

Feb. 13, 1934.

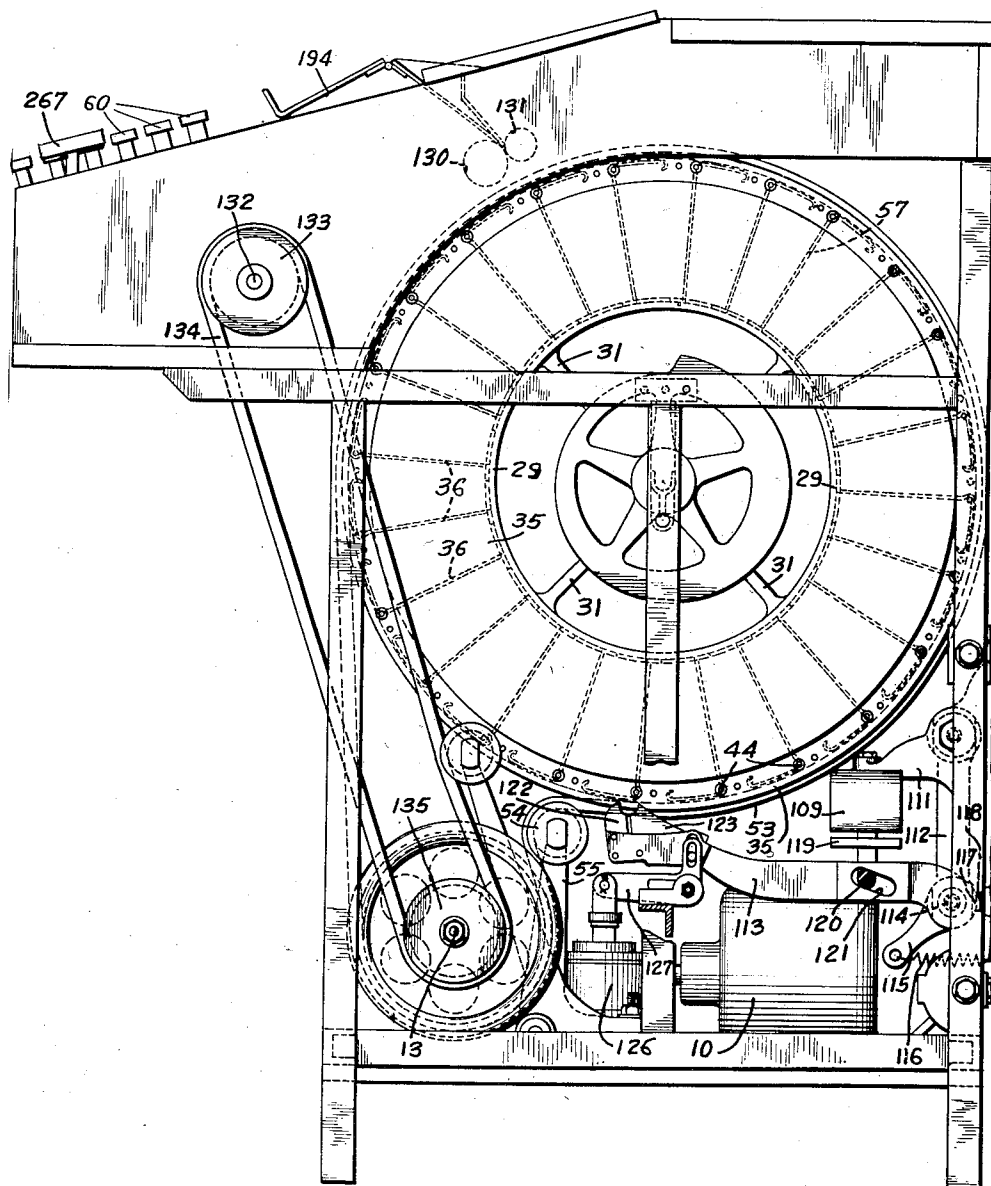
F. L. FULLER

1,946,906

SORTING MACHINE OF THE MANUAL CONTROL TYPE

Original Filed Oct. 21, 1930 10 Sheets-Sheet 1

FIG.1.



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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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FIG.2.

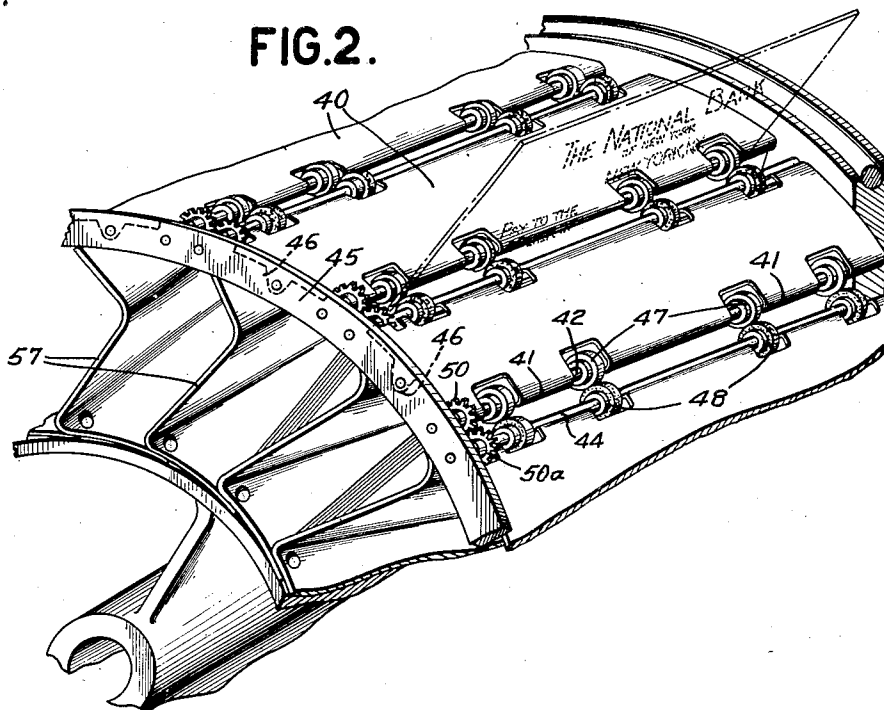


FIG.14.

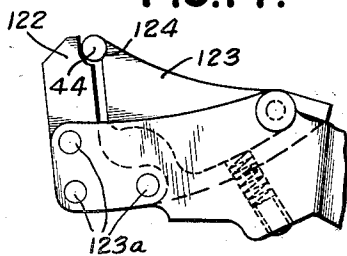
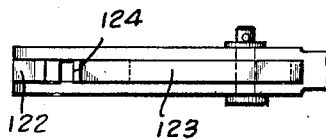


FIG.15.



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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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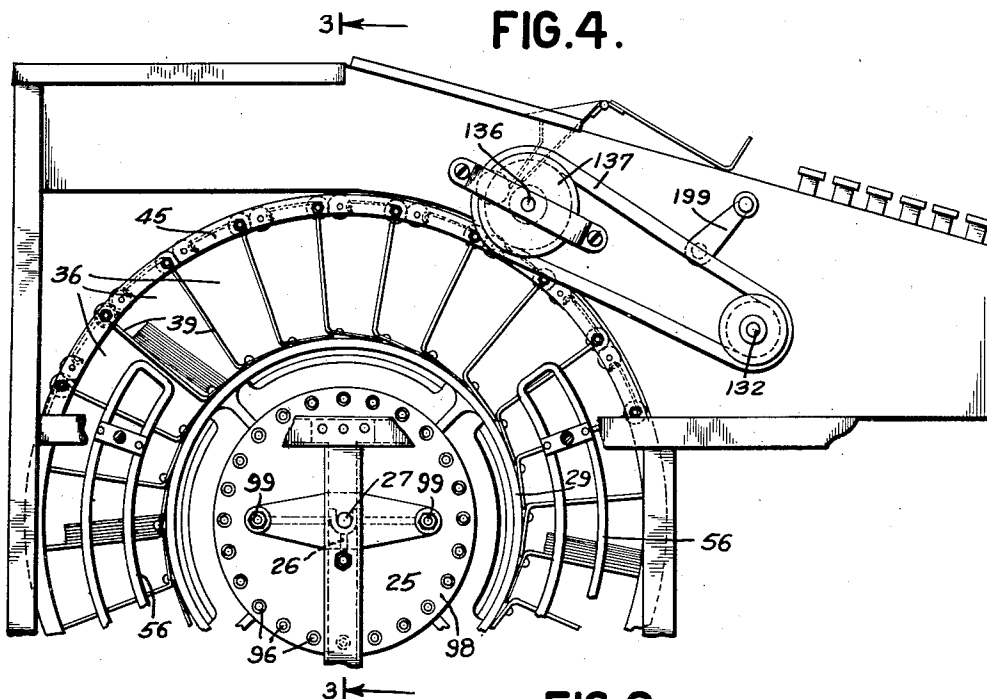
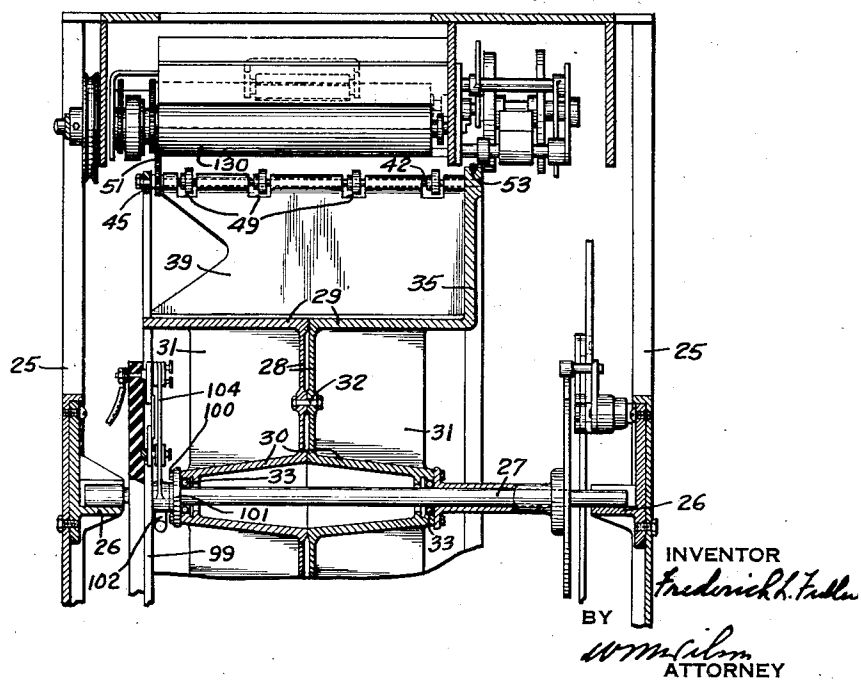


FIG.3.



