March 17, 1964 I. EDMUNDS ETAL 3,125,230

MACHINES FOR SORTING ARTICLES

Filed June 30, 1961 6 Sheets-Sheet 1

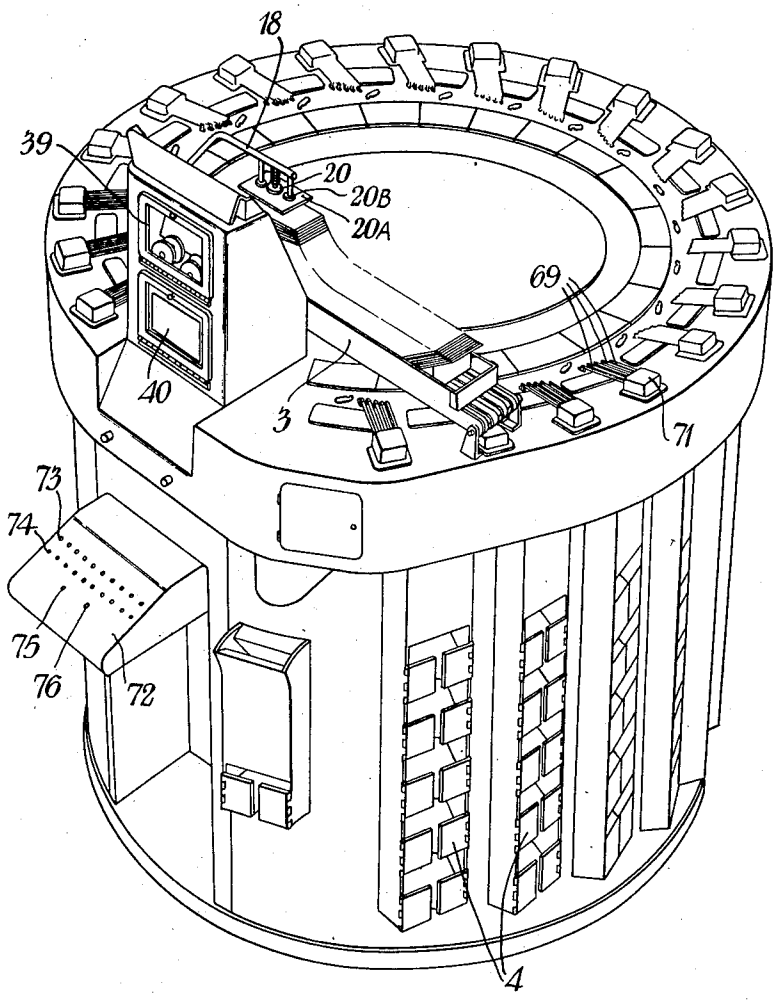


FIG.1.

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MACHINES FOR SORTING ARTICLES

Filed June 30, 1961 6 Sheets-Sheet 2

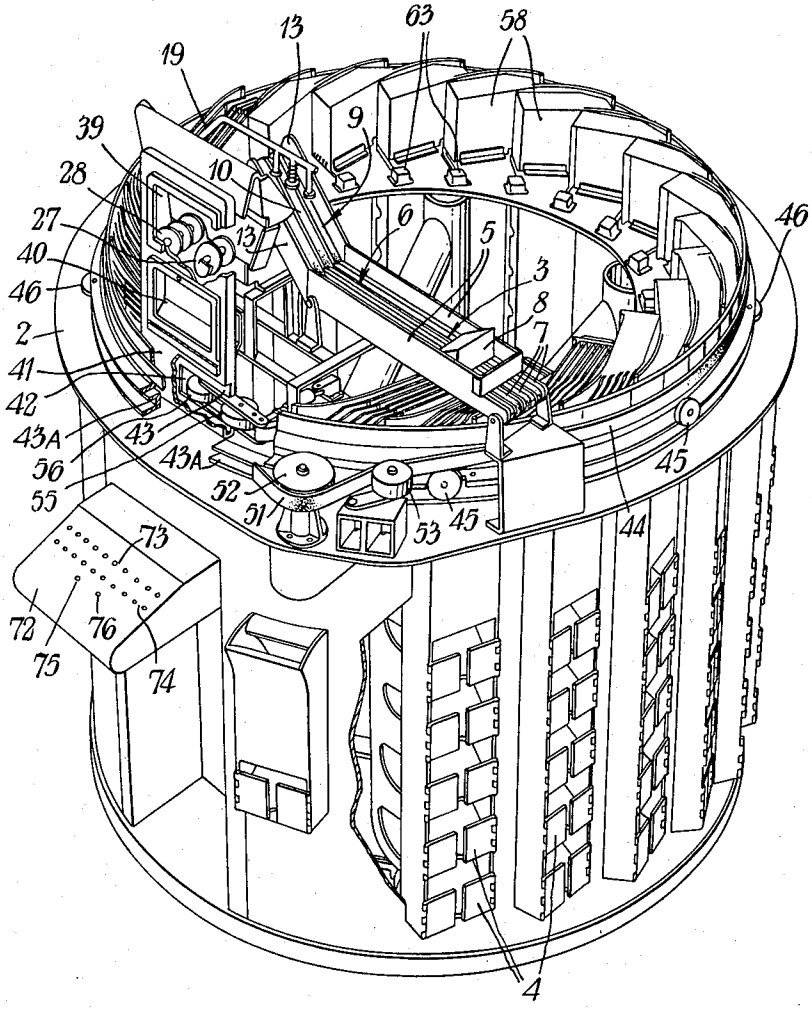


FIG. 2.

