pair of side rails 60 connected at various intervals by bars 61, two of which are shown in dotted lines in Fig. 8. Above each of the bars 61 is a bar 62, shown in Fig. 7, to which are secured panel plates 63, also fastened to vertical T bars 64, rising from the side rails 60. On each side of the machine, and fastened to the upright T bars 64, are two angle irons 65, which are used for strengthening purposes and also used to support other mechanism to be described hereinafter.

As has been previously stated, there is a plurality of levels of sorting stations, and for each level there is a table 66 (Figs. 1, 4, and 8). These tables are supported mainly by the panel plates 63.

As above mentioned, there are in the form of the invention illustrated twelve sorting stations, six stations on the upper level and six stations on a lower level. These stations for convenience are numbered I to XII in Roman numerals, station I being the top rear station as viewed in Fig. 8 and station VI being the top front station of Fig. 8, station VII being the bottom rear station, and station XII being the bottom front station, the intermediate stations, of course, not being shown because of the break in the drawings.

Since Fig. 8 is a right side elevation the left part of this figure is the front section of the machine and between the two T bar risers 64 of this front section, there are shown three side plates, 67, 68, and 69, which, together with side plates identical with those, and located on the left side of the machine, support various mechanisms to feed the waybills onto the station tables 66. These plates or frames 67, 68, and 69 are shown in dot-and-dash lines in Fig. 1.

In Fig. 1 there is shown a portion of three station level tables 66. As mentioned earlier, the invention is not limited to two or three station levels, because as many may

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be used as are necessary to take care of the type of business with which the sorting machine is to be used.

The pairs of plates 67 and 68 are tied together by tie-bolts 70. The plates 69 are secured to the vertical T bars 64.

There is also a pair of plates 71 (only one of which is shown in dot-and-dash lines in Fig. 1), which are tied together by tie rods 72. The plates 71 are secured to the front panel plate 63 and support a portion of the initial feed roll mechanism. Projecting from the front end of the machine and secured to the front panel plate 63 is a table bracket 73, upon which the waybills are placed prior to being fed into a feed slot 74 in this front panel plate 63.

Initial feeding rolls

Mounted in the plates 71 are shafts 80 and 81, to which are secured feed rollers 82 and 83, respectively. Cooperating with the feed roll 82 is a plurality of tension rolls 84 (only one of which is shown in Fig. 1) mounted on a rod 85 carried by a pair of levers 86 (only one of which is shown) pivoted on a rod 87 supported by the frames 71. A spring 88, connected to each of the levers 86, holds the rollers 84 upward away from the feed roller 82. Each of the levers 86 has a flange 90 surrounding an extended core 91 of a solenoid 92. Secured to the end of the core 91 is a pair of lock nuts 93, and between these lock nuts and the flange 90 of each of the levers 86 is a compression spring 94, which, when the solenoid 92 is energized to draw in its core 91—that is, move it toward the left, as viewed in Fig. 1—causes the levers 86 to rock counter-clockwise, against the tension of the spring 88, and move the rollers 84 into contact with the waybill, which has been projected into the slot 74 from the table 73.

The reason for the spring 94 is to insure contact of the rollers 84 and 82 with the waybills, or other papers regardless of the various thickness of such waybills or other papers.

Normally contacting the feed roller 83 is a roller 100, carried by a pair of levers 101, only one of which is shown, each lever having connected thereto a spring 102 to normally hold the roller 100 in contact with the roller 83. These levers 101 are pivoted on the rod 87.

Station level elevator belts

As the waybills are fed into the machine by means to be hereinafter described, there are provided belts to carry the waybills to the center level or to an upper level or to a lower level.

Referring particularly to Figs. 1 and 4, after the waybill leaves the feed rollers 83 it is engaged by a belt 110, which runs over four pulleys 111 held taut by an idler pulley 112 on an arm 113 under tension of a spring 114. Cooperating with this belt is a spring-pressed feed table 115, held against the bottom of the belt by springs 118, so as to always press the paper against the feed belt 110 and a rigid plate 116. The plates 116 and 115 are bent to form a chute 117 for the waybills.

Another belt 120 is provided, and this belt is supported by three pulleys 121, held taut by a pulley 122, carried by an arm 123 under tension of a spring 124. A roller 125, mounted on a lever 126, is held against the inside of the belt 120 by a spring 127 to hold the belt against a feed plate 128, which is also pulled toward the belt by a spring 129, so as to provide the proper friction to feed the waybill downwardly when the occasion requires.

Drive for initial feed rolls and elevator belts

Carried on studs 130 and 131 (Fig. 4), supported in the left plate 71, are gears 132 and 133 meshing with gears 134 and 135, respectively, secured to the feed rolls 82 and 83, respectively. Meshing with the gear 133 is a gear 147, which in turn meshes with a gear 136, secured to the left-hand pulley 111.

When this pulley 111 is driven counter-clockwise by means to be described later, the train of gears just described drives the feed roll 82 and the feed roll 83 clockwise to feed the inserted waybill toward the right as viewed in Figs. 1 and 4.

The belt 110 is driven by means of a gear 137 secured to the upper pulley 111 and meshes with a gear 138 fastened to a pulley 139 driven by a belt 140 directly from pulley 141 on a motor 142 mounted on a plate 143 carried by the side plates 69. Also secured to the pulley 139 is a smaller pulley 144, which drives a belt 145 connecting the pulley 144 with the lowermost pulley 121 for the belt 120.

Clockwise movement of the pulley 139 drives the gear 137 counter-clockwise, thus driving the belt 110 and the pulley 111 counter-clockwise to feed the waybills to the right after they leave the feed rolls 83 and 100. This clockwise movement of the pulley 139 through the belt 145 drives the pulley 121 clockwise, whereupon the belt 120 runs clockwise to feed the paper downwardly when it is directed away from the table 115 by means to be described hereinafter. Likewise, the belt 110 carries the waybill upwardly away from the table 115 when it is so directed in that manner by means to be described hereinafter.