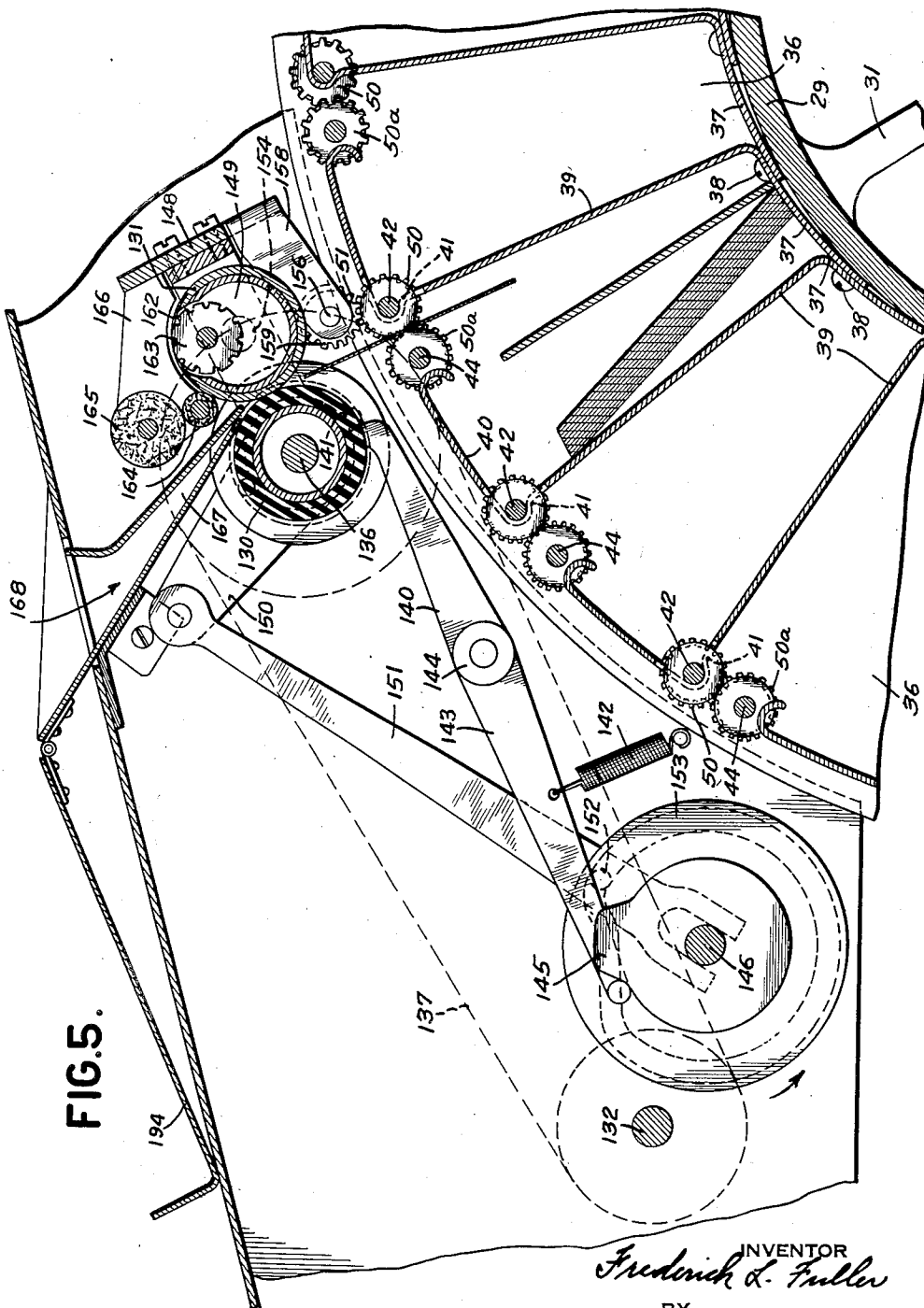
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1. SORTING MACHINE OF THE MANUAL CONTROL TYPE

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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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FIG. 6.

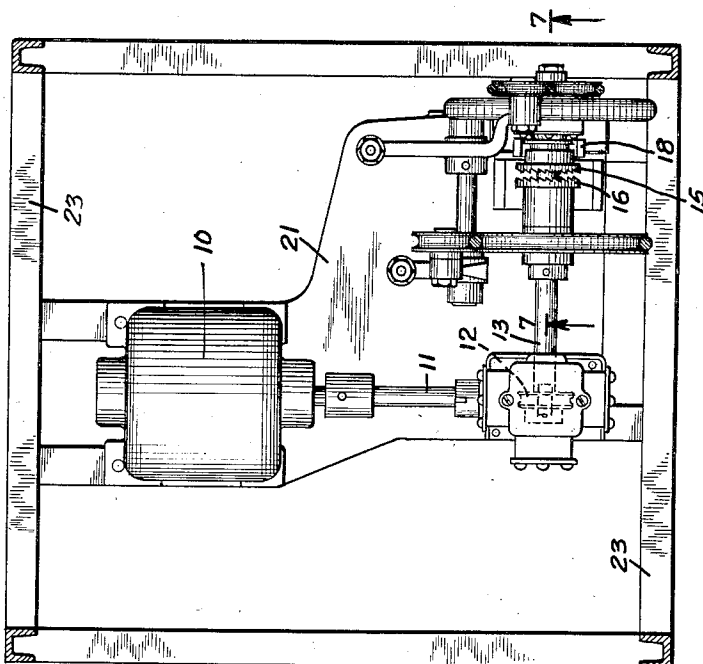
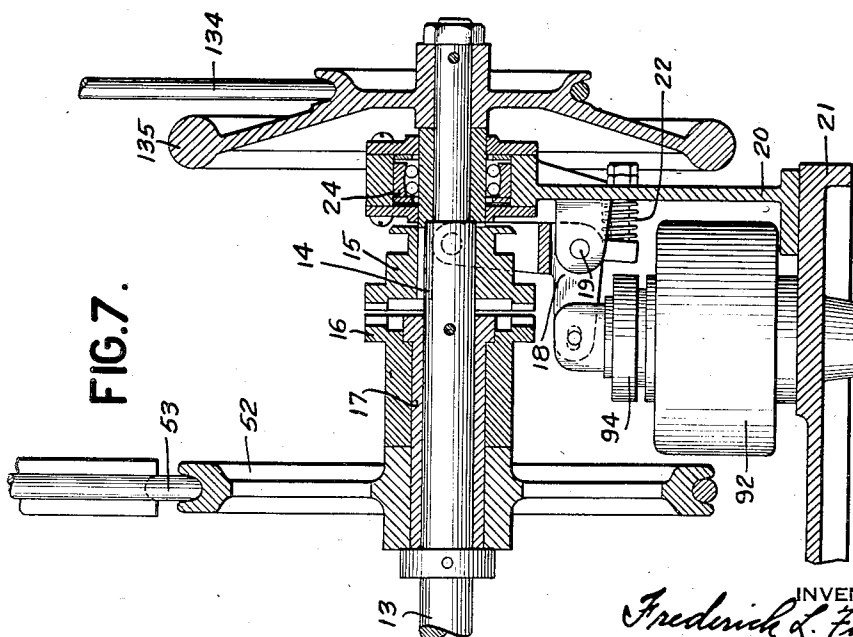


FIG. 7.



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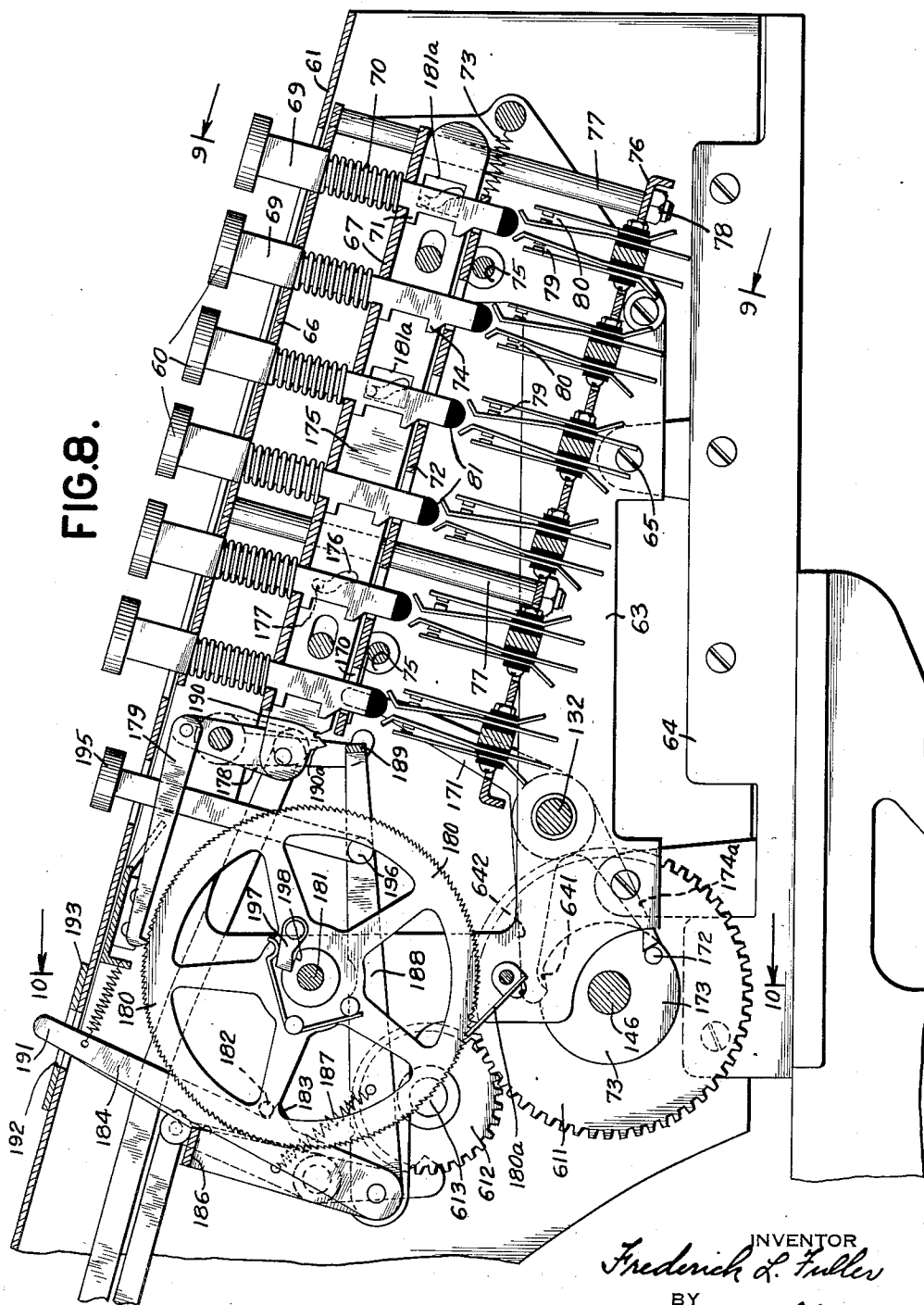
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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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FIG.9.