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MACHINES FOR SORTING ARTICLES

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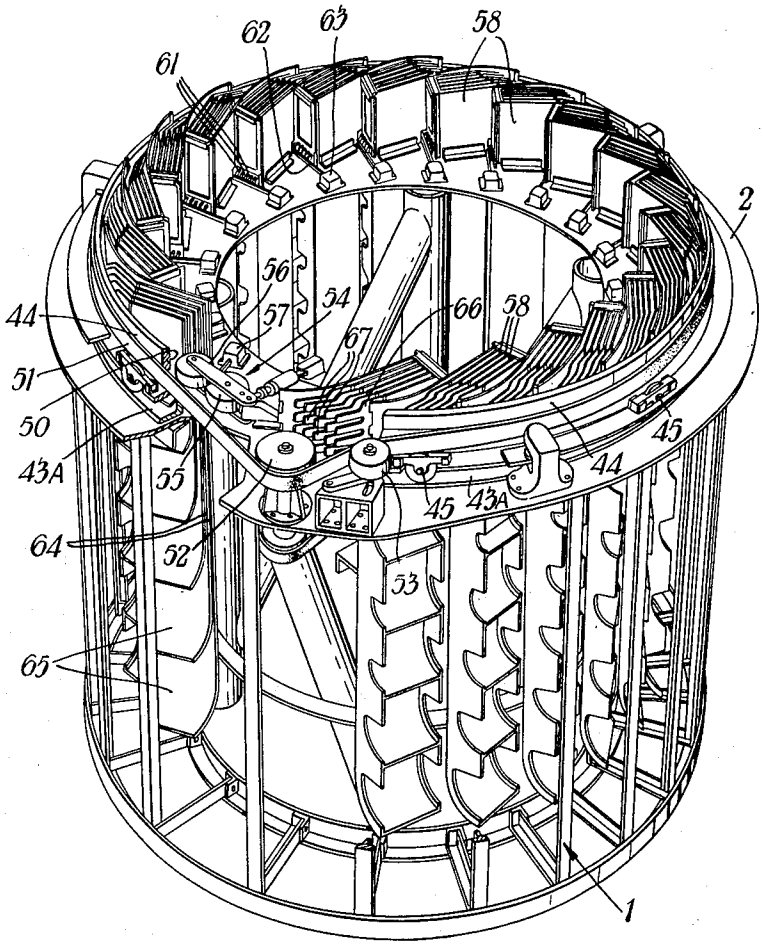


FIG. 3.

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March 17, 1964 I. EDMUNDS ETAL 3,125,230

MACHINES FOR SORTING ARTICLES

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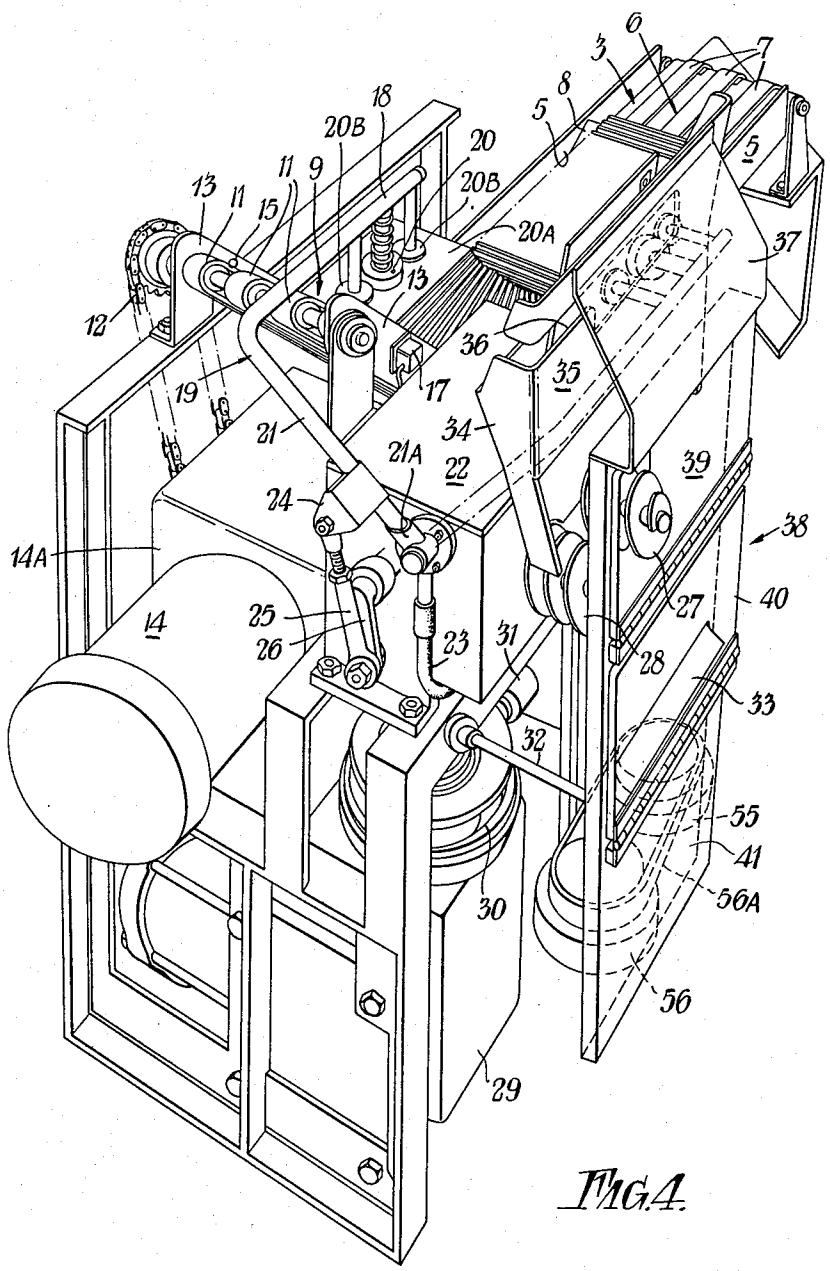