Normally contacting each station level table 66 is a feeler 146 (Figs. 1 and 9). This feeler 146 is in the elevator motor circuit, and, when a waybill is fed onto a table 66, it passes between the feeler 146 and the table, thus breaking the circuit to the elevator motor 142 by releasing relay R-2, as previously mentioned in the General Description.

Station level selecting guides

As the waybills are fed to the right of the feed rolls 82 and 83 through the chute 117, as viewed in Figs. 1 and 4 they are, as above mentioned, picked up by the feed belt 110 and fed still farther to the right, which is toward the rear of the machine.

Prior to the time the waybill is inserted into the elevator feed slot 74, the operator determines which of the station levels is to receive the waybill, so that it will be fed to the proper one of the stations.

To direct the waybills from the chute 117 to the station levels, so that the waybill will be deposited upon the proper table 66, there are provided selectively operable pivoted guides. These will now be described.

Referring to Figs. 1 and 4, there is provided a pair of plates 150 and 151, each having secured thereto a pivot stud 152 and 153, respectively, which are pivoted in the frame plates 68. Connecting the plates 150 and 151 at the bottom is a plate 154. The plates 150 and 151 carry a curved chute 155. Below the plates 150 and 151 there is provided a pair of plates 160 and 161, carrying pivot studs 162 and 163, respectively, which are mounted in the two frame plates 68. A plate 164 connects two plates 160 and 161, as shown in Fig. 4. The plates 160 and 161 carry a curved chute 165.

When the chutes 155 and 165 are in the positions shown in Figs. 1 and 4, the plates 154 and 164 form guides for the waybills to travel straight toward the right, out of the chute 117 and into a chute 170, to be deposited on the station table 66 in the line with this chute 170.

Pivoted on the stud 153 is a bell crank 171, connected to a stud 172 carried by the plate 151. This bell crank 171 engages a pin on a core 173 of a solenoid 174. Pivoted on the stud 163 on the plate 161 is a bell crank 175, which is connected to a stud 176 carried by the plate 161. The bell crank 175 engages a pin on a core 177 of a solenoid 178. These solenoids are shown in the wiring diagram in Fig. 9.

When the operator wishes to direct the waybill to, for example, the upper sorting station table 66, shown in Figs. 1 and 4, he operates a switch 179 (Fig. 9), which

completes the circuit from the line H through the solenoid 174 back to the ground line, thus energizing the solenoid 174, whereupon its core 173 is raised, thus rocking the bell crank 171 and rocking the plates 150 and 151 and the curved chute 155 counter-clockwise about its pivots 152 and 153 to position the lower left end of the chute 155 opposite the chute 117, whereby the waybill, after it leaves the chute 117, is guided upwardly through the curved chute 155. Above the chute 155 is a guide 180, held against the belt 110 by a spring 181.

Since the belt 110 is narrow, there is provided another guide 182 to the left of the belt, to guide the waybills straight upwardly when they are to be directed to a table above the top table 66, shown in Fig. 1.

To direct the waybill onto the top table 66 in Fig. 1, the operator must also operate the switch 183 (Fig. 9). The operation of this switch 183 causes a circuit from the line H through the switch 183 and through a solenoid 184 and thence back to the ground. This energizes the solenoid 184, whereupon it attracts its core 185 (Figs. 1 and 4), moving the same to the right against the action of a spring 186 connected to an arm 187 pivoted at 188. Also connected to the arm 187 is a guide 189, which, when the core 185 is moved to the right upon the energization of the solenoid 184, rocks the guide 189 clockwise until its lower end enters an offset portion 190 in the permanent guide 182. This guide 189 is separated to straddle the belt 110 when said guide 189 is moved in a clockwise direction. After this guide 189 has been moved clockwise it opens a path of travel for the waybill beneath said guide 189 and above a stationary guide 191, which guides the waybill onto the top of the sorting station table 66, shown at the top in Fig. 1. Upon the deenergization of the solenoids 174 and 184, the guide 189 is moved back into the position shown in Fig. 1 by its spring 186, and the curved chute 155 is moved back into the position shown in Fig. 1 by a spring 192 connected to the bell crank 171.

Should it be desired to direct the waybill from the chute 117 to the lowermost table 66, shown in Figs. 1 and 4, the operator closes a switch 200 (Fig. 9) to energize the solenoid 178 by current from the line H through the solenoid and back through the ground, whereupon the bell crank 175 is rocked clockwise, thus rocking the chute 165 clockwise to position its left end opposite the chute 117 and its lower end in position so that the paper will be guided between the belt 120 and the pressure plate 123, which has been described previously. A permanent guide 201 is provided to take care of the wide waybills because of the narrowness of the belt 120.

When the operator closes the switch 200, he will also close a switch 202 to complete a circuit from the line H through switch 202 and a solenoid 203 back to ground. When this solenoid 203 is energized, it moves its core 204 to the right, against the tension of a spring 205 attached to an arm 206 pivoted at 207. Also connected to the arm 206 through the pivot 207 is a curved guide 208, which, when the arm 206 is moved counter-clockwise, is rocked counter-clockwise to direct the waybill from the belt 120 above the guide 203, so that the waybill will be deposited on the lower table 66.

Upon the deenergization of the solenoids 178 and 203, the parts are all returned to the positions shown in Fig. 1, the guide 208 being moved back to normal position by the spring 205 and the curved guide 165 being moved back to normal position by means of a spring 209, shown in Fig. 4.

Sorting stations

As has been described previously, the sorting stations are located on the station level tables 66. In Fig. 1 there are shown three such tables, and in Fig. 8 there are shown two such tables. However, as previously mentioned, it is not intended to limit this invention to two or three table levels, as more may be added without in any way changing the scope of this invention.

Therefore, for illustrative purposes, only twelve of the stations will be considered. These stations are numbered in Roman numbers from I to XII, and Fig. 8 shows stations I, VI, VII, and XII. However, in the wiring diagram there are shown twelve solenoids, which will be described hereinafter and which are selected by switches to determine at which station the waybill is to stop.