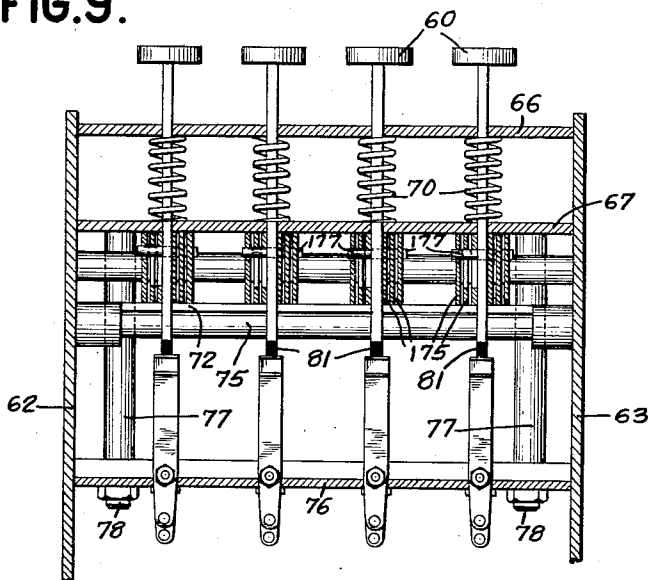
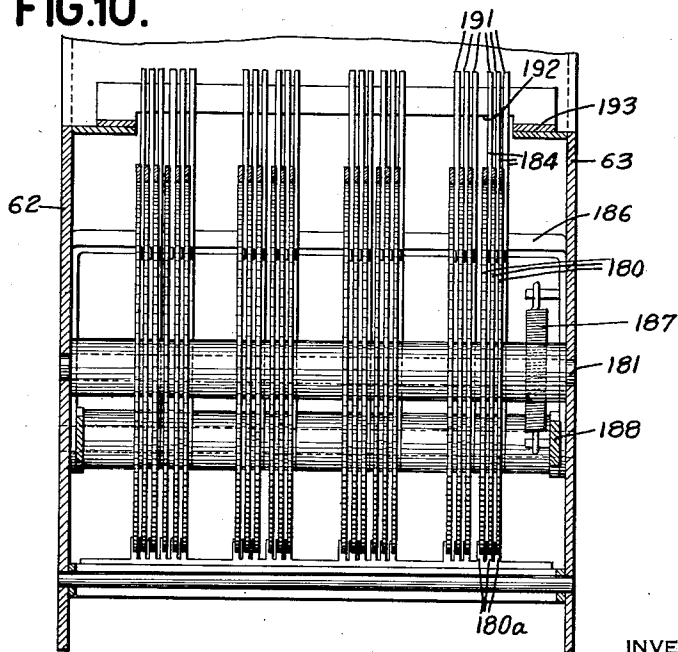


FIG.10.



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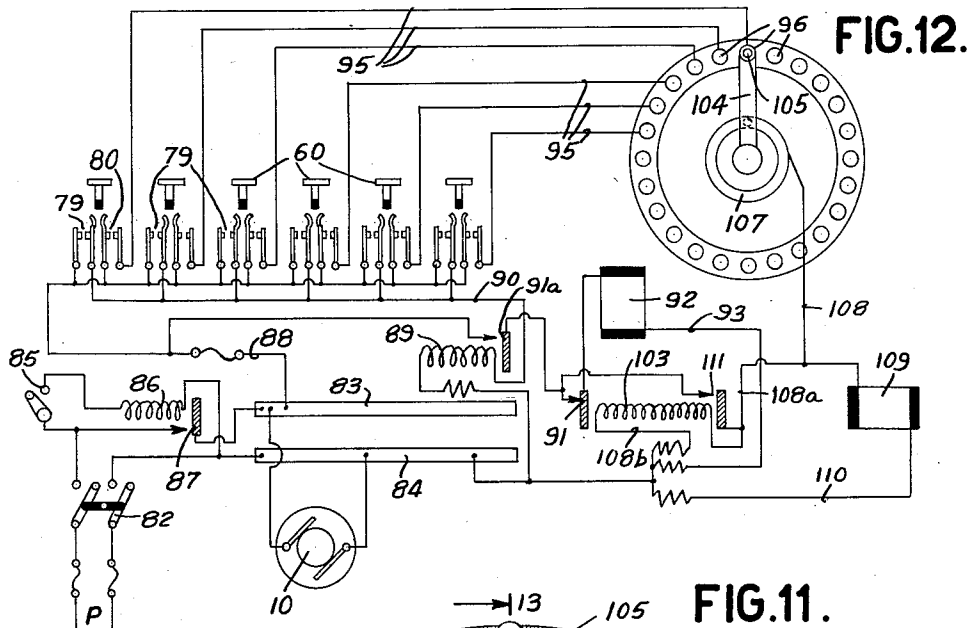
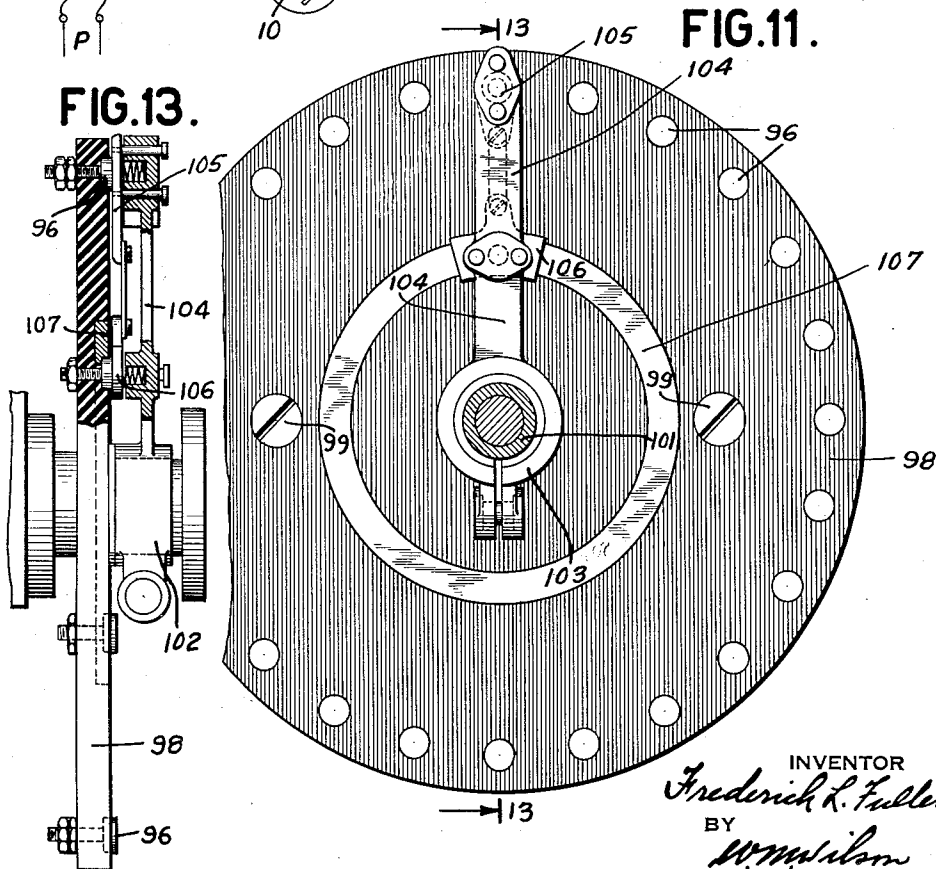
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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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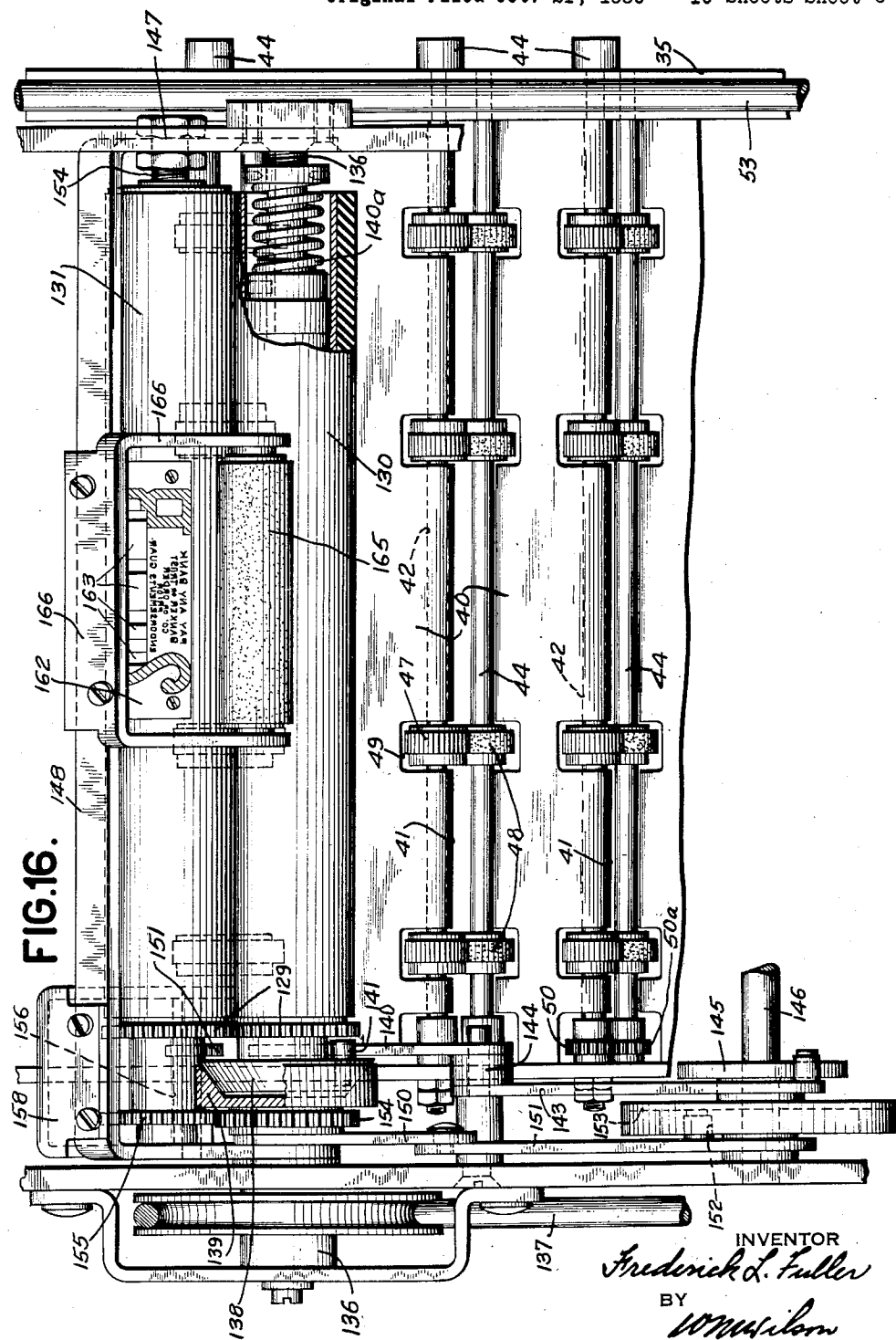
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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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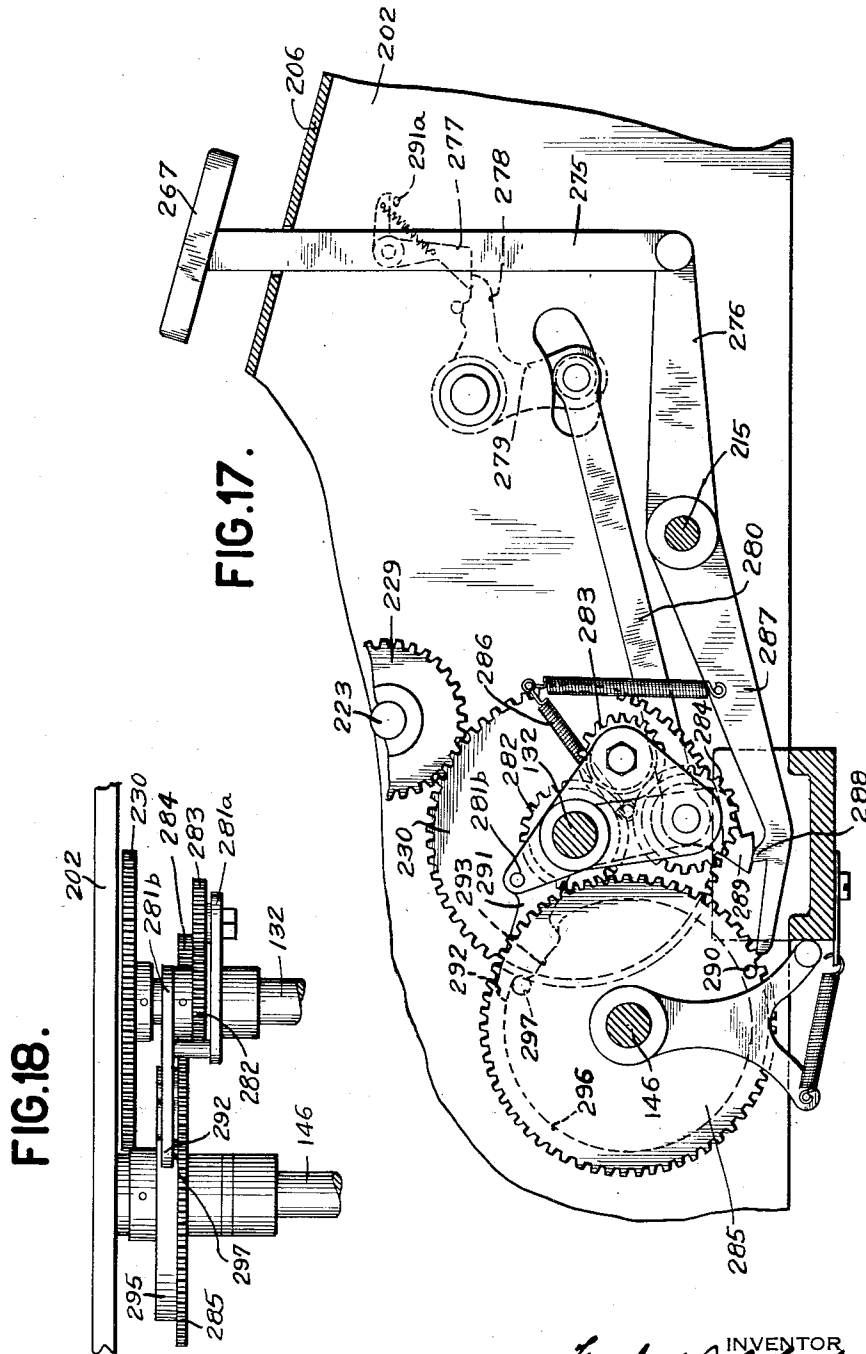
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SORTING MACHINE OF THE MANUAL CONTROL TYPE