FIG.4

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MACHINES FOR SORTING ARTICLES

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FIG 7

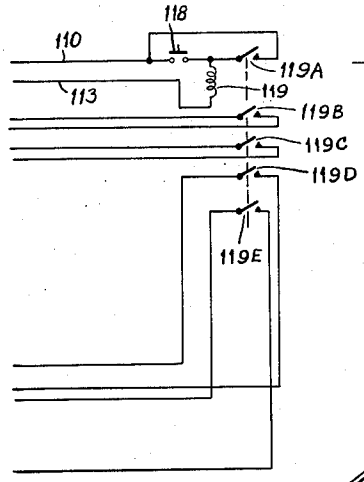


FIG 5

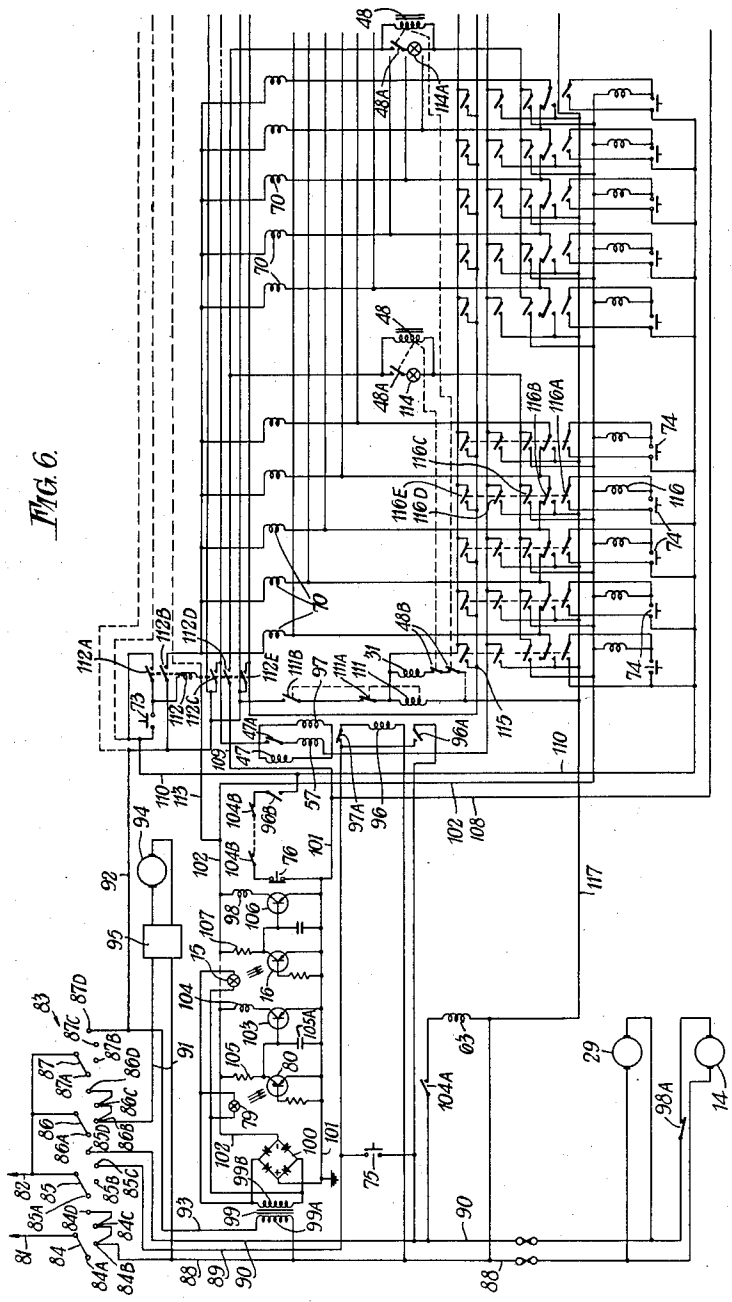
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March 17, 1964 I. EDMUNDS ETAL 3,125,230

MACHINES FOR SORTING ARTICLES

Filed June 30, 1961 6 Sheets-Sheet 6

FIG. 6.



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Patented Mar. 17, 1964

3,125,230

MACHINES FOR SORTING ARTICLES

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Filed June 30, 1961, Ser. No. 121,249
Claims priority, application Great Britain July 5, 1960
6 Claims. (Cl. 214—11)

This invention relates to machines for sorting articles.