Also, in Fig. 9, showing the wiring diagram, there are shown, associated with the selector switch at the bottom of the diagram, twelve solenoids for the right-hand side of the switch and twelve solenoids for the left-hand side of the switch, which solenoids control the ejection of the waybills from the selected stations to the right of the stations and to the left of the stations, depending upon the sorting receptacle which has been selected, and depending upon which of the ejection motors has been selected to operate either to the right or to the left side of the sorting stations, and depending upon whether the top level or the bottom level, as shown in Fig. 8, has been selected.

In Fig. 8, and also in Figs. 2 and 3, there is shown two station levels only whereas in Figs. 1 and 4 there have been shown three station levels. The two station levels shown in Figs. 1, 2 and 8 correspond to the two lower station levels of Figs. 1 and 4. In other words, the top station level shown in Figs. 2, 3 and 8 is the same as the middle level of Figs. 1 and 4 and bottom station level of Figs. 2, 3 and 8 is the same as the bottom station level of Figs. 1 and 4.

Since most of the description with relation to the stations and the levels is in connection with Figs. 2, 3 and 8, such station levels have been called the top and bottom levels.

Webbing feed belts for sorting station levels

Webbing feed belts have been shown only in connection with two of the station level tables 66. Referring to Figs. 1, 3, and 8, there is associated with the upper level table 66 a webbing feed belt 220, and associated with the lower level table 66 is a webbing feed belt 221.

The belt 220 runs around a pulley 222 (Fig. 3) supported by a bracket 223 carried by the panel plate 63. The feed belt 220 also runs around a pulley 224 and under a pulley 225 (Fig. 1). A take-up or tension pulley 226 is carried by a pivoted arm 227 having connected thereto a spring 228 to keep the belt 220 taut at all times.

The belt 221 associated with the lower level table 66 is carried at its right end, as shown in Fig. 3, by a pulley 230 mounted on a bracket 231 supported by the panel plate 63. At its left end, and as shown in Fig. 1, the belt 221 passes around a pulley 232 and a pulley 233. A take-up pulley 234 is mounted on a pivoted arm 235, which is drawn upwardly by a spring 236 to keep the belt 221 taut at all times.

Both belts 220 and 221 are driven counter-clockwise, so that the lower portions of the belts, which contact the tables 66, are moving toward the right which is toward the rear of the machine. Therefore, when a waybill leaves the chute 117 and passes between the plates 154 and 164, it is projected underneath the belt 220 and above a guide 237, so as to feed the waybill onto the upper level table 66 shown in Fig. 8. In Figs. 1 and 4 this is the center table 66, as has been previously mentioned.

The guide 237 is pivoted at 239 (Figs. 1 and 4), and a spring 240 presses the left end of the guide 237 against the underside of the belt 220 to insure the feeding of the record material by the belt 220. At the same time, the spring 240 holds the right-hand edge of the guide 237 down against the table 66.

When a waybill has been directed downwardly by means of the chute 165 to the lower level, it passes from the guide 208 above a guide 238, against which the belt 221 rests, thereby carrying the waybill to the right onto the lower table 66.

The guide 238 is pivoted at 246 (Figs. 1 and 4), and a spring 247 presses the left end of the guide 238 against the under side of the belt 221 to insure the feeding of the record material by the belt 221. At the same time, the spring 247 holds the right-hand edge of the guide 238 down against its associated table 66.

Drive for webbing feed belts

As above mentioned, the webbing feed belts are driven counter-clockwise, so as to carry the waybills to the right, that is toward the rear of the machine to any one of their selected stations I to VI on the upper level table 66, as viewed in Fig. 8 and VII to XII on the lower level table 66.

The means for driving the webbing feed belts 220 and 221 will now be described. A drive motor 241 (Figs. 3, 8 and 9) is mounted on a shelf 242 supported by two of the panel plates 63, as shown in Fig. 3. This motor 241 has a pulley 243 to drive a belt 244, which belt also passes around a pulley 245, secured to the previously-described pulley 230. Around the pulley 230 and 222 there is a belt 246.

The pulley 243 is driven counter-clockwise, whereby, through the belts 244 and 246 and the previously-described pulleys, the webbing feed belts 220 and 221 are both driven counter-clockwise to feed the waybills from the entry station, shown in Fig. 1, onto the various station levels in the manner previously described.

Feed belt tension rolls

In order to maintain the belts 220 and 221 constantly in contact with the upper surfaces of their respective station level tables 66, there is provided in each station a tension roll 250, (Figs. 2, 5 and 8) made from non-static material and carried by a pair of arms 251. The arms 251 are connected by a yoke plate 252 and are pivoted on a shaft 253 supported by the angle bars 65. Tension is placed on the rollers 250 by the upper portions of the belts 221, as shown in Fig. 2, which belts contact the upper parts of the rollers 250. As said belts are held very taut by the strong springs 228 and 236 (Fig. 1), there is enough tension in the belt to always maintain the rollers 250 against the top side of the lower parts of the belts 220 and 221. Secured to the arms 251 and the yoke plate 252 is an arm 254, having an enlarged end 255 lying just beneath an arm 256, which is secured to a shaft 257 (Figs. 2 and 5). One end of this shaft is supported by the angle bar 65 (Fig. 5), and the other end of the shaft is connected by a coupling 258 to a core 259 of a rotary solenoid 260.

When this rotary solenoid is energized, as will be described hereinafter, the shaft 257 is rotated counter-clockwise, as viewed in Fig. 2, whereupon the arm 256, by its contact with the enlarged end 255 of the arm 254, rocks said arm clockwise and raises the tension roller 250 off from the belt 221. When the solenoid 260 is deenergized, the roller 250 again contacts the belt, since, on deenergization of the solenoid, the shaft 257, by action of the solenoid spring (not shown), is rotated back to its normal position, shown in Fig. 2.

Paper retainers and electro-static charge reducers

In order to prevent the paper from curling up on its sides, there are provided two wires 265 (Figs. 2, 3, 5 and 6), which are stretched tight so as to be about one eighth of an inch above the tables 66 of the upper and lower levels. These wires hold the papers down as they are being carried along by the belts 220 and 221.