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UNITED STATES PATENT OFFICE

1,946,906

SORTING MACHINE OF THE MANUAL
CONTROL TYPE

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Original application October 21, 1930, Serial No.
490,155. Divided and this application February
6, 1932, Serial No. 591,275, and in Canada
September 25, 1931

41 Claims. (Cl. 214-11)

This application is a division of the copending
application Serial No. 490,155, filed October 21,
1930.

This invention relates to sorting machines in
general, and particularly to the type in which
provision is made for sorting under manual control
papers of different classification such papers
consisting of, checks, receipts, cards or the like.
An extended feature of the present machine pro-
vides for not only sorting the papers but effect-
ing some type of endorsement or designation
upon one face of the paper delivered to the sort-
ing compartment.

The present machine, however, is so arranged
that it may be utilized separately as a sorting
machine or an endorsing machine and while in
the preferred employment of the machine the
combined functions are preferably utilized to
gain all the benefits, the invention is not limited
to the combination as each of the features and
many of the improvements residing in such fea-
tures are applicable singly, or in combination, to
machines of the same or other types.

The machine embodying the various features
thus generally described has been designed par-
ticularly for use in banks and by the inclusion
of the sorting and endorsing functions is able to
effect, to a great extent, a considerable saving in
labor now required in the accounting and dis-
tribution systems of the check departments of
banks and clearing houses.

To more clearly perceive one of the outstand-
ing features that accrue from the present ma-
chine, it is pointed out that the receiving teller of
a bank, for example, in accepting deposits re-
ceives a considerable number of checks as well
as currency. In order that the operator may, at
some desired time, be able to furnish a list of all
the checks of the same classification, it is re-
quired that the checks be separately examined
and sorted according to classification designa-
tions by hand.

In the system now in vogue, the sorting opera-
tion is performed manually without the aid of
any machine, the operator merely depositing the
checks in the predetermined one of a series of
boxes. At the termination of a sorting opera-
tion each box, if no error has been made, con-
tains checks or papers of like classification.
After the sorting operation, the checks are sep-
arately passed to the printing mechanism of an
endorsing machine.

The sorting operation is laborious and difficult
since considerable manual effort is required to
deposit each check in the predetermined one of

a series of sorting boxes, the large number of
boxes required necessitating that many of them
be distantly located from the operator and be-
yond the normal reach of a person's hand. Fur-
thermore, frequent errors are made in sorting
checks which considerably reduces the net speed
of sorting.

By the employment of the present machine,
the checks may be sorted into twenty-four differ-
ent classifications and the sorting pockets are
selected under control of keys. As each check
is sorted the endorsement is made upon one face
of the check.

With respect to the machine as a whole, it is
the main object of the present invention to de-
vise a machine capable of sorting a promiscuous
group of slips or checks of different classifica-
tions by a mechanical arrangement which great-
ly increases the speed of sorting operations.

It is a further object to devise a general ar-
rangement of the machine which facilitates the
operation of the machine and which is preferably
carried out by placing the manually controlled
devices, such as keys, within easy access of the
operator.

With respect to the machine employed as a
sorting machine alone, it is an object of the in-
vention to provide a sorting receptacle of the ro-
tary type with radially arranged compartments,
any one of which may be selected for reception
of the checks or slips to be sorted by merely
depressing the related key. In the preferred form
of construction this is carried out by causing a
power drive of the drum when any selected key
is operated and by the provision of a novel form
of electrical control, stopping the drum when the
compartment selected is at the desired position.

A further object of the invention consists in
the provision of an improved form of electrical
control for determining the differential rotation
and position of the drum. This is preferably car-
ried out by a commutator structure consisting of
a series of concentrically arranged electrical con-
tacts any one of which is rendered effective by the
depression of the related key. As the drum is set
into operation by depression of the key, a brush
revolving with the drum passes over the contacts
and when it engages the contact previously ren-
dered effective by the depressed key a stop arm
is shifted to effect a stopping of the drum.

A further object of the invention relates to the
drum stopping device and is so arranged that it
will permit high speed of rotation of the drum
but will quickly stop the drum at the desired po-
sition and with a minimum of shock to the various

parts of the machine. This is preferably carried out by so arranging the arm when it contacts with the drum to stop its rotation that it will be carried along with the drum against the tension of a suitably selected spring. In the preferred construction when the drum has been brought to rest in its rotary movement the spring will gradually draw the arm, and likewise the drum, back against a stationary stop accurately defining and aligning the position of the drum.

To further carry out the requirements of quiet and shockless operation a special connection to a shock absorbing device is provided for the drum stopping device.

A still further object of the invention consists in the particular arrangement employed for forming the series of compartments. The compartments are preferably formed of suitably bent strips attached to a drum base in an overlapping arrangement, the outer portion of each being bent concentrically so as to form a cover for the related compartment.

A still further object of the invention is to provide a construction whereby the tops of the compartments will not only prevent dropping out of the checks deposited therein when the compartment is being turned but also provide a passage means whereby the checks may be readily fed into the compartment but unable to fall out through the passage means. This arrangement is preferably provided for by equipping the cover of each compartment with a series of feeding rollers which, when rotated oppositely, will feed the check to the selected compartment but effectively prevent passage of the check between the feeding rollers when the checks fall by gravity towards the rollers during the turning of the drum.

A still further object of the invention, with respect to check feeding operations, is to provide a set of main feeding rollers which are adapted to feed a check inserted therebetween to the rollers which are related to the receiving compartments.

A still further object of the machine consists in the provision of a manual control over the driving of the check endorsing and compartment feeding rollers which permits the desired driving movement of such rollers to effect the endorsing and check feeding operations.