According to the present invention there is provided a machine for sorting articles comprising means for feeding articles in succession to a viewing position, a drum, means for rotating the drum about its axis, a plurality of fixed stations spaced at intervals around the inner surface of the drum for receiving sorted articles, means at each station for removing an article from the inner surface of the drum to collect the article at the station, each removing means being normally inoperative, means for selecting which one of the removing means is to be rendered operative, and means for transferring each article that has been viewed from the viewing position to the inner surface of the drum, the arrangement being such that in operation the drum rotates and articles are fed in succession to the viewing position, the selecting means being actuated according to the result of viewing to render the removing means associated with a particular station operative and the viewed article being fed to the inner surface of the drum by the transferring means and carried round by the drum, the article being retained against said inner surface by centrifugal force until removed therefrom by the last-mentioned removing means and thereby collected at said particular station.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a letter sorting machine according to the invention,

FIGURES 2 and 3 are broken-away semi-diagrammatic perspective views of the same letter sorting machine,

FIGURE 4 is, to an enlarged scale, a perspective view of the mechanism in the machine of FIGURE 1 for feeding letters to a viewing station,

FIGURE 5 is, to an enlarged scale, a perspective view of a group of traps for receiving letters being sorted, together with scoops for guiding letters into the traps,

FIGURE 6 is a simplified circuit diagram of the letter sorting machine, and

FIGURE 7 is a diagram of circuitry that can be added to the circuit diagram of FIGURE 6, when a reject box is used with the machine for receiving letters that the machine operator intentionally selects to be rejected.

The machine has a framework 1 of upright tubular form which supports at the top thereof an annular platform 2. Letters to be sorted are supplied to an entry channel 3 and the sorted letters are delivered to boxes 4 arranged in twenty columns around the periphery of the framework 1. The channel 3 has upright side walls 5 extending along the opposite sides of a conveyor 6 which forms the bottom of the channel 3. The conveyor 6 is in the form of a plurality of side-by-side belts 7 which are passed around end rollers (not shown), those at one end of the conveyor being driven. A ramp 8 is disposed in the entry end of the channel 3. The delivery end of the conveyor 6 is arranged to discharge letters into the lower end of an inclined channel 9 the bottom of which is formed by a conveyor 10 in the form of a plurality of side-by-side belts 11 passed around end rollers, the upper ones of which are driven by a chain 12. The channel 9 has upright side walls 13 extending along opposite sides of the conveyor

10. An electric motor 14 drives, through a reduction gear contained in a housing 14A, the chain 12 and the driven rollers of the conveyor 6. A lamp 15 is provided near the top of the channel 9 and on one side thereof for shining a horizontal beam of light across the channel 9 to impinge on a photo transistor 16 (shown only on FIG. 6) contained in a housing 17 on the opposite side of the channel 9. One arm 18 of a right-angled tube 19 carries a suction cup 20 and support pads 20B, the cup 20 serving for picking up the top letter 20A in the channel 9. The end 21A of the other arm 21 of the tube 19 is pivotally secured about a horizontal axis to one side of a gear housing 22. A pipe 23 connects the tube 19 to a vacuum source (not shown). A bracket 24 on the arm 21 is connected by an adjustable link 25 to a crank arm 26. The free ends of two side-by-side helical screws 27, 28 which are rotatable about horizontal axes project from the front of the housing 22. An electric motor 29 drives the crank 26 and the screws 27 and 28 through a one-revolution clutch 30 and gearing (not shown) in the housing 22. The one-revolution clutch 30 is arranged to be electrically operated by a solenoid 31. The motor 29 is also arranged through the clutch 30 to reciprocate a spindle 32 which is connected for tipping a flap 33 which is pivoted about a horizontal axis and serves as a letter trap. Each time the clutch 30 is engaged the spindle 32 is displaced once in one direction and once in the opposite direction so that the associated trap formed by the flap 33 is opened and closed again.

A vertical chute 34 is disposed immediately above the screws 27, 28, the front of the chute having integral therewith an upwardly extending guide plate 35 which has a horizontal slot 36 through which the arm 18 and its associated suction cup 20 and pads 20B can pass. The chute 34 and the plate 35 are supported from the top of a viewing box 38 by a bracket 37. The viewing box 38 has an upper window 39 adjacent the screws 27, 28, and a lower window 40 immediately below the window 39 and immediately above the flap 33. The part of the box 38 that is below the flap 33 forms a progression box 41 which has a rear opening 42 (FIGURE 2) and a side opening 43.

An annular track 43A is secured on the platform 2 and a shallow circular drum 44 is rotatably mounted on the track 43A through the intermediary of nylon rollers 45 and 46 which are mounted on the drum 44. The rollers 45 are rotatable about horizontal axes and co-operate with the bottom flange of the track 43A whilst the rollers 46 are rotatable about vertical axes and co-operate with the vertical web of the track 43A. On its inner surface the drum 44 has four vertically spaced circumferential grooves 50, only one of which is visible in the drawings. A belt 51 is passed around the outer surface of the drum 50 and around a driven pulley 52, there being a jockey wheel 53 for maintaining the tension of the belt 51.

An injector mechanism 54 is disposed adjacent the interior surface of the drum 44 and behind the progression box 41. The mechanism 54 includes rollers 55 and 56. The roller 55 is spring-urged against the interior surface of the drum 44 to be driven thereby. The roller 56 is connected to the roller 55 by a driving belt 56A. A progression solenoid 57 is provided for displacing the roller 56 laterally through the opening 42 and against the interior surface of the front wall of the progression box 41.