Now, in order to prevent too much electro-static charge from being generated in the paper, which would be caused by the paper being held too tightly against the tables 66, as the paper is moved thereover there is permanently fastened to each of the tables 66 on each side of the belts 220 and 221 a pair of wires 266, which raise the paper from the tables 66 in two positions, thus creating air

space between the table and paper and preventing electrostatic charge in the paper, as the paper is fed along by the belts 220 and 221.

Station selection

The station I to XII, which is to be selected to have the waybill stopped at, is determined by the energization of the solenoid 260, there being one of such solenoids at each of the several stations.

In circuit with each of the solenoids 260 is a switch 267. These switches simulate the keys of a business machine. An operated switch 268 selects the station I to XII with which said switch and solenoid are associated. Upon the closing of the switch 267, the solenoid 260 is energized to cause the rocking of the shaft 257, as previously described.

The stations I to XII on the two station levels are selected by operation of one of the switches 267, depending upon which of the stations I to XII is to be selected.

The circuit closed by the switch 267 comes from line H (Fig. 9) over closed contact 4b in line 268, through switch 267, solenoid 260 back to ground line 269.

When one of the stations I to XII has been selected by operation of its associated switch 267, the waybill which is being fed by either the belt 220 or the belt 221 is stopped at the station corresponding to the switch 267, which has been operated.

The means for stopping the paper in the proper station which has been selected will now be described.

It will be recalled that, when the solenoid 260 (Figs. 2 and 5) is energized, it rocks the shaft 257 counter-clockwise.

Secured to this shaft for each of the stations is a pair of yokes 275, each having a downwardly-projecting flange 276. Each of the yokes 275 also carries an ejection feeler 277.

Normally the flange 276 and the ejection feelers 277 are in the "up" position, away from the tables 66, as shown in Fig. 2.

When the solenoid 260 is energized and the shaft 257 is rocked counter-clockwise by such energization of the solenoid 260, the yokes 275 are rocked counter-clockwise, whereupon the feelers 277 contact the surface of the table 66, and the flange 276 is moved downwardly into the path of the traveling paper to stop the paper in the station which has been selected.

As above mentioned, the paper-sensing feelers 277 in the several stations are normally up, so that papers may pass those stations if the stations are not selected, but, when the station is selected by the closing of the switch 267, the corresponding feelers 277 at that station engage the grounded table.

The ejection circuit, as previously mentioned, consists of the 2D-21 "Thyratron," a center tap transformer for grid and anode supply, and the relay R-4 in the anode circuit. When the relay contacts 3a and/or 4a are closed, the transformer is energized. When both feelers 277 of the selected station contact the table, as the "Thyratron" cathode is connected to the transformer center tap, the grid is made negative with respect to the cathode because of the resistor values in the voltage divider, which are, as above mentioned, 250,000 ohms on the negative side and 500,000 ohms on the positive side of the center tapped transformer secondary. Therefore the "Thyratron" does not conduct, and the relay R-4 is deenergized.

When a paper slides to a stop under one or both of the feelers 277, the "Thyratron" grid swings positive through the 50,000-ohm and 500,000-ohm resistor and causes the thyratron to conduct, thus pulling in relay R-4.

The operation of relay R-4 causes either the right-hand or the left-hand ejection solenoid, to be described later, to operate, whichever was preselected by its switch, and this solenoid pulls the ejection rolls, to be described later, against both the table and the ejection line shaft.

The operation of relay R-4 also causes the contact 4b to be shunted across 1a, feeding relay R-3 to open, thus releasing relay R-3 and stopping the belt motor, so that the paper may be ejected from the selected station either to the right or to the left thereof, depending upon whether or not the right-hand or the left-hand side of the station has been selected.

PAPER EJECTION

Ejection line shafts

Since there are two levels of sorting stations—namely, I to VI and VII to XII—and since the paper or the waybills may be ejected from either side of the stations, it necessarily requires two ejection shafts on each of the station levels.

An ejection shaft 280 (Figs. 3, 5 and 7) is provided for the left-hand side of the upper station level and serves the left-hand side of stations I to VI. An ejection shaft 281 is provided for the right-hand side of the upper station level and serves stations I to VI.

The ejection shaft 283 for the left-hand side of the lower station level for stations VII to XII is shown in Fig. 10 in connection with a modified form of ejection. An ejection shaft 284 (Figs. 2 and 3) is shown as being provided for the right-hand side of the lower station level, and this shaft serves the right-hand side of stations VII to XII. These shafts are supported at their right-hand ends, as shown in Fig. 3, by the panel plate 63 and are supported at intervals along the various stations by brackets 285 (Fig. 5) secured to the angle bars 65.

The shaft 280 has secured to it for each of the several stations on the upper left level a pair of feed rollers 286 made of resilient material. The shaft 281 has secured to it for each of the various stations on the upper level a pair of resilient feed rollers 287. The shaft 284 for the lower level of stations VII to XII has secured thereto for each station a pair of rollers 288 (Fig. 2), only one of which is shown.

Ejection line shaft drive

There are four ejection motors to drive the four ejection shafts. These motors are shown diagrammatically in the wiring diagram in Fig. 9, and three of the motors are shown in Figs. 3 and 7.

A motor 290 (Fig. 3), through a belt 291 and a pulley 292, secured to the ejection shaft 281, drives this shaft for the right-hand side of the upper station level. A motor 293 (Fig. 3), through a belt 294 and the pulley 289 on the ejection shaft 284, drives this shaft for the right-hand side of the lower level of stations. A motor 295 (Figs. 7 and 9) through a belt and pulleys (not shown) drives the ejection shaft 280 for the left-hand side of the upper level of sorting stations. A motor 296, shown only in diagrammatic form in Fig. 9, drives the ejection shaft 283 (Fig. 10) for the left-hand side of the lower level of stations VII to XII.

Ejection rolls

At the left-hand side and right-hand side of each of the stations there is provided a pair of ejection rolls 300 (Figs. 2 and 6) adapted to be moved into cooperative relation with their respective rolls on their associated ejection shafts 280 to 284. These ejection rolls are shown in Figs. 2, 5, and 6, and, since they are all identical, a description of one of them will suffice.