A still further object of the invention is the provision of means for calling the operator's attention when a predetermined number of operations of a compartment selecting key has been reached. Since a key is employed for each check feeding operation, it will be obvious that this indirectly informs the operator that a predetermined number of checks have been fed to the related compartment.

This object is preferably carried out by the provision of a counting device, one for each compartment selecting key. At the termination of a predetermined number of operations of the related key, the key will be automatically locked, this condition giving the necessary information to the operator. By the provision of a supplemental manually operated device, the counting device may be shifted an additional extent which unlocks the key previously locked and brings the counting device to its normal position in readiness for the commencement of a new counting operation.

Further but relatively important objects in connection with the invention as a sorting machine consists in; details of construction whereby the sorted checks may be readily withdrawn from the

compartments; the general arrangement of the compartment selecting keyboard making it readily accessible to the operator of the machine; a motor bar control which sets into operation the endorsing and check feeding mechanisms and causes the automatic release of the previously depressed compartment key so that the keyboard is again in position for a subsequent compartment selecting operation; and a flexible keyboard arrangement whereby if an undesired compartment has been selected in error, the desired compartment may be selected for operation by merely depressing the proper key which automatically effects the release of the key depressed in error and brings the desired compartment in registration with the check feeding and endorsing mechanism. Other objects subordinate to those just enumerated will appear as the necessity of their accomplishment is developed during the course of the succeeding description of the preferred but illustrative embodiment of the invention.

In the drawings:

Fig. 1 is a view in side elevation of the right side of the assembled machine and illustrates the rotatable sorting drum and the associated stop devices;

Fig. 2 is a perspective view of a portion of the drum showing how the outer ends of the compartments are closed and the manner in which checks may be inserted by the feeding rollers to the selected sorting compartments;

Fig. 3 is a central sectional view taken on the line 3—3 of Fig. 4 showing the manner in which the drum is assembled to form the sorting compartments;

Fig. 4 is a view in side elevation of the upper portion of the left side of the assembled machine;

Fig. 5 is a sectional view of the sorting drum.

Fig. 6 is a plan view of the base of the machine showing in detail the main driving motor, the speed reduction mechanism and the associated clutch and control devices;

Fig. 7 is an enlarged sectional view taken on the line 7—7 of Fig. 6.

Fig. 8 is a longitudinal sectional view in side elevation taken through the keyboard section associated with the compartment selecting devices. This view also illustrates the mechanism for limiting the number of effective operations of each of the compartment selecting keys;

Fig. 9 is a cross sectional view taken on the line 9—9 of Fig. 8;

Fig. 10 is a cross sectional view in side elevation taken on the line 10—10 of Fig. 8;

Fig. 11 is a front view in elevation of the commutator and associated brush devices for controlling the selection of the compartments of the sorting drum;

Fig. 12 is a diagram showing the wiring of the electrical instrumentalities of the machine;

Fig. 13 is a sectional view taken on the line 13—13 of Fig. 11;

Fig. 14 is an enlarged view of the end of the drum stopping arm;

Fig. 15 is a plan view of the parts shown in Fig. 14;

Fig. 16 is a plan view of the check feeding and endorsing devices;

Fig. 17 is a view in side elevation of the manually depressible bar and its connections to cause the feeding operations after a particular compartment has been selected.

Fig. 18 is a plan view of some of the parts disclosed in Fig. 17.

80

85

90

95

100

105

110

115

120

125

130

135

140

145

150

Prime mover

The power to drive the various mechanisms of the machine is derived from a motor 10 running constantly when the machine is in operation. From Fig. 6 it will be observed that the motor 10 drives a shaft 11, and through a reduction gear mechanism 12 a shaft 13 is also driven. By the provision of a spline 14 the shiftable element 15 of a clutch device has a constant driving engagement with the shaft 13. A companion clutch element 16 is loosely mounted on a sleeve 17 pinned to the shaft 13.

A driving engagement between clutch elements 15 and 16 is effected by the shifting of the vertical arm of a bell crank 18 pivoted at 19 to a bracket 20 secured to a base plate 21. The companion clutch elements are normally separated by means of a spring 22 acting on bell crank 18.

Base plate 21 is secured to a pair of oppositely arranged cross members 23 and provides the mounting at the lower part of the machine for the motor 10, reduction gear 12, and by bracket 20 a support for the outer end of the shaft 13, the shaft being suitably mounted in a ball bearing assembly 24.

Sorting drum

Referring particularly to Fig. 3, it will be observed that secured to vertical supporting or frame members 25 are bearing brackets 26 in which is journaled a rod 27. This rod is the support or axis about which the assembled sorting drum rotates. The particular manner in which the drum is constructed to form sorting compartment is preferably as follows:

The drum is comprised of a pair of symmetrical castings (Fig. 3) preferably of aluminum or other material of a low specific gravity, each of which comprises an annular plate 28, the outer concentric edge having an integral ring portion 29 substantially parallel to the rod 27 and extending completely around.

The inner concentric edge of the plate 28 is provided with an integral conically shaped bearing portion 30. Radial ribs 31 (see also Fig. 1) extend between the portions 29 and 30 to give rigidity to the casting. Two such sections are joined together by fastening means such as screws 32. The smaller end of each bearing portion 30 is supported by ball bearing assemblies 33 surrounding rod 27 to provide for a non-frictional rotation of the drum.

As shown more clearly in Figs. 1 and 3 the right casting (Fig. 3) differs from the left only in the provision of an integral annular plate 35 providing at one end a closure for the series of compartments 36 and to which plate is secured other devices not forming a part of the present invention. Upon the outer rings 29 are secured a plurality of adjacently mounted bent plates preferably aluminum to reduce the weight and each comprising (as shown in Fig. 5) concentric base portions 37 preferably overlapping each other and fastened to the rings 29 by screws 38. This overlapping arrangement makes the portions 37 the bottoms of the compartments and gives a plane bottom as contrasted to one which would be afforded by the unfinished joined rings 29.

Portions 37 have integral upwardly extending radial plates 39 forming the side walls of the compartments and they extend the width of the drum. Plates 39 are also formed over concentrically with respect to the center of the drum as indicated at 40 while the angle portion between 39 and 40 is formed with semi-circular portions

41 to receive a shaft 42. A pair of such shafts 42—44 form the journaling means for the feeding rollers and such shafts are journaled at their ends in the end wall plate 35 (Figs. 1 and 16) and at their opposite ends in an annular ring 45 (Figs. 2 and 4). The plates 40 at their ends have tabs 46 (Fig. 2) secured to the ring 45 thus holding the latter in place.

As is best shown in Fig. 16 the shaft 42 has loosely mounted thereon a plurality of feeding rollers 47, preferably of brass and with smooth peripheries. The shaft 44 has secured thereto a plurality of knurled feeding rollers 48 preferably of rubber and in immediate feeding engagement with associated rollers 47. The radial portions 39 (as well as portions 41) are suitably cutaway at 49 (Fig. 3) to receive the plurality of sets of rollers and by this arrangement the bottom (when the compartment is below) is suitably closed to prevent dropping out of the checks by the concentric plates 40 and the coaxing sets of rollers 47—48, while entrance of a check to the compartment (when it is above) may be effected by insertion of a check between such pairs of rollers and then suitably rotating them. To this end on shaft 42 there is loosely mounted a pinion 50 geared to a pinion 50a secured to shaft 44 the pinion 50 having a driving engagement with a pinion 51 (Fig. 5) at the proper time so as to drive the feeding rollers of the compartment selected to receive and feed a check or paper thereto. The particular means whereby this is effected will be described more in detail hereinafter.

To prevent checks from falling out by shifting edgewise guide rails 56 (Fig. 4) are secured to the framework while the diagonally shaped notches 57 (Fig. 2) in the plates 39 permit the checks to be easily withdrawn from the uppermost compartments.

To rotate the drum through the clutch device there is rotatable with the clutch element 16 a grooved driving wheel 52 (Figs. 1 and 7) receiving an endless belt 53 passing around the edge of plate 35 which is suitably grooved to receive the belt. The belt is kept tensioned by a pulley 54 carried by spring urged arm 55 (Fig. 1).

Compartment selection by keys

The drum, of course, is rotated differentially whenever a compartment not in position is to be selected to receive a check and such rotation is under the control of a series of compartment selecting keys 60 (Fig. 1) there being one for each compartment and preferably grouped in banks. In the instant case 24 compartments are provided and correspondingly there are four banks (Fig. 9) of six keys each, which in aggregate provide a keyboard of 24 keys mounted in an aperture an inclined plate 61 for access by the operator of the machine. The key caps carry suitable indicia to designate the compartment that may be selected and are lettered according to the classification numbers, letters, etc., of the checks, vouchers, etc., to be sorted. The keyboard comprises a separate unit detachable from the machine for assembly and inspection purposes. As is best shown in Figs. 8 and 9 it comprises a pair of side plates 62 and 63 secured to a base plate 64 by screws 65 said screws passing into integral brackets extending upwardly from the base plate to thus hold the framework.

Secured to and between the plates 62 and 63 are a pair of plates comprising an upper guide plate 66 and a lower guide plate 67. Both of these are provided with a series of guide slots in which

the upper and intermediate portions of the keys are received as best shown in Fig. 8. The enlarged head 69 of each key 60 bears against a related compression spring 70 fitting around the reduced stem of the key, the lower portion of the spring bearing against the lowermost guide plate 67. In this manner each spring is capable of restoring its related key 60 to its normal position, the latter being maintained by virtue of a lug 71 engaging beneath the plate 67. Each key is also received by a slot in a detent plate 72 the latter being urged to its normal position by means of a spring 73 and plate 72 may be shifted towards the left by means of an inclined lug 74 on the lower end of each key 60.

When a key is depressed the coercion of the inclined lug 74 with the slot in the detent plate 72 will shift the same against the action of the spring 73 said guide plate being shiftably guided by pairs of guiding rollers 75 provided for the purpose of eliminating frictional resistance. When the cam lug 74 in the depression of the key 60 has passed beneath the detent plate the same will be urged by the spring 73 to its normal position so that upon a restoration of the key the lug 74 will coact with the underside of the detent plate to thereby hold the key in depressed position. As will be described more in detail hereinafter means are also provided for operating the detent plate to release the depressed key at the end of the machine operation.

It is also pointed out that the detent plate 72 is common to the several banks of keys 60 so that depression of a key in one bank will shift the detent plate sufficiently to release a key depressed in either the same or another bank.

Located beneath the lower ends of the keys is a contact unit carried by a plate 76 spaced apart from the intermediate plate 67 by sleeves 77 in which pass the fastening means 78. The plate 76 carries several banks of contact units each of which comprises two sets of contacts 79 and 80. The intermediate blades of the sets of contacts are engaged by insulated portions 81 secured to the lowermost end of the keys so that upon a full depression of a compartment selecting key contacts 79 and contacts 80 will be closed and remain closed by virtue of the previously mentioned locking of the key in depressed position.