Spaced around the platform 2 are twenty groups of traps 58, there being five traps 58 in each group. The traps 58 of each group are formed by parallel side-by-side vertical panels 59 (FIGURE 5) and a vertical rear panel 60, the panels 59 and 60 being integral. The bottom of each trap 58 is formed by a pivoted platform (not shown). Each platform is mounted on a spindle (not shown) con-

nected to a lever 61. The five levers 61 associated with each group of traps 58 are pivotally secured to a common rod 62 which is fixed to the armature of a solenoid 63. Chutes 64 lead from the undersides of the pivoted platforms to the boxes 4. The chutes 64 are formed by vertical panels 65 the upper ends of which align with the panels 59. Each panel 59 at its end remote from the panel 60 has a scoop 66 pivotally secured thereto about a vertical axis. Each scoop 66 has four fingers 67 for engagement one in each of the four grooves 50 of the drum 44. Each scoop 66 has an upwardly directed pin 68 secured thereto, the pin being pivotally connected to one end of a rod 69 (FIGURE 1) which is connected to the armature of a solenoid 70 (FIGURE 6) contained in a box 71 (FIGURE 1). Each box 71 contains five solenoids 70 associated one with each of the adjacent five scoops 66. The scoops 66 are normally maintained with their fingers 67 clear of the interior surface of the drum 44, the fingers 67 only entering the grooves 50 upon energisation of the associated solenoid 70. A brush 77 is provided at the entrance to each trap 58, the bristles of each brush extending from one side wall of the trap 58 in the direction across the trap entrance and towards the panel 60. A hole 78 is formed in each panel 59, the holes 78 of the panels 59 of each group of traps 58 being in alignment and there being a lamp 79 (shown only in FIGURE 6) on one side of the group for projecting a beam of light through the aligned holes 78 onto a photo-transistor 80 (shown only in FIGURE 6) on the other side of the group.

A keyboard 72 is provided at the front of the machine. The keyboard has thereon a bank of ten keys 73, a bank of ten keys 74, a reset key 75 and a cancel key 76.

Referring now to FIGURE 6, the electrical components of the machine are supplied from alternating current supply lines 81, 82 via a master switch 83 having four operative positions and provided with four switch arms 84 to 87. The arm 84 co-operates with four contacts 84A to 84D and the arms 85 to 87 similarly co-operate with four associated contacts. The switch arms 84 to 87 each engage one of their associated contacts in each of the four positions of the switch 83. The contacts 84B, 84C and 84D are connected together to a line 88. The contact 85B is a dummy contact as are the contacts 87B and 87C. The contact 85C is connected to a line 89 and the contact 85D is connected to a line 90. The contacts 86B, 86C and 86D are connected together to a line 91, while the contact 87D is connected to lines 92 and 93. In the first position of the switch 83 which is an "off" position the switch arms 84 to 87 each contact their associated contacts 84A to 87A which are blind contacts so that none of the electrical equipment is energised. In the second position of the switch 83 the arms 84 to 87 engage with associated contacts 84B to 87B, the arms 84 and 86 causing a motor 94 to be energised through a starter 95. The motor 94 drives the pulley 52 to cause the belt 51 to drive the drum 44. In the third position of the switch 83 the arms 84 to 87 engage their associated contacts 84C to 87C. The motor 94 continues to be energised and in addition the coil 96 of a fault relay is energised from the lines 88 and 89 via contacts 97A controlled by a relay coil 97. The coil 97 is in parallel with a relay coil 47 which when energised closes, with a slight delay, an associated contact 47A in series with the progression solenoid 57. The coils 47 and 97 are each connected across the series-connected solenoid 57 and contact 47A. The relay coil 97 is arranged to operate its associated contacts 97A with a 15 seconds delay. The coil 96 controls contacts 96A and 96B both these pairs of contacts becoming closed when the master switch 83 is placed in its third position. When the master switch is moved to its fourth position the switch arms 84 to 87 engage their associated contacts 84D to 87D. The motor 94 continues to be driven, the motor 29 is energised and the motor 14 is supplied with current via contacts 98A controlled by a relay coil 98. In addition the line 92 is rendered live and the primary winding 99A of a step-down transformer 99 is energised. The secondary winding 99B of the transformer supplies the lamp 15 and all twenty lamps 79 of which only one is shown in the circuit diagram. The secondary winding 99B is also connected to the input of a four-arm rectifier bridge network 100 the output of which supplies low voltage direct current to a positive line 101 and a negative line 102.

The collector of each photo-transistor 80 is connected to the base of an associated amplifying transistor 103 the collector of which has a relay coil 104 in series therewith. The coil 104 controls contacts 104A in series with the associated trap solenoid 63, and contacts 104B, all the contacts 104B being connected together in series between the cancel key 76 and the contact 96B. In FIGURE 6 only one solenoid 63 is shown but it will be realised that there are in fact twenty such solenoids in the machine, one associated with each group of traps 58 and each connected in series with an associated pair of contacts 104A across the lines 88 and 90. When each lamp 79 illuminates its associated photo-transistor 80 the latter is conductive and there is a relatively large voltage drop across an associated resistance 105 connected between the negative line 102 and the collector of the photo-transistor 80. When the light beam from the lamp 79 is interrupted the photo-transistor 80 cuts-off so that there is a considerable change in the voltage drop across the resistance 105 and the potential of the collector of the photo-transistor 80 and the base of the amplifying transistor 103 become more negative. The change in the potential of the base of the transistor 103 causes the latter to conduct so that the coil 104 is energised to operate its associated contacts. The base of the transistor 103 is connected to the positive line 101 through a capacitance 105A which has the effect of delaying energisation of the relay coil 104 consequent upon interruption of the beam of light falling on the transistor 80 from the lamp 79.

The collector of the photo-transistor 16 is connected to the base of an amplifying transistor 106 the collector of which is connected to the negative line 102 through the relay coil 98. The collector of the transistor 16 is connected to the negative line 102 through a resistance 107. When light falls onto the transistor 16 from the lamp 15 the transistor conducts and there is a relatively large voltage drop across the resistance 107. When the light from the lamp 15 is interrupted the transistor 16 cuts-off so that the voltage drop across the resistance 107 is considerably reduced and the collector of the transistor 16 and the base of the transistor 106 become more negative. The change in potential of the base of the transistor 106 causes the latter to conduct so that the relay coil 98 is energised.