These ejection rolls 300 are made of resilient material, and each of them is mounted in a forked arm 301, secured to a core 302 of a rotary solenoid 303.

Since there are four ejection rolls 300 for each of the stations, and as there are twelve stations, there are 48 ejection rolls 300, and consequently there are 48 rotary solenoids 303. Each of these solenoids is mounted on a bracket 304 secured to its associated angle bar 65, as shown in Figs. 5 and 6.

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Upon the energization of the solenoid 303, the core 302 is pulled in and at the same time rotated clockwise as viewed in Fig. 6, whereupon the ejection roller 300 is moved from the full-line position down to the dot-and-dash line position into contact with the paper, which has been stopped in this station. Continued rotary movement of the arm 301 then causes the roller 300 to contact the roll 288 on the ejection shaft 284, and, as this shaft 284 and the roller 288 are turning, the roller 288 rotates the roller 300.

In the dot-and-dash position (Fig. 6), the roller 300 contacts the paper or waybill which has been stopped at the selected station, and, due to the clockwise turning of the roller 300, the pair of rollers for either the right-hand or the left-hand side of the selected station, which has been previously selected, as will be described hereinafter, ejects the waybill from the station through a chute 310 into a sorting bin or receptacle 311 mounted on a plate 312 secured to the upright or vertical T bars 64.

In order to insure proper ejection of the waybill by the ejection rollers 300, there is, just below each of the rollers 300, a freely-rotatable disk 315, which is flush with the top of the station level table 66. This disk 315 is provided with a guide pilot 316, projecting through a bronze bushing 317 carried by a disk 318 secured to the under side of the table 66 by screws 319, as shown in Fig. 5.

The disk 318 is counterbored, as at 320, to receive the disk 315, and the bronze bushing projects slightly above the bottom of the counterbore 320 so as to provide a free-bearing surface between the top of the bushing 317 and the under side of the disk 315.

Such a construction beneath the paper and the ejection roller 300 prevents too much friction between the paper and the table at the point of contact of the roller 300 with the paper.

Ejection selection

To simulate selecting keys on an accounting machine with which the present invention may be adapted to be used, there is provided, as shown diagrammatically in Fig. 9, a rotor-switching mechanism comprising a turning knob 325, having connected thereto a contact arm 326. This contact arm 326 is always in contact with one side of the line by its contact with a common contact ring 327. Arranged to the right side of the contact arm 326 are twelve contact points 328, numbered I to XII, representing the twelve sorting stations. Each of these contact points 328 is connected with the pair of solenoids 303 associated with that respective station. Only a portion of the pairs of solenoids 303 is shown herein. These contacts 328 are associated with the solenoids 303 for the right-hand side of the sorting stations. To the left of the contact 326 are twelve contact points 329, numbered I to XII, and these contact points 329 are connected to the twelve pairs of solenoids 303 (only a portion of which are shown) associated with the left-hand side of the sorting stations I to XII.

In the circuit with each of the ejection motors 290, 293, 295, and 296 (Fig. 9) is a manually-operable switch 330.

Before the paper has been started through the elevator, its exact path to one of the delivery receptacles 311 has been determined by the closing of one of the switches 267 (Fig. 9) to select one of the twelve sorting stations on one of the two sorting station levels, so that the paper will stop at that point.

Then, depending upon whether or not the waybill is to be ejected to the left-hand side or to the right-hand side of that particular station, the knob 325 is turned to connect one of the contacts 328 or 329 with the common contact ring 327, depending upon which of the stations has been selected by the switch 267.

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After the knob 325 has been set to select the right-hand or left-hand side of the selected station, the switch 330 for the ejection line shaft motor is closed.

With these switches closed, and as previously described, the operation of relay R-4 causes the selected pair of ejection solenoids 303 to operate and to pull their respective ejection rolls 300 against both the paper and the associated ejection line shaft.

The operation of relay 4 also causes a timer 331 (Fig. 9) to be energized from line H through 4a contact to the ground, and at the end of the time period (approximately one fifth of a second) the timer contact Ta starts the selected one of the ejection motors 290, 293, 295, or 296, thus causing the paper to be ejected sideways into its associated receptacle 311, as above described. When both of the feelers 277 again contact the table after the paper has been ejected, relay R-4 deenergizes, thus stopping the ejection motor and releasing the ejection solenoid 303.

The reason why it is necessary for both of the feelers 277 to contact the table after the one or both of said feelers have been separated from the table by the paper is because of the fact that the table, being grounded, is a part of the circuit, and therefore, in order to deenergize R-4, the "Thyratron" must swing from the positive side back to the negative side, which it does when the circuit is completed through both feelers 277 and the grounded table 66.

It is apparent that, in order to energize relay R-4, all that is necessary is the breaking of the circuit between either one or both of the feelers 277 and the table 66.

Such a circuit takes care of a case where the corner might be torn off of one of the waybills or record strips, as it is being fed to the station stop to be ejected. In other words, when a waybill is stopped at the station, even though one of the corners has been torn off and consequently the feeler 277 associated with the particular missing part of the paper, the fact that the other feeler 277 is separated from the table, the circuit will be broken, and consequently the "Thyratron" will swing to the positive side and thus cause the energization of relay R-4. Therefore, as above mentioned, it is necessary that both feelers 277 contact the table 66 to again complete the control circuit for relay R-4 in order to complete the ejection cycle.

Should the record paper tear during the ejection thereof and leave a piece of the record material under the feeler 277, it would be necessary for the operator to remove such piece of record material from the table 66 in order to permit both feelers 277 to again contact the table to complete the control of relay R-4.

MODIFICATIONS

"Electric eye" control of ejection

There is shown in this application a modified form of means for ejecting the waybill or record strip from a selected station, and such modification includes the selection and control of the ejection rolls by means of an electric eye beam.

Such mechanism is shown in Figs. 10 and 11, and the parts in these two figures, which are the same as the preferred form, have been given the same numbers.