Electrical controls

The purpose of these contacts will be more apparent from the wiring diagram illustrated in Fig. 12. The diagram, incidentally, shows the motor connections and connections to the other electrical instrumentalities. In the wiring diagram reference character P indicates a power line adapted to be extended by means of a switch 82 to the bus bars 83 and 84. When said switch is shifted to the left, the lowermost bar 84 will be connected to the corresponding line side. When, however, a switch 85, positioned upon the keyboard for manipulation by the operator is shifted the magnet 86 of a relay will be energized resulting in closing contacts 87 to thus connect the bus bar 83 to the corresponding side of the power line. This will set the motor 10 in continuous operation until either switch 82 or 85 is opened.

Contacts 79, when closed by depression of any of the related keys 60 will result in the energization of a magnet 92 which controls the main clutch device (Fig. 7) to effect a rotation of the drum. As will be observed in Fig. 12 one blade of contacts 79 is connected to the bus bar 83 by means of a wire 88. The other blade of the set

in question is in series with the relay magnet 89 by means of a wire connection 90, the other side of said magnet being connected to the bus bar 84. From the above, it will be apparent that the depression of any of the keys 60 in the several banks will cause energization of the relay magnet 89 to attract an armature thereby closing contacts 91a which extend a circuit from the wire 88 through the closed contacts 91a and then through the normally closed contacts 91 of a supplemental relay to one side of the clutch magnet 92. The other side of the magnet is connected by a wire 93 to the bus bar 84. Thus depression of any key 60 energizes clutch magnet 92.

Referring particularly to Fig. 7, it will be observed that when the magnet 92 is energized an armature 94 is attracted resulting in rocking the bell crank 18 in a counterclockwise direction thereby effecting a clutch connection between the companion clutch elements 15 and 16. This causes rotation of the drive wheel 52 and through the endless belt connection previously described effects a rotation of the drum.

In addition to starting the rotation of the drum, the keys control the differential rotation of the drum in order that when the selected compartment is at the proper position at which to feed the check the drum will be stopped in its rotation and locked in place. The means whereby this is effected comprises the supplementary set of contacts 80 and, considering an individual set, it will be noted that one side thereof is connected to the bus bar 83 and the other blade of the same set by means of a wire 95 to a contact point 96. Considering a full complement of keys it will be observed that the associated contact plate of each of the various sets 80 is connected to its related contact point 96 so that depression of a key extends the circuit from the bus bar 83 to the corresponding contact point 96.

The series of contact points 96 with a related commutator lever 104 comprise a commutator structure the mechanical details of which are shown in Figs. 11 and 13. The series of contact points 96 are carried by a disk of insulating material 98 fixed by screws 99 to the right bracket 26. By means of screws 100 (Fig. 3) a flanged cylinder 101 is made an extension of the left hand bearing of the drum and by means of a split hub clamp 102 the commutator lever 104 (Fig. 11) is secured to the cylinder 101 and thus rotates with the drum. A contact 105 passes over contacts 96 to engage therewith electrically, while a spring urged contact 106 is in constant engagement with a ring 107 connected by a wire 108 (Fig. 12) to one side of magnet 109 the other side being connected to the bus bar 84 by a wire 110.

The circuit from wire 108 or lever 104 also divides so that by wire 108a the magnet 103 of a relay (which controls contacts 91 and 111) is extended to the bus bar 84.

It will be apparent that if a key is depressed the contact 96 operatively related thereto will extend the circuit from bus bar 83 to this point and since the drum is now placed in rotation lever 104 will move correspondingly until it engages the contact point 96 related to the depressed key. This will, by the circuit connections just explained, cause magnet 109 to be energized. The latter has control over the devices which effect stopping of the drum in its rotation. It will be noted that energization of magnet 103 will cause opening of contacts 91 to deenergize magnet 92. The latter will permit the clutch devices to be

separated thereby rendering ineffective the motor drive for the drum.

Drum stopping devices

5 In general, this comprises an arm which is normally in ineffective position but is rendered effective whenever the magnet 109 is energized to engage a portion of the drum to stop its rotation.

10 As best shown in Figs. 1, 14 and 15 pivoted to the framework structure 111 is a depending arm 112 to which is pivoted at 114 a lock arm 113, the arm 112 having an extension 115 to which is secured a spring 116. Contact between an extension 117 of lock arm 113 and a fixed projection 118 determines the normal position of arm 112 under control of spring 116.

15 Magnet 109 has a retractable core piece 119 the lower end having a pin 120 in engagement with an inclined slot 121 in arm 113.

The free end of arm 113 has secured thereto an extension 122 by rivets 123a so that when it is projected upwardly it is placed in the path of one of a series of extensions which in the present instance comprises the extensions of the shafts 44.

20 It will be obvious that when magnet 109 is energized at the proper time the pin 120 engaging slot 121 will elevate arm 113 bringing the upward extension 122 in front of some particular shaft 44 thus acting as an obstruction to the drum in its rotation. The contact of shaft 44 with the extension 122 will tend by the momentum of the drum to shift arm 113 to the left, and as it is now held in its upward position due to the elevation of pin 120 by continued energization of magnet 109, the incline of the slot 121 will cause arm 113 to be elevated still further, so that the extension 122 always retains its position in front of shaft 44 as the latter moves in a concentric path. The speed of rotation of the drum and the tension of spring 116 is so selected that arm 113 is never shifted to the left to its extreme position so that pin 120 never strikes the end of slot 121. The drum having been thus stopped by the arm 113 the latter with the drum are retracted by spring 116 until a position defined by contacts of elements 117—118 is obtained. This position brings the various devices to be operated, as well as to bring the compartment to receive a check in the proper position, the drum being held locked in this position until the magnet 109 is later de-energized by the release of the depressed key and which does not occur until the final operation of the machine at which time a check has been deposited to the selected compartment.

25 To prevent retrograde movement of the drum when stopped there is pivoted in a slot in the arm 113 a spring urged check arm 123 having an extension 124 receiving one end of the shaft 44. The free end of the arm 123 is depressed by a shaft 44 when the arm 113 is upward and extension 124 snaps upwardly when the shaft clears the arm. Since the shaft 44 is now firmly engaged between parts 122 and 124 it will be seen that a positive lock or hold for the drum in both directions is provided as long as arm 113 is held upwardly.

30 To reduce the momentum of the drum when stopped in its rotation a compression device 126 of any suitable form may be provided. In the present machine when a shaft 44 engages the extension 122 the arm 113 will be shifted to the left but this is effected against the action of the compression device 126, through an interconnecting bell crank 127. This causes a gradual stopping of the drum in its rotation and eliminates

the possibility of injury to the parts by shock if a sudden stop was effected.

Check feeding devices

In the preferred construction after a compartment has been selected to receive a check the latter is fed to the compartment feeding rollers by suitable feeding means and which, in the instant case, comprise a pair of feeding rollers 130, 131 (Fig. 5) between which the check or paper has been previously inserted.

35 The driving devices for driving the feeding rollers receive their power from a constantly rotating shaft 132 (Fig. 4) which extends completely through the upper controlling section of the machine the right end of the shaft having a pulley 133 (Fig. 1) having a belt connection 134 to a pulley 135 secured to the constantly rotating shaft 13 (see also Fig. 7).

40 As shown in Figs. 4 and 5, the shaft 132 drives a shaft 136 through a belt and pulley arrangement 137. Loosely mounted upon shaft 136 is the lower feeding roller 130 (Fig. 16) operatively engaged by intermeshing gears 129 with the upper roller 131; that is, the rollers have a positive driving engagement to feed a check inserted therein when the rollers are oppositely rotated. For driving the feeding roller 130 by the shaft 136 a friction drive comprising a conical shaped disk 138 secured to the roller 130 and an internally recessed flange member 139 secured to shaft 136 is provided. A coil spring 140a is provided to give the required amount of friction between the elements 138—139 to drive the roller 130.

45 While shaft 136 and, therefore, element 139 are constantly rotating, the lower roller is locked against movement by a lock arm 140 (Fig. 5) normally engaging a stud 141 secured to disk 138, this action being maintained by a spring 142. When it is desired to feed a check in between rollers 130—131 the arm 140 is rocked to bring its extremity away from the path of the stud to permit the frictional drive of the pair of feeding rollers, this being preferably effected by rocking an arm 143 secured to the arm 140 by a sleeve 144 (Fig. 5) the arm 143 having a stud in engagement with the periphery of a profile cam 145 secured to shaft 146. After the sorting pocket has been selected, a motor bar 267 (Fig. 1) is depressed by the operator so that shaft 146 is driven so that the initial rotation of the cam 145 in the arrow direction (Fig. 5) will unlock the feeding roller to cause an opposite rotation of rollers 130—131. At the final operation of the machine the arm 140 is restored by spring 142 to again contact roller 141 to stop the feeding movement. The above mechanism provides for an invariable operation of the feeding rollers.

50 The upper feeding roller 131 is journaled by shaft 154 in a yoke shaped frame comprising a side plate 147 (Fig. 16) a cross member 148 (Fig. 5) and a side plate 149, both of said plates being mounted upon the shaft 136. Pinned to the plate 149 is an upwardly extending arm 150 to which is articulated a link 151 bifurcated to receive the shaft 146 but having a roller 152 engaging the race of a box cam 153 secured to shaft 146.

55 Secured to the clutch element 139 is a gear 154 in continuous engagement with a gear 155 secured to a stud shaft 156. This shaft is carried by a bail shaped frame 158 (Fig. 5) secured to the cross member 148 to receive like movements of the latter. Pinned to the shaft 156 which, it will be observed, constantly rotates, is the roller driving pinion 51.

Under the action of cam 153 the frame members 148 and 158 are initially rocked about shaft 136, roller 131 rolling slightly over roller 130. Movement of frame 158 downwardly causes the pinion 51 to engage one of the pinions 50 to thereby rotate the selected sets of feeding rollers 47 and 48 to receive the check or paper issuing from the rollers 130, 131 which are simultaneously driven thereby transferring the check to the selected compartment. At the termination of such feeding movement the frames are restored and pinion 51 is elevated to give the necessary clearance and permit a subsequent rotation of the drum to select another compartment.

When the drum is stopped, the checks already in the compartment have a tendency to lie in an inclined manner against the left wall (as shown in Fig. 5) thus shifting the checks already within the compartment to permit an unobstructed entrance of a new check to the compartment and so that all of the checks are in the same sequence they are sorted to a pocket.