The positive line 101 supplies positive lines 108 and 109 directly, and a positive line 110 through the series-connected cancel key 76, the contacts 104B and the contacts 96B.

The clutch solenoid 31 that operates the one-revolution clutch 30 is connected in series with a chain of twenty series-connected contacts 48B. This chain of contacts and the solenoid 31 have a relay coil 111 in parallel therewith, the relay coil 111 controlling contacts 111A and 111B. Upon energisation of the coil 111 the contacts 111B close immediately whereas the contacts 111A open 150 milliseconds after such energisation.

As there are five traps 59 in each group and twenty groups in all, there are, in the machine, one hundred traps 59 and one hundred scoops 66 each of which is controlled by an associated solenoid 70. The particular one of the hundred solenoids 70 that is to be energised is determined by pressing one key 73 and one key 74. There being ten keys 73 and ten keys 74 it will be realised that one hundred selections are provided. The first one of the ten keys 73 is arranged for placing first and second banks of solenoids 70 in a condition for energisation. Each such

bank has five solenoids 70, the solenoids of the first bank being associated one with each of the scoops 66 of the first group of traps 59 around the platform 2. The five solenoids 70 of the second bank are associated one with each of the five scoops 66 of the second group of traps 59 around the platform 2. The ten keys 74 are respectively arranged for completing the circuits through the ten solenoids 70 of the first and second banks. Similarly the second key 73 is associated with third and fourth banks of five solenoids each, the ten keys 74 being respectively arranged for completing the circuits through these ten solenoids. The solenoids in the third and fourth banks are associated with the scoops 66 of the third and fourth groups of traps 59 around the platform 2. Similarly the third to tenth keys 73 are arranged for placing in a condition for energisation further banks of solenoids 70 for the scoops 66 of the remaining groups of traps 59, each pair of banks of five solenoids 70 each, that are associated with each single key 73 being arranged to have their circuits completed by the keys 74. For the sake of simplicity the circuit diagram of FIGURE 6 shows only one key 73, the first and second banks of solenoids 70 and the ten keys 74.

Each key 73 when closed connects the coil of an associated relay 112 between the positive line 110 and a negative line 113 connected to the line 102. Energisation of the coil 112 closes associated contacts 112A to 112E. The contacts 112A are holding contacts for the coil 112. The contacts 112B when closed connect one side of each of the ten solenoids 70 of the first and second banks to the live line 92. The contacts 112C when closed connect one side of the coil 47, one side of the coil 97 and the contacts 47A to the line 92. The contacts 112D when closed connect, via a contact 48A, one side of a first bank indicator lamp 114 and, via another contact 48A, one side of a second bank indicator lamp 114A, to the positive line 109. A relay coil 48 is associated with each of the twenty lamps 114, 114A, each coil 48, when energised, operating associated contacts 48A and 48B with a 750 milliseconds delay. As previously mentioned the contacts 48B are connected together in series with the solenoid 31. Each contact 48A is connected in series with the associated lamp 114, 114A, the associated coil 48 being connected across the series connected lamp and contact 48A. The contacts 112E when closed connect a point 115 with the live line 92.

Each key 74 when closed connects an associated relay coil 116 between the positive and negative lines 110 and 102, so that the coil is energised to operate its associated contacts 116A to 116E. The contacts 116A are holding contacts for the coil 116. The contacts 116B when closed connect the other side of a particular one of the ten solenoids 70 associated with each key 73 to a line 117 connected to the line 88. The contacts 116B when closed also serve for completing the circuit through any subsequent solenoid 70 in the same bank. That is to say, if the key 74 upon operation energises the third solenoid 70 of a bank, the fourth and fifth solenoids of the same bank will also be energised via the unoperated contacts 116B associated with the fourth and fifth solenoids of the bank and the operated contacts 116B associated with the third solenoid 70 of the bank. The contacts 116C when closed connect the other sides of the bank indicator lights 114 and 114A to the negative line 102. The particular lamp which is energised depending upon whether the operated key 74 is associated with an odd or even bank of solenoids 70. The contacts 116D when closed connect the line 117 to the solenoid 57 and the coils 47 and 97. The contacts 116E when closed connect the point 115 to one side of the solenoid 31 and to one side of the coil 111, the other side of the coil 111 being connected directly to the line 117 and the other side of the solenoid 31 being connected to the line 117 via the contacts 48B.