In Fig. 11 there is shown solenoid 340, secured to the panel plate 63. The core 341 of the solenoid is shown in the position as though the solenoid 340 was energized and consequently this core has pushed a bar 342 upwardly. This bar 342 is connected to a yoke 343, having fingers 344, shown in a position above the table 66 as though the solenoid 340 were energized. When the solenoid is deenergized, the fingers 344 are down and flush with the top of the table 66.

This solenoid 340 is shown diagrammatically in the wiring diagram in Fig. 12 and is connected to line H and to contacts 345 and 346, which are also designated as VII-L and VII-R and which correspond to the right- and

left-hand sides of the station VII. Either the contact 345 or the contact 346 is adapted to be contacted by a wiper blade 350, which is connected to the ground line 347.

The contact 350 is similar to the contact 326, shown in Fig. 9, and is connected to a wiper blade 351, operated by a knob similar to the knob 325, to select either the right-hand or the left-hand contacts 352 (VII-L) or 353 (VII-R), depending upon whether or not the paper is to be ejected from the left-hand side or the right-hand side of station VII.

Therefore, when the blade 351 is moved to select the left-hand or the right-hand side of station VII, the blade 350, which is secured thereto, will connect either the left-hand or the right-hand contact 345 or 346, depending upon which of the contacts 352 or 353 is contacted by the blade 351.

Therefore, as soon as the circuit is completed through either of the contacts 345 or 346, the solenoid 340 is energized and moves the stop fingers 344 into the position shown in Fig. 11 to stop the paper in station VII.

Ejection rolls

Secured to the shafts 283 and 284 are ejection rolls 360, which are made of resilient material. Cooperating with the ejection rolls 360 on the ejection shaft 284 is a pair of resilient rollers 361 (Figs. 10 and 11), each carried by an arm 362 secured to a shaft 363, mounted in bearings 364, secured to the panel plates 63. Also secured to the shaft 363 is an arm 365 connected to a bar 366, which rests on a core 367 of a solenoid 368.

Whenever this solenoid 368 is energized by means to be described hereinafter, the core 367 is moved upwardly, thus pushing the bar 366 upwardly and rocking the arm 365, the shaft 363, and the arms 362 to bring the rollers 361 into contact with the paper on the table 66, and, since the shaft 284 is turning at this particular time, the pairs of rollers 360 and 361 will engage the paper and eject it off to the right from station VII into a receptacle such as that shown in Fig. 6 and designated 311.

Cooperating with the rollers 360 on the shaft 283 is a pair of rollers 371, each carried by an arm 372 secured to the shaft 373 supported by bearings 374 secured to the panel plates 63. Also secured to the shaft 373 is an arm 375 connected to a bar 376, which rests on a core 377 of a solenoid 378.

When this solenoid is energized by means to be described hereinafter, the core 377 is moved upwardly, thus moving the bar 376 upwardly and rocking the arm 375, the shaft 373, the arms 372, and the rollers 371 into contact with the paper on top of the table. The paper is thereby gripped between the pairs of rollers 360 and 371, thus causing it to be ejected out to the left from the station VII, due to the fact that the rollers 360 are being operated at this particular time.

The shafts 283 and 284 are rotated by means of a motor 381 (Fig. 10), which drives a belt 382, which in turn, by means of a pulley 383 on the shaft 284, drives the shaft 284. Also on the shaft 284 is a pulley 384, around which is a belt 385, which is also around a pulley 386 secured to the shaft 283. This belt 385, as shown in Figs. 10 and 11, is crossed, so that the proper directions of the shafts 283 and 284 may be obtained from the motor 381.

Electric eye control

Mounted below the table 66 in station VII is a housing 390, having therein a light source 391, which receives its energy from a transformer 392 in a control box 393 (Fig. 12). Mounted in a housing 394 is a photo electric cell 395, which in turn is connected to a photo electric cell relay in the control box 393. This relay is normally energized.

In this control box 393 is a contact 396, which is closed when a light beam 400, indicated by dot-and-dash lines, is broken. This light beam 400 projects upwardly from the source of light 391, through a hole 401 (Fig. 10) in

the table 66, and is reflected by a mirror 402 (Fig. 11) across to a mirror 403, then downwardly to the photo electric cell 395.

When a waybill or record sheet is stopped in station VII, this station having been previously selected and the fingers 344 raised to stop the paper, the light beam 400 is broken, and, when this occurs, the contact 396 (Fig. 12) is closed, thus creating a circuit from line H through the contact 396 to whichever one of the solenoids 368 or 378 has been selected by the blade 351 being in contact with the contact 352 or 353, and thence to the ground line 347. Such closing of the contact 396 energizes the selected one of the solenoids 368 or 378, causing its associated rollers 361 or 371 to contact the ejection rolls 360 on the shaft 284 or 283, respectively, depending upon whether or not the right-hand or left-hand side of the station VII has been selected to have the waybill deposited in the receptacle 311 on either the right-hand or left-hand side thereof.

The shafts 283 and 284 in this modification are constantly rotated by the motor 381.

Second ejection modification

In Figs. 13 and 14 is shown another modified form of ejection mechanism for the waybills or records to eject the waybills from either the right-hand or left-hand side of the selected station.

In connection with this modification, the station shown in Figs. 13 and 14 will be assumed to be station I, and it has been so designated.

The main difference between this modified form and the other preferred form is that in Figs. 13 and 14 the ejection rolls are always in engagement with the rolls on the ejection shafts, and, when either the right-hand or the left-hand side is selected for ejection, the ejection rolls are rolled around the ejection shaft rolls and moved downwardly into contact with the paper, which is on top of the table 66, to effect an ejection from either the right-hand or the left-hand side, depending upon which side has been selected by the operator prior to the time of inserting the waybill into the opening 74 from the table 73 of Fig. 1.

The station-selecting mechanism in connection with this modification is substantially identical with that described in the preferred form with the exception of the shapes of the feelers themselves and the flanges for stopping the paper at the selected station. In the preferred form, there are two flanges to stop the paper at the required station, and in this modified form there are four flanges.

Another difference in the specific construction is that in the preferred form the station-selecting means is rocked by means of a rotary solenoid, whereas in the present, the other type of solenoid is used. These various differences will be described in detail in connection with the description of this modified ejection.