Certain adjuncts may be provided to print upon the back of the check fed any desired matter, such as the endorsement. Such devices in the present instance comprise an electrotype plate 162 secured to the periphery of the roller 131. The plate is preferably apertured to receive a series of adjustable printing wheels 163 suitably pivoted in a recess in the roller 131. The latter feature is carried out in essentially the same manner as indicated in the patent to H. Cook, No. 483,511 and provides for printing of dates, etc.

Inking of the printing members may be effected by an inking roller 164, in constant engagement with a felt supply inking roller 165 these inking devices being suitably carried by a yoke frame 166 secured by screws to the cross member 148.

For facilitating the entry of checks for reception by rollers an inclined chute 167 is provided and in which a check is inserted. The weight of the checks is usually sufficient to insure that they pass in the "bite" of rollers 130 or 131 but in case they are crumpled, forcible entry may be required and to this end the upper portion of chute 167 is flared at 168 to permit entry of the fingers of the operator's hand when depositing a check in said chute.

Motor bar control

The performance of the feeding operations just described is under control of motor bar 267 depressible by the operator after a compartment has been selected. Depression of bar 267 effects the clutching of the constantly running shaft 132 (Fig. 17) with the shaft 146 which performs the paper feeding operation and the endorsing operation. The preferred form of clutch mechanism will now be described in detail, reference being had particularly to Figs. 17 and 18.

The motor bar 267 is operable exteriorly of the machine and is carried by a stem 275 (Fig. 17) slidably mounted at its upper end and pivoted at its lower end by an arm 276. The stem carries a pawl 277 the lower end of which is adapted to engage one arm 278 of a bell crank, the vertical arm 279 being pivoted to a link 280 which is secured to the lower end of a pinion carrying frame comprising parallel plates 281a and 281b both loosely mounted on shaft 132 (see Figs. 17 and 18). Secured to the constantly running shaft 132 is a pinion 282 in mesh with an idler pinion 283 pivotally mounted on the frame

plate 281a. Pinion 283 is in constant mesh with a broader pinion 284 also pivotally mounted on plate 281a. The pinion 284 when rocked into mesh is sufficiently broad to mesh with and drive a pinion 285 secured to the cam carrying shaft 146.

A spring 286 (Fig. 17) connected to the frame 281a—281b retracts the latter so a normal disengagement is effected between pinions 284 and 285. When the motor bar is depressed pawl 277 rocks bell crank 278—279 to shift the link 280 so that when the pinion carrying frame is rocked sufficiently to effect a driving engagement between pinions 284—285 a lug 288 of a spring urged latch arm 287 will spring behind a projection 289 of frame plate 281.

Shaft 146 will now be driven to effect the paper feeding and endorsing operation. Towards the end of a complete revolution a pin 290 secured to gear 285 will coact with a tail of the latch arm 287 permitting spring 286 to restore the frame to effect disengagement between pinion 284 and gear 285.

When stem 275 is depressed pawl 277 will rock the bell crank and by the coaction of a tail of the pawl with a fixed stud 291a the pawl will be rocked in its downward movement and will pass by the arm 278 after the pinion carrying frame is rocked to be latched by pawl 287. The engaging end of pawl 277 now being below the arm 278 it will be observed that repeated operations of the drive shaft 146 cannot be effected by holding the motor bar depressed. The provision of the above "non-repeat" device requires restoration of the motor bar and a subsequent depression for each operation of the drive shaft 146.

Secured to an extension 291 of plate 281b is a plate 292 the lower concentric edge 293 being adapted to be engaged by a pin 297 secured to the gear 285 rotatable with shaft 146. The passage of the pin 297 beneath the concentric edge retains initially the desired clutching engagement of the drive and driven pinions and this is maintained after the pin has cleared the edge 293 by the concentric edge 296 of disk 295 coacting with the lower edge 293. When the shaft 146 returns to its home position restoration of the frame 281a, 281b by the unlatching of lever 287 will cause the lower projecting portion of plate 291 to fit in and engage a cut out portion of the disk 295, the parts now being at normal.

Key release mechanism

At this point there will be described the means for releasing the keys. Detent plate 72 (Fig. 8) and a plate secured beneath has a slot 170 which is received by the upper end of one arm of a bell crank 171. This slot in the normal position of bell crank 171 permits free movement of detent plate by depression of the keys.

The lower arm 174a of the bell crank is restored to normal position by a pin 172 on a disk 173 secured to the operating shaft 146 which it will be remembered is driven during check feeding operations. Coaction of pin 172 to shift arm 174a shifts the detent plate 72 to its normal position. This movement releases the detent plate from the depressed key which is restored to its normal position by its spring 70.

In connection with the release of the keys it was previously pointed out that the circuit through magnet 109 (Fig. 12) is closed both by the contact of point 105 and a point 96. Now, when the depressed key 60 is released opening of contacts 79 will cause magnet 89 to be deenergized, so that

contacts 91a will open. As the contacts 111 also open, since relay magnet 103 is deenergized by opening of contacts 80, the circuit to magnet 109 from bus bar 84 to bus bar 83 is open at two points resulting in its deenergization. Such an arrangement provides for a minimum of sparking at the key controlled contacts 79 and 80 and permits it to take place at the relay contacts.

10 Lock for unoperated compartment selecting keys controlled by the main drive shaft

Secured to the shaft 146 (Fig. 8) is the disk 173 previously mentioned having a wedge shaped notch 641 normally engaged by a similar shaped extremity of an arm 642 movable with the arm 171. It will be remembered that the upward extremity of arm 171 is so positioned in the slot 170 that a free movement of the detent plate 72 may be effected. When, however, shaft 146 is set into operation the wedge shaped extremity 641 will shift the arm 642 upwardly and the arm 171 to the right as viewed in Fig. 8 bringing one edge thereof against the wall of the slot 170 thereby locking the detent plate 72 to prevent depression of any of the unoperated keys 60 as well as to prevent release of any previously depressed key by a partial depression of another key.

30 Devices for limiting number of checks fed in a compartment

It will be observed that the selection of a compartment requires a depression of a key 60 each time, this being particularly true since the drum is released for free rotation in either direction when a key 60 is released. This rotation is primarily effected by the unbalanced condition or state of the drum. It will be thus observed that the drum does not usually stay in the selected position and the feeding of a second check in the same compartment usually necessitates the successive depression of the same key. For this reason devices are employed to inform the operator when the same key has been depressed a certain number of times, which correspond to an equal number of checks in the compartment. By suitable indicating means the operator will thus know that a certain compartment has received a limited number of checks and that this compartment requires emptying.

Associated with each key is a slidably mounted plate 175 (Fig. 8) having a cam slot 176 in engagement with a stud 177 on the related key. When a key is depressed the related plate 175 is shifted to the left to rock a related bell crank 178 and by a pawl 179 engaging the notched teeth of a disk 180 will give a units movement thereto. When the key is released the reverse action of pawl 179 will not affect the positioned disk as detent plates 180a retain them in position. The studs 177 (Fig. 9) are of different lengths to coact with its related cam plate and where such studs extend through plates 175 which are not to be operated, apertures 181a (Fig. 8) are provided for such plates.

Successive operations of the same key will bring the related counter disk 180 around until a stud 182 (Fig. 8) thereon engages a cam edge 183 of a lever 184.

There is, of course, a series of such disks 180 one for each key (as shown in Fig. 10) so that the depression of any one will shift a bail 185 extending across the series of levers 184 and by tensioning slightly a normally untensioned spring 187 will elevate one arm 188 of bail member 189. This will then pass in front of the diagonal edge

190a of the unoperated plates 175 and a diagonal notch 190 of the operated plate thereby locking all the keys against depression and retaining the one just depressed even though the detent plate 72 is subsequently operated for key release. This depressed condition of the key will be apparent to the operator and by the position of extension 191 of the shifted lever 184 he will also know which key is locked and, correspondingly which compartment is full.

The extensions 191 are shiftable in slots 192 (Figs. 8 and 10) in a cover plate 193 lettered like the keys to give the desired information. Access to such levers and other operating devices is afforded by elevation of a hinged cover 194 (Fig. 4).

If a certain key, say #10 is locked down, the operator knows by the position of the related lever 184 that the #10 compartment is filled. The checks or papers, are then withdrawn and thereafter a key 195 is depressed. This is pivoted to arm 188 of bail 189 at 196 and when key 195 is depressed shifts the latter to unlock the series of plates 175 to permit release of the locked key by depression of another key and also tensions spring 187. When key #10 is now restored to normal by depression of some other key it is again depressed alternately with some other key (the operator holding key 195 down) as many times as is necessary so that the related counter 180 will be given an additional movement. This immediately brings pin 182 above the cam 183 releasing the related lever 184 so that it is restored to normal by the bail 186 through the spring 187 when it was tensioned by depression of key 195.

The parts are now again at normal being ready to start a new count for the previously locked key 60.

It is desirable to reset the variously positioned disks at the termination of a sorting operation and to this end each disk 180 has a pawl 197 in operative engagement with the groove 198 of the support shaft 181. When the handle 199 (Fig. 4) secured to shaft 181 is turned the shoulder of the groove will encounter the variously positioned pawls 197 to restore all the disks 180 to normal starting position. This particular expedient is well known in the art and for this reason is briefly explained herein.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims:

What is claimed is as follows:

1. A machine of the class described comprising in combination, a rotatable drum, a plurality of radially arranged sorting compartments in said drum, a corresponding number of selecting keys, means independent of the keys for rotating said drum, manually controlled means for feeding material to the selected compartment, and means under control of said keys for causing the differential rotation of said drum to bring the selected compartment into association with the feeding means.

2. A machine of the class described comprising in combination, a bodily movable receptacle having sorting compartments, a set of keys, 150

means effective upon the depression of a key for moving said receptacle, means common to and controlled by said keys for stopping said receptacle in its movement to select a compartment, and means independent of said receptacle for shifting said stopping means to a drum stopping position.

3. A machine of the class described comprising in combination, a rotatable drum, a plurality of sorting compartments in said drum, a corresponding number of keys, means common to said keys for stopping said drum in its rotation at different positions to select particular compartments, and means whereby said keys cause the stopping means to be operated to engage said drum to thereby stop the latter.

4. A machine of the class described comprising in combination, a rotatable drum, a plurality of sorting compartments in said drum, a corresponding number of keys, power means independent of said keys for rotating said drum, means under control of said keys for causing the power means to rotate said drum, and means controlled by said keys for stopping said drum in its rotation at different positions to select particular compartments.

5. In a sorting machine, a rotatable drum, a plurality of sorting compartments in said drum, a feeding device for feeding the material to be sorted to a particular compartment, means for stopping said drum in its rotation when the selected compartment is in registration with the feeding device, and common power means for rotating said drum and operating the feeding device.