In use of the machine desecribed above the master switch 83 is turned from its first or off position to the second position to energise the motor 94 which is set in motion to turn the drum 44. The switch 83 is then turned to its third position to energise the faulty relay coil 96 whereby the contacts 96A and 96B are closed. The switch 83 is then moved over to its fourth position, the contact 96A remaining closed during such change-over so that the relay coil 96 is energised from the lines 88 and 90 via the contacts 96A and 97A. The moving of the switch 83 to its fourth position causes the conveyor motor 14 and the one-revolution clutch motor 29 to operate. Letters with their addresses upwards are placed one behind the other in the channel 3. These letters are advanced by the conveyor 6 to the conveyor 10. The letters advance up the channel 9 until the top letter 20A interrupts the beam of light falling on the photo-transistor 16 from the lamp 15. This causes the transistor 16 to cut-off and the transistor 106 to conduct whereby the relay coil 98 is energised and the contacts 98A in series with the conveyor motor 14 are opened so that the advance of letters is interrupted. When the top letter 20A is removed from the beam of light from the lamp 15 again falls on the photo-transistor 16, the transistor 106 cuts-off and the contacts 96A close so that the motor 14 raises the stack of letters to the required level whereupon the beam of light is again interrupted and the motor 14 switched off. Each energisation of the solenoid 31 (in the manner to be described later) causes engagement of the clutch 30 whereby the tube 19, which is connected to the suction source, is swung from the position shown in dotted lines in FIGURE 4 to its position shown in full lines and back again. The suction cup 20 carries the top letter 20A to a position above the chute 34. As the suction cup 20 passes through the slot 36, the letter, which cannot pass through the slot 36, is disengaged from the cup 20, drops down the chute 34 and comes to rest in the grooves of the two helical screws 27 and 28. A subsequent energisation of the solenoid 31 connects the motor 29 through the one-revolution clutch 30 to drive the screws 27 and 28 whereby the letter resting in the grooves of these screws is moved forwards to the front of the window 39 where it disengages from the screws and drops from the upper window 39 to the lower window 40 to rest on the flap 33. Whilst in the windows 39 and 40 and resting on the flap 33 the operator reads the address on the letter. The operator presses the key 73 and the key 74 appropriate to the address he has just read on the letter. The associated relay coils 112 and 116 are energised and the associated contacts 112A to 112E and 116A to 116E are operated. The clutch solenoid 31 is, as described later, immediately energised so that the clutch 30 is engaged and causes the spindle 32 to be displaced to tip the flap 33 whereby the letter drops into the progression box 41 where it temporarily rests. The coils 47 and 97 are energised by closure of the contacts 112C and 116D. The coil 47 after a slight delay sufficient to allow the letter to drop into the box 41 closes its contact 47A whereby the progression solenoid 57 is energised so that the rotating roller 56 is displaced through the aperture 42 towards the front of the progression box 41 to engage the letter in the box. Such engagement causes the letter to be injected into the nip between the roller 55 and the drum 44 which is rotating at the speed of about 120 r.p.m. The letter is pressed against the inner surface of the drum 44 by the roller 55 and is retained on the inner surface of the drum 44 by centrifugal force, the letter being carried round with the drum. The solenoid 70 selected by the particular keys 73 and 74 which have been depressed is energised via contacts 112B and 116B so that the associated scoop 66 is swung about its pivot whereby its fingers 67 engage in the grooves 50 in the interior of the drum. So that the scoop 66 just mentioned does not encounter adjacent subsequent scoops during its displacement, the solenoids 70 associated with the subsequent scoops of the same group are energised in the manner previously described so that these scoops 66 are also displaced so that their fingers 67 engage in the grooves 50. The letter moves round with the drum 44 until the letter

encounters the first set of fingers 57 that are in the grooves 50 whereupon the letter is guided by the scoop 66 past the associated brush 77 into the associated trap 58. On entering the trap 58 the letter breaks the beam of light from the adjacent lamp 79 so that the associated photo-transistor 80 cuts-off and the associated amplifying transistor 103 is rendered conductive to energise the associated relay coil 104. Such energisation operates associated contacts 104A and 104B. The operation of the contacts 104B opens the circuit to the positive line 110 so that the coils 112 and 116 are de-energised and the contacts 112A to 112E and 116A to 116E that were previously operated return to the position shown in FIGURE 6. The solenoid (or solenoids 70) that was energised is thereby de-energised so that the scoop (or scoops) 66 that was displaced returns to its initial position under the action of an associated spring (not shown). The progression solenoid 57 is de-energised so that the roller 56 returns to its initial position. During energisation of the relay coils 112 and 116 the clutch solenoid 31 is also energised by closure of contacts 112E and 116E so that the flap 33 is tipped to discharge the letter thereon into the box 41, the tube 19 is opertaed to move the top letter 20A in the channel 9 to the top of the chute 34, and the screws 27, 28 are rotated to cause the letter resting thereon to be progressed to the window 40. The contacts 111A and 111B are connected to by-pass the contacts 112E and 116E so that in the event that the relays 112 and 116 should be de-energised before the one-revolution clutch 30 has completed one revolution, the solenoid 31 will remain energised until the delay contacts 111A operated by the coil 111 open, the contacts 111A being delayed sufficiently for ensuring that the clutch 30 can complete one revolution for every time the solenoid 31 is energised.

Consequent upon energisation of the relay 104 after the letter entered the appropriate trap 58, the associated solenoid 63 is energised, by closure of the associated contacts 104A, to tilt the platforms at the bottoms of the traps 58 in the associated group so that the letter drops down the chute beneath the trap 58 in which it was entered into the appropriate box 4. It will be recalled that there is a slight delay between interruption of the beam of light 79 to the photo-transistor 80 and the energisation of the associated relay coil 104. This delay permits the letter that has entered the trap 58 to settle before being dropped down the associated chute 64.