The parts in connection with this modified form which are identical with those in the preferred form have been given the same numbers.

The station stopping mechanism consists of a shaft 410 carrying a pair of arms 411 connected to a yoke 412, which supports four stopping flanges 413. Secured to each of the two outside flanges is a feeler 414, which functions like the feelers 277, previously described. Also secured to the shaft 410 is an arm 415, connected to a core 416 of a solenoid 417.

When this solenoid is energized, the core 416 causes a counter-clockwise rocking of the arm 415 and the shaft 410, to move the stopping flanges 413 downwardly against the table 66 to stop the paper in the station with which these stopping flanges are associated.

The yoke 252, which supports the tension roller 250, is mounted on a shorter shaft 420, which is supported in a U bracket 421 secured to the panel plate 63. Also secured to the shaft 420 is an arm 422, which underlies

a stud 423 of an arm 424, secured to the shaft 410. Consequently, when the shaft 410 is rocked counter-clockwise, the stud 423, by its contact with the arm 422, rocks the arm 422 and the shaft 420 clockwise and raises the tension roller 250 off the belt 220, so that there will be no pressure on the paper by the belt after the paper has once been stopped at its selected station.

The shaft 280 has secured thereto a pair of knurled feed rolls 430 (only one of which is shown), and the shaft 281 has secured thereto a pair of knurled feed rolls 431 (only one of which is shown).

Since all of these rolls are identical, and since they are operated by solenoids, a description of one will suffice. The roller 430 and its associated mechanism associated with the shaft 280 and shown at the right side in Fig. 14 will be described in detail.

Normally engaging the pair of rollers 430 is a pair of ejection rollers 435, which are secured to a shaft 436 carried in a slot in a pair of arms 437 pivoted on a shaft 432 and having a flange 438 supporting an adjusting screw 439. Fast on the shaft 432 is a pair of arms 445, each having a flange 446, against which the adjusting screw 439 is adapted to be screwed and locked for adjustment purposes of the pressure between the rolls 435 and 430. A spring 447, connected between the arms 437 and 445, tends to keep the end of the screw 439 in contact with the flange 446 of the arm 445.

This arm 445 is connected to a core 450 of a solenoid 451. A spring 452, connected to the arm 445, also tends to hold the flange 446 against the end of the screw 439 and acts to return the arms 445 and the core 450 to normal positions.

When this solenoid 451 is energized and attracts its core 450, it causes a counter-clockwise rocking of the arms 445 and 437, whereupon the roller 435 is moved downwardly to contact the paper on the table 66, which has been stopped in the station with which this roller 435 is associated, and, since the ejection shaft 280 and the rolls 430 are rotating, the ejection rollers 435 are also rotating and cause ejection of the paper or the waybill into the receptacle 311 associated with this particular side of the station.

A spring 453, connected to the shaft 436 and to the arm 437, holds the rollers 435 against the rollers 430.

The shafts 432 are mounted in bearings 454, supported in the panel plates 63.

The circuit for the solenoids 451 is substantially the same as the circuit for the solenoids 303, and therefore it is not thought necessary to go into any description of any circuits for the operation of these solenoids, as reference may be had to the wiring diagram (Figure 9) in connection with the previously-described solenoids 303.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the forms of embodiment herein disclosed, for it is susceptible of other embodiments in various forms.

What is claimed is:

1. In a sorting machine adapted to sort record material, the combination of a plurality of groups of sorting stations; means to feed record material to any group of stations; means to feed record material to any station of any group of stations; means to select one of the groups of stations; means to select any station in any selected group of stations; an ejection line shaft associated with one side of all stations in each group of stations; an ejection line shaft associated with the opposite side of all stations in each group of stations; a plurality of ejection members on the first mentioned shaft at each of said stations; a plurality of ejection members on the second mentioned shaft at each of said stations; electrical means associated with each shaft to rotate the same; a plurality of ejecting devices adapted to cooperate with each plurality of members but normally disengaged therefrom; selec-

tively operable electrical means to cause said ejecting devices to be engaged with their associated ejecting members to cause ejection of the record material from the selected station; and an interlocked electrical circuit to control the station selecting means and the operation of the ejecting devices.

2. In a sorting machine adapted to sort record material, the combination of a plurality of groups of sorting stations; a table for each group of stations and along which the record material is fed until it reaches a selected one of said stations; means to feed the record material along each table; a record material receptacle associated with each side of each sorting station; electrically operated means to select a sorting station to receive the record material; electrically operated means to eject the record material from the selected station into a receptacle on one side of said station; electrically operated means to eject the record material from the selected station into a receptacle on the other side of said station; means to select either of said ejecting means; an electrical control circuit; a relay in said circuit; and a plurality of feelers contacting said table, either of said feelers when separated from the table by the record material in the selected station causing operation of said relay to operate the selected one of said ejecting means, said circuit being arranged so as to require all of said feelers to again contact said table to control the ejection of a subsequent record material from said selected station.

3. In a sorting machine adapted to sort record material, the combination of a plurality of groups of sorting stations; a table for each group of stations and along which the record material is fed until it reaches a selected one of said stations; means to feed the record material along each table; a record material receptacle associated with each side of each sorting station; electrically operated means to select a sorting station to receive the record material; electrically operated means to eject the record material from the selected station into a receptacle on one side of said station; electrically operated means to eject the record material from the selected station into a receptacle on the other side of said station; means to select either of said ejecting means; an electrical control circuit; a relay in said circuit; a plurality of feelers contacting said table, either of said feelers when separated from the table by the record material in the selected station causing operation of said relay to operate the selected one of said ejecting means, said circuit being arranged so as to require all of said feelers to again contact said table to control the ejection of a subsequent record material from said selected station; and means controlled by operation of said relay to stop the operation of the record material feeding means.

4. In a sorting machine adapted to sort record material, the combination of a plurality of sorting stations; a table common to all stations; record material ejecting means for each station; a control circuit for the ejecting means including a pair of feelers contacting said table; and means in the control circuit to cause operation of the ejecting means when either feeler is separated from the table by the record material, and to prevent a subsequent operation of said ejecting means when either feeler remains separated from said table.