6. In a sorting machine, a rotatable drum, a plurality of sorting compartments in said drum, a corresponding number of keys for selecting the compartments, a feeding device for feeding the material to be sorted to a selected compartment, and power means independent of said keys and effective upon an operation of a key for causing the differential positioning of said drum to bring a selected compartment in association with the feeding device.

7. In a sorting machine, a carrier having a plurality of sorting compartments, a plurality of keys, selecting means effective upon the locking of a key in a depressed position for selecting a sorting compartment, and means whereby the release of a locked key by the depression of another key and the continued depression of the latter to locked position causes the automatic operation of the compartment selecting means to select the compartment related to the last key pressed.

8. In a machine of the class described, a movable receptacle having a plurality of sorting compartments, a corresponding number of keys, means under control of the keys for selecting a related compartment, a stop device common to and under control of said keys for stopping said receptacle in its movement to select the desired compartment, and means for operating said stop device at different times dependent upon the sorting compartment selected.

9. In a machine of the class described, a receptacle having a plurality of sorting compartments, power means for causing movement of said receptacle, a plurality of compartment selecting keys, a clutch device under control of said keys for causing movement of the receptacle by the power means and a stop device operated at a differential time and controlled by said keys for stopping the movement of said receptacle.

10. In a machine of the class described, a receptacle having a plurality of sorting compartments, power driven means for causing movement of said receptacle, a plurality of compartment selecting keys, a clutch device under control of said keys for causing movement of the receptacle by the power driven means, a stop device operated at a differential time and controlled by said keys for stopping the movement of said compartment, and means whereby the clutch device is rendered ineffective when the stop device is operated.

11. In a machine of the class described the combination of a movable drum having a plurality of compartments, power driven means adapted to drive said drum, keys for selecting the compartments and means for disconnecting the power driven means from the drum after the drum has been driven to select a compartment.

12. In a machine of the class described, the combination of a sorting drum having a plurality of radially arranged compartments, feeding rollers for feeding the paper to be sorted, keys for selecting the compartments, constantly operated means for operating the feeding rollers to feed the paper to the selected compartment, and means whereby the last named means operates said rollers an invariable amount for each operation.

13. In a machine of the class described, the combination with a rotatable drum having a plurality of compartments, of a plurality of contact points one for each compartment, a corresponding number of keys each adapted to render its related contact point effective, a stop device for said drum, and means rotatable with said drum adapted to contact the effective point and render the stop device operative whereby a particular compartment is selected.

14. A machine of the class described comprising in combination, a rotatable drum having a plurality of compartments, keys for selecting the compartments, a drive for said drum, means for stopping said drum in its rotation, means whereby operation of said keys causes a connection of the drive and said drum, and means whereby said drive is disconnected from the drum when the stopping means is rendered operative to select a particular compartment.

15. In a sorting machine, a rotatable drum having a plurality of sorting compartments, a stop arm to stop said drum in its rotation, a plurality of keys corresponding in number to the sorting compartments, feeding means, and means effective upon the rotation of said drum for shifting said arm to stop the drum when a particular compartment is in registration with the feeding means.

16. In a sorting machine, a rotatable drum having a plurality of sorting compartments, a corresponding number of compartment selecting keys, an arm actuated during the rotation of said drum to stop said drum, and means under control of said keys for predetermining the point in the rotation of the drum when said arm is to be actuated.

17. In a sorting machine, a rotatable drum having a plurality of selectable sorting compartments, feeding rollers, a pair for each compartment, and means for driving the feeding rollers of a selected sorting compartment.

18. In a sorting machine, a rotatable drum having sorting compartments, key controlled means for selecting a compartment, feeding rollers, a pair for each compartment and arranged to form

the entrance to a related compartment, and means comprising a series of plates for forming the side wall and closures of the compartments, a pair of said feeding rollers being arranged between each pair of plates.

19. In a sorting machine, a drum base having a concentric exterior, a series of plates secured to the exterior having radially extending wall portions for forming the side walls of sorting compartments, said plates having concentrically arranged integral extensions forming the covers for said compartments.

20. In a sorting machine, a sorting drum having a circular periphery, a series of plates secured thereto in overlapping relationship each plate providing a base for a sorting compartment, each plate having radially extending wall portions for forming the side walls of the sorting compartments, integral extensions of said plates parallel to the periphery of the drum and forming the covers for said compartments, and a pair of feeding rollers, a pair for each compartment, arranged between adjacent cover plates.

21. In a sorting machine, a sorting drum having a plurality of compartments, a feeding device for feeding a paper to a selected compartment, key controlled means for bringing the selected compartment to the feeding device, and feeding rollers, a set for each compartment adapted to convey the paper fed from the feeding device to the selected compartment.

22. A sorting machine comprising a rotatable drum with a plurality of radially arranged sorting pockets, means for feeding the sorted paper to the selected pocket, common means for stopping said drum to select a pocket, and means whereby said common stopping means stops the drum at such a position that by stopping the drum and the shifting of the papers in a selected compartment there is provided an unobstructed entrance by other papers for papers to be sorted to the selected pocket whereby said papers are arranged in the same sequence they are sorted.

23. A sorting machine comprising a rotatable drum with a plurality of radially arranged sorting pockets, means for stopping the drum to select a sorting pocket, a feeding device, and means for stopping the drum at such a position that by the stopping of the drum and the shifting of the papers in the selected pocket the papers fed to the selected pocket are fed unobstructedly thereto.

24. In a sorting machine, a rotatable drum having a plurality of sorting compartments, a corresponding number of depressible keys each held depressed for causing an automatic rotation of the drum, and means controlled by each key when held depressed for selecting a compartment with provisions in the selecting means whereby when one key is depressed to release a depressed key the drum will be additionally turned automatically to select the compartment appropriated to the depressed last key.

25. In a sorting machine, a rotatable drum having a plurality of sorting compartments, a plurality of keys, means for driving said drum to a selected position, means controlled by said keys and effective at a certain point in the rotation of the drum for holding said drum at the selected position, a manually controlled means independent of said keys for controlling feeding of material to the selected compartment, and means whereby the last named means causes the releasing of the depressed key and for causing the disabling of the drum holding means.

26. In a sorting machine, a sorting drum having a plurality of compartments, key controlled means effective when the selected key is held depressed for causing rotation of said drum and holding of said drum at the selected position, feeding means for the compartments, and means effective after a single operation of the feeding means for releasing the depressed key and said drum.

27. In a sorting machine, a sorting drum having a plurality of compartments, key controlled means for causing rotation of said drum to a selected position, feeding devices, and means independent of the keys for holding said drum in the selected position and automatically disabled to release said drum after the operation of the feeding devices.

28. In a sorting machine, a sorting drum having a plurality of compartments, key controlled means for selecting said compartments of the drum for receiving material, driving means for said drum, and means effective concurrently when the driving means is disconnected from said drum for holding the drum in the selected position determined by the key operated.

29. In a sorting machine, a rotatable sorting drum, a set of rollers at each compartment, a feeding device, and key controlled means for causing the stopping of the drum at a selected position to correlate a selected set of rollers with said feeding device.

30. In a sorting machine, a rotatable sorting drum having a plurality of selectable compartments, a set of rollers for each compartment, and means for positioning said drum whereby the selected rollers provide the entrance of material to the selected compartment.

31. In a sorting machine, a sorting drum having a plurality of sorting compartments, key controlled means for causing differential rotation of the sorting drum to select a compartment, a pair of feeding rollers for each compartment, a set of rollers common to the compartment rollers, and means for causing an operation of the pair of rollers of the selected compartment as the set of rollers are brought into engagement to feed a paper to the selected compartment.

32. In a sorting machine, a receptacle having a plurality of compartments, means for shifting said receptacle for positioning a compartment to a common feeding plane, means independent of the shifting means for holding the receptacle in shifted position, mechanism for causing feeding of material to the selected compartment, and means whereby said holding means is disabled after an operation of the feeding mechanism.

33. In a sorting machine, a rotatable sorting drum having a plurality of radially arranged sorting pockets, means for causing the sudden stoppage of said drum, and means whereby the drum stopping means causes the papers already in said drum to lie in a plane away from the feeding plane of a paper to be fed to the compartment.

34. In a sorting machine, a rotatable drum having a series of compartments, driving means for the drum, key controlled means for setting the driving means in operation, means rotatable with the drum for causing the holding of the drum at the point determined by the key depressed, and connections whereby the last named means simultaneously stops the operation of the driving means.

35. In a sorting machine, a rotatable drum having a series of compartments, driving means for the drum, key controlled means for setting

- the driving means in operation, means rotatable with the drum for causing the holding of the drum at the point determined by the key depressed, connections whereby the last named means simultaneously stops the operation of the driving means, a device for feeding a paper to the selected compartment, and means for releasing said drum when said feeding device is set into operation.
36. In a sorting machine, a drum having several sets of rollers one for each compartment, key controlled means for causing the driving of the drum to a predetermined position, means for holding the drum in the predetermined position, a feeding device adapted to be correlated with any of said sets of rollers, and means for causing the simultaneous operation of the set of rollers of the selected compartment and said feeding device and subsequently causing the disabling of the holding means for a subsequent positioning of the drum.
37. In a machine of the class described, a rotatable drum carrying a plurality of sorting compartments, said compartments being arranged radially and around the complete periphery of said drum, a corresponding number of compartment selecting keys, means for rotating said drum, and means whereby said drum rotating means under control of said selecting keys is adapted to position said drum to bring any one of the plurality of compartments to a common record receiving position.
38. In a machine of the class described, a rotatable drum, a plurality of sorting compartments carried by said drum, said compartments being arranged radially and around the complete periphery of the drum, means for rotating said drum uni-directionally, a corresponding number of compartment selecting keys, and means whereby the drum rotating means under control of said keys is adapted to position said drum to bring any of the plurality of compartments to a common record receiving position.
39. In a sorting machine, a drum having a horizontal axis about which said drum rotates and a plurality of radially arranged sorting compartments, means including selecting devices for causing said drum to be rotated to bring a selected compartment to a common record receiving position, and means carried by said drum for preventing the dropping out of the records already in the compartments as said drum rotates.
40. In a sorting machine, a movable sorting receptacle having sorting compartments, means for engaging said receptacle in its movement to stop it at a predetermined record receiving position, and means coacting with the engaging means for taking up the shock to the receptacle due to its sudden stoppage by said engaging means.
41. In a sorting machine, a sorting receptacle having sorting compartments, a member having a catch portion engaging a portion of the receptacle as the latter in movement approaches a predetermined record receiving position, and resilient means for thereafter retracting said member to normal and said receptacle to the predetermined record receiving position.
- FREDERICK L. FULLER.

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