Following energisation of the progression solenoid 57 to feed a letter onto the inner surface of the rotating drum 44, if no light beam from any lamp 79 to the associated photo-transistor 80 has been interrupted in the time it would take a letter to go past all the group of traps 58, a fault has obviously occurred. When this happens no contact 104B opens and the energised coils 112 and 116 remain energised long enough for the coil 48 associated with the group of traps 59 in which the selected trap 59 occurs, to operate its associated contacts 48A and 48B. Closing of the contact 48A causes the associated lamp 114 or 114A to be illuminated so that the operator receives a visual indication that a fault has occurred, the particular lamp 114 or 114A that is illuminated indicating the location of the fault. Opening of the contact 48B de-energises the clutch solenoid 31 so that operation of further keys 73 and 74 cannot progress any letter to the box 41 because the clutch 30 which operates the flap 33 is prevented from being engaged by the solenoid 31 being maintained de-energised. Eventually the coil 97 in parallel with the solenoid 57 operates its delay contact 97A which de-energises the fault relay coil 96. Such de-energisation causes the contacts 96B to open so that firstly the energised coils 112 and 116 are de-energised and secondly further operation of keys 73 and 74 is ineffective to energise any of the coils 112 and 116. Thus the clutch solenoid 31 and the progression solenoid 57 and relay coil 97 all become de-energised and cannot by normal operation be re-energised so that the feed of letters into the machine is interrupted. Upon clearing of the fault the operator depresses the reset key 75 which re-energises the fault relay coil 96 from the lines 88 and 90 via the now closed contact 97A. Immediately the coil 96 is energised its associated holding contacts 96A are re-closed as are the contacts 96B so that the selection of the destination of letters amongst the boxes 4 by the keys 73 and 74 can again proceed.

Should the operator realise that he has pressed a wrong key 73 or 74 after depressing only one key he can reset the machine by depressing the cancel key 76 which has the effect of de-energising the coil 112 or 116 that was energised by the wrong key operation. The operator can then start his selection again.

If desired a reject box (not shown) can be provided between the twentieth group of traps 58 and the progression box 41, such reject box having a scoop with its fingers permanently engaged in the grooves 50 of the drum 44. In the event of failure of a solenoid 70 to operate its associated scoop 66 the letter will be removed from the drum 44 by the scoop associated with the reject box into which the letter will fall. The address on the letter in the reject box will indicate the solenoid 70 that has failed.

The reject box may be arranged so that the operator can intentionally select the reject box as the destination for a letter he is viewing. When this provision is required an additional key, key 118, (FIG. 7) is provided on the keyboard 72, the key 118 when closed connecting a relay coil 119 across the lines 110 and 113 so that this coil is energised in a way similar to the coils 112. The coil 119 controls contacts 119A and 119E. The contacts 119A are holding contacts for the coil 119, the contacts 119B are in parallel with all the contacts 112C, the contacts 119C are in parallel with all the contacts 112E, the contacts 119D are in parallel with all the contacts 116E and the contacts 119E are in parallel with all the contacts 116D. Thus when the key 118 is depressed the coil 119 is energised and maintained energised by its contacts 119A. The now closed contacts 119B and 119E initiate energisation of the progression solenoid 57 whilst the now closed contacts 119C and 119D cause the clutch solenoid 31 to be energised. Thus the letter in the window 40 that the operator desires to be rejected is dropped into the box 41 and then progressed to the drum 44 which carries it around to the reject scoop where the letter is removed from the drum 44 and drops into the reject box.

We claim:

1. A machine for sorting articles, the machine comprising means for feeding articles in succession to a viewing station, a drum having an inner surface, means for continuously rotating the drum about its axis at a speed sufficient to maintain an article being sorted against said inner surface by centrifugal force, a plurality of fixed receiving stations spaced at intervals around the inner surface of the drum for receiving sorted articles, means at each receiving station for removing an article from the inner surface of the drum to collect the article at the station, each removing means being normally inoperative, means for selecting, as a result of viewing, which one of the removing means is to be rendered operative, means responsive to operation of the selecting means for transferring each article that has been viewed from the viewing station to the inner surface of the drum, and means associated with each receiving station for producing, when the station receives an article from the associated removing means, a release signal which is effective on the selecting means to render the operated removing means inoperative and to restore the selecting means to its initial condition.

2. A machine as claimed in claim 1, wherein the inner surface of the drum is grooved, and wherein each removing means includes a scoop having a finger for en-

gaging each groove of the drum when the associated removing means is operative.

3. A machine as claimed in claim 1, wherein each receiving station includes a trap and a box beneath the trap, each trap having an entrance at one side thereof for receiving an article from the associated removing means, an openable bottom, and means for opening said bottom a predetermined time after an article has entered the trap to discharge the article into the box beneath the trap.

4. A machine as claimed in claim 3, including a photoelectric device associated with each trap, a lamp for causing a beam of light to traverse the trap and shine onto the photoelectric device, the lamp being positioned such that its beam is interrupted when an article enters the trap so that the photoelectric device produces a response, and means for causing said response to operate the opening means.

5. A machine as claimed in claim 1, wherein each means for producing a release signal includes a photoelectric device, a lamp for causing a beam of light to shine onto the photoelectric device, the lamp being positioned such that its beam is interrupted when the station receives an article from the associated removing means so that the photoelectric device produces a response which constitutes said release signal.

6. A machine as claimed in claim 1, wherein the transferring means includes a driven roller within the drum, a plate-like element disposed between the roller and the inner surface of the drum, the viewing position being immediately above the gap between the roller and said element when the roller is spaced from the element, means mounting the driven roller for displacement towards and away from the plate-like element, means responsive to the selecting means for maintaining each article in the viewing station until the selecting means is operated whereupon the article in the viewing station drops into the gap between the roller and said element, and means responsive to operation of the selecting means for effecting delayed operation of the mounting means to cause said roller, after the viewed article has been dropped into said gap, to be displaced towards said element so that the article is nipped therebetween and driven across the element onto the inner surface of the drum, the article continuing its motion with the inner surface of the drum.

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