5. In a sorting machine adapted to sort record material, the combination of a plurality of sorting stations; a table common to all stations; record material ejecting means for each station; and a circuit for the ejecting means including a relay and a pair of feelers, said feelers contacting said table to control the relay to operate to cause operation of the ejecting means when either of said feelers is separated from the table by said record material, and causing deenergization of said relay upon contact of both feelers with said table after ejection of the record material.

6. In a sorting machine adapted to sort record material, the combination of a plurality of sorting stations;

a table common to all stations; record material ejecting means for each station; and a circuit for the ejecting means, said circuit including a relay, an electronic control device, and a pair of feelers, said feelers being in contact with said table to cause the electronic control device to conduct and operate the relay when either of said feelers is separated from the table to cause the ejecting means to eject the record material, said feelers causing the electronic device to stop conducting thus deenergizing said relay when both feelers again contact the table after ejection of the record material.

7. In a sorting machine adapted to sort record material, the combination of a plurality of sorting stations; a table common to all stations; record material ejecting means for each station; and electrically controlled means including a pair of feelers contacting said table to control the last-mentioned means to operate the ejecting means when either of said feelers is separated from the table by the record material and to control said electrically controlled means to prevent a subsequent operation of the ejecting means until both feelers again contact said table.

8. In a sorting machine adapted to sort individual paper records of various sizes, the combination of a plurality of sorting station levels; a plurality of sorting stations on each level; means to feed individual paper records of variable sizes to the various levels; pivoted guides to direct said individual paper records to any of said levels; means to feed said records along each of said levels; pivoted means adapted to be engaged by the individual records to stop the feeding of the records at any sorting station on any level; means to grip said individual paper record to eject the engaged paper record from one side of any station; and means to grip said individual paper record to eject the engaged paper record from the opposite side of any station.

9. In a sorting machine adapted to sort individual paper records of various sizes, the combination of a plurality of sorting station levels; a plurality of sorting stations on each level; means to feed individual paper records of variable sizes to the various levels; magnetically operated means including a pivoted paper chute to direct said records to any of said levels; means to feed said records along each of said levels; magnetically operated means to stop the feeding of the records at any station on any level; magnetically operated means to eject the record from one side of any station; and magnetically operated means to eject the record from the opposite side of any station.

10. In a sorting machine adapted to sort individual paper records of various sizes, the combination of a plurality of sorting station levels; a plurality of sorting stations on each level; means to feed individual paper records of variable sizes to the various levels; electrically operated means including pivotally mounted directional control chutes actuated by solenoids to select a station level to receive the record; means to feed said record along the selected level; electrically operated means including a plurality of feelers moved into position to cooperate with the individual paper records to select a station on the selected level to stop the record; electrically operated ejecting means to eject the record from the station; and means cooperating with the paper record to control said ejecting means.

11. In a sorting machine adapted to sort individual paper records of various sizes, the combination of a plurality of sorting station levels; a plurality of sorting stations on each level; means to feed individual paper records of variable sizes to the various levels; electrically operated means including a plurality of solenoids and a plurality of directional control paper chutes actuated by said solenoids to select a station level to receive the record; means to feed said record along the selected level; electrically operated means including feelers moved into position to cooperate with the individual paper records to

select a station on the selected level to stop the record; electrically operated ejecting means to eject the record from one side of the station; electrically operated ejecting means to eject the record from the opposite side of the station; means to select either of said ejecting means; and common means cooperating with the paper record to control the operation of the selected one of said ejecting means.

12. In a sorting machine adapted to sort individual paper records of various sizes, the combination of a plurality of sorting station levels; a plurality of sorting stations on each level; means to contact each paper record to feed the individual paper records of variable sizes to the various levels; means to contact each paper record to feed the individual paper records along each of said levels; means contacted by the individual paper as it is being fed by the second mentioned feeding means to stop the operation of the first feeding means; selectively operable means to stop the individual paper at any station; devices moved into the path of the individual paper by said selectively operable means; selectively operable means to eject the individual paper from one side of the selected station; selectively operable means to eject the individual paper from the opposite side of the selected station; and means controlled by said devices upon contact of the individual paper therewith to effect an operation of the selected one of said ejecting means.

13. In a sorting machine adapted to sort individual paper records of various sizes, the combination of a plurality of sorting station levels; a plurality of sorting stations on each level; means to contact the individual paper records of variable sizes to feed the same to the various levels; means to contact the individual paper records to feed the same along each of said levels; electrical means to operate the first-mentioned feeding means; means in circuit with said electrical means and contacted by each individual paper as it is being fed by the second-mentioned feeding means to stop the operation of said electrical means; selectively operable means engaged by the traveling individual paper record to stop the record at any station; selectively operable means to grip the stopped paper record to eject the record from one side of the selected station; selectively operable means to grip the stopped paper record to eject the record from the opposite side of the selected station; an ejection circuit to effect operation of the selected ejecting means; and devices in the ejection circuit and contacted by the individual paper record as it moves into the selected station to cause the ejection circuit to actuate the selected one of said ejecting means.

14. In a sorting machine adapted to sort individual paper records of various sizes, the combination of a plurality of sorting station levels; a plurality of sorting stations on each level; means to contact the paper records to feed the same to the various levels; means to contact the paper records to feed the same along each of said levels; electrical means to operate the first mentioned feeding means; means in circuit with said electrical means and contacted by the individual paper record as it is being fed by the second mentioned feeding means to stop the operation of said electrical means; selectively operable means engaged by the traveling individual paper record to stop the record at any station; selectively operable means to grip the stopped paper record to eject the record from one side of the selected station; selectively operable means to grip the stopped paper record to eject the record from the opposite side of the selected station; an ejection circuit to effect operation of said ejecting means; and a pair of devices in the ejection circuit and so connected therein, that contact by the individual paper record with any one of said devices causes the ejection circuit to actuate the selected one of said ejecting means, and that both of said devices must again complete the circuit at these points to prepare the circuit for further operation

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before any of said devices can again control the ejection circuit to actuate the selected one of said ejecting means.

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