

**Oct. 7, 1930.**

**A. E. GRAY**

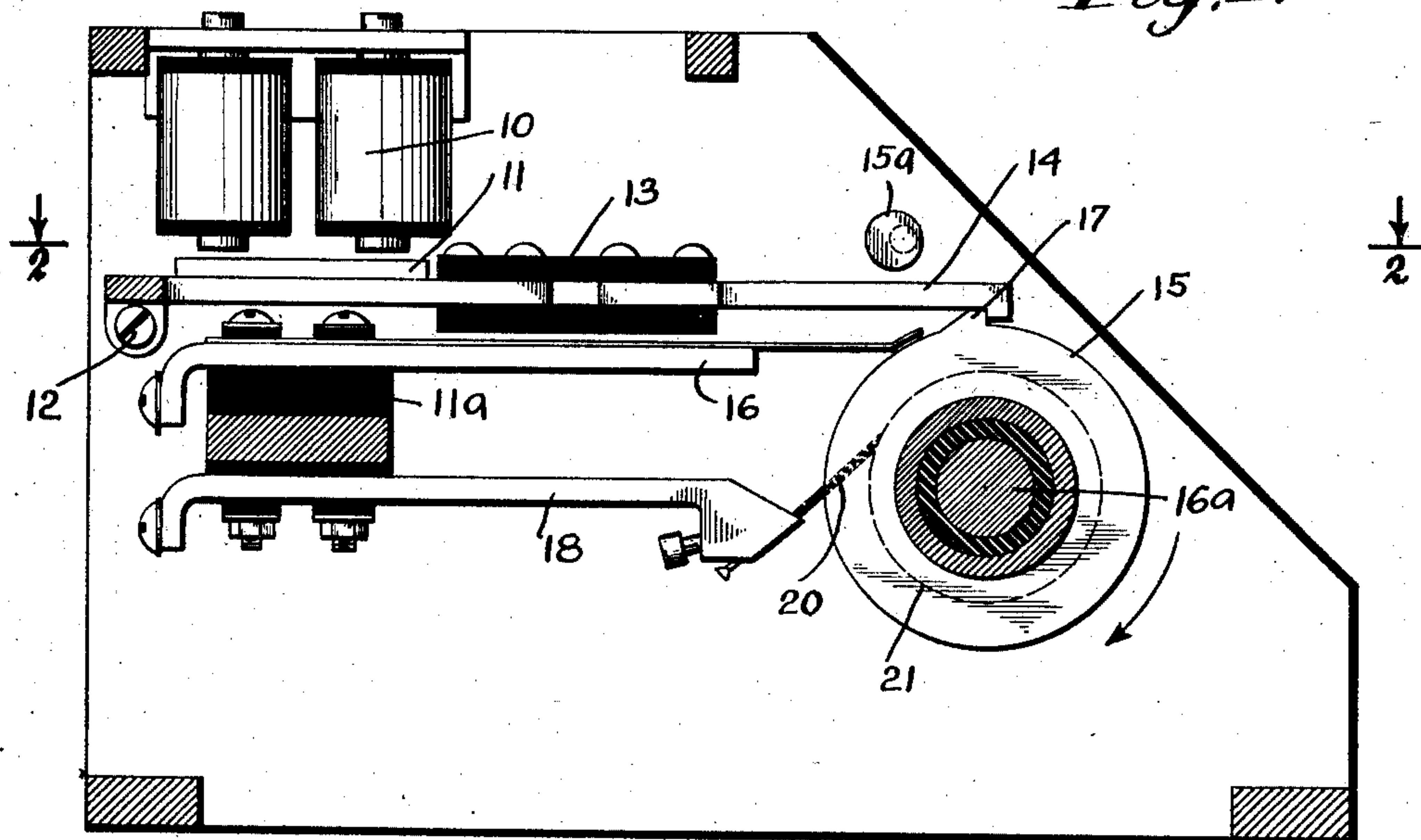
**1,777,882**

## SORTING MACHINE

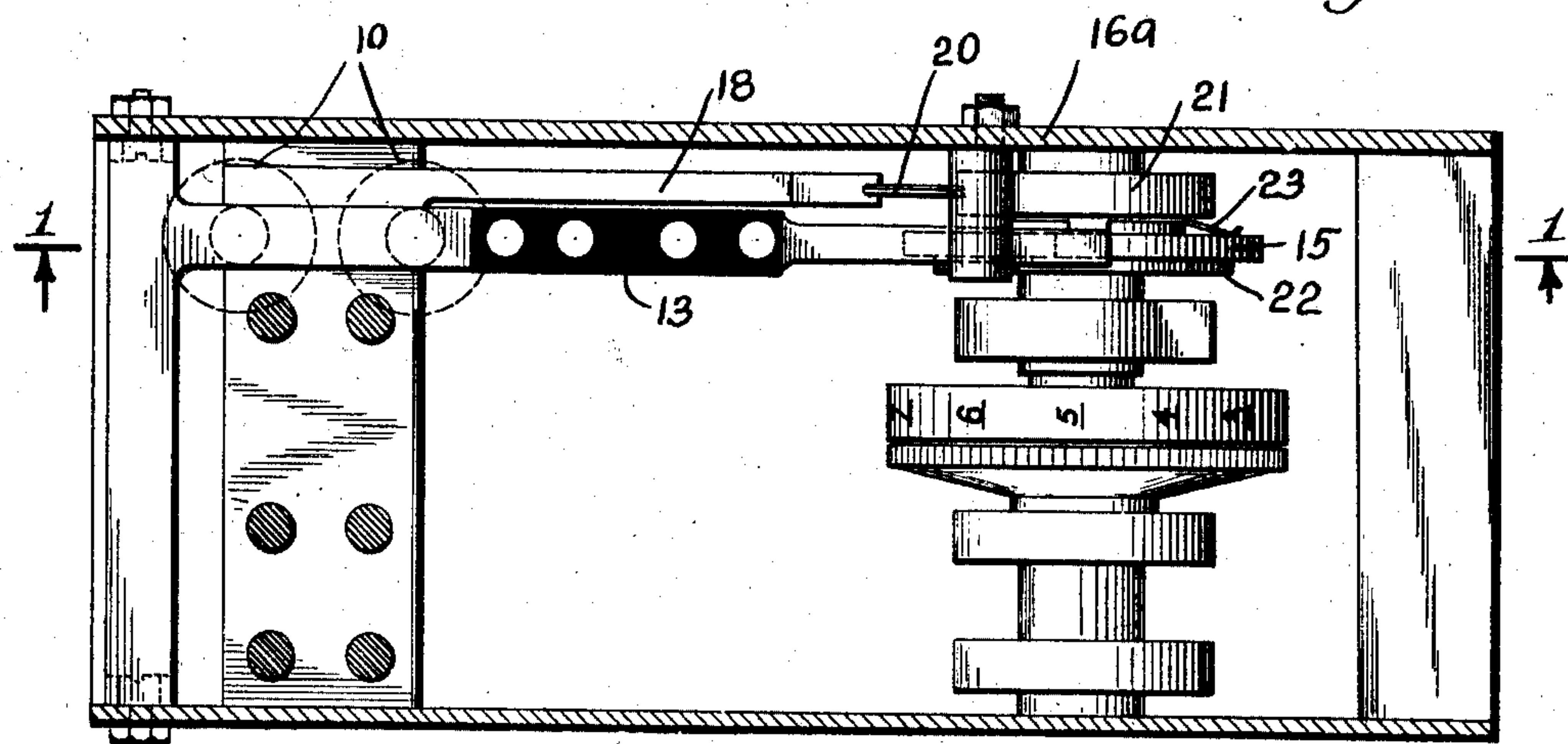
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2 Sheets-Sheet 1

*Fig. 1.*



*Fig. 2.*



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2 Sheets-Sheet 2

Fig. 3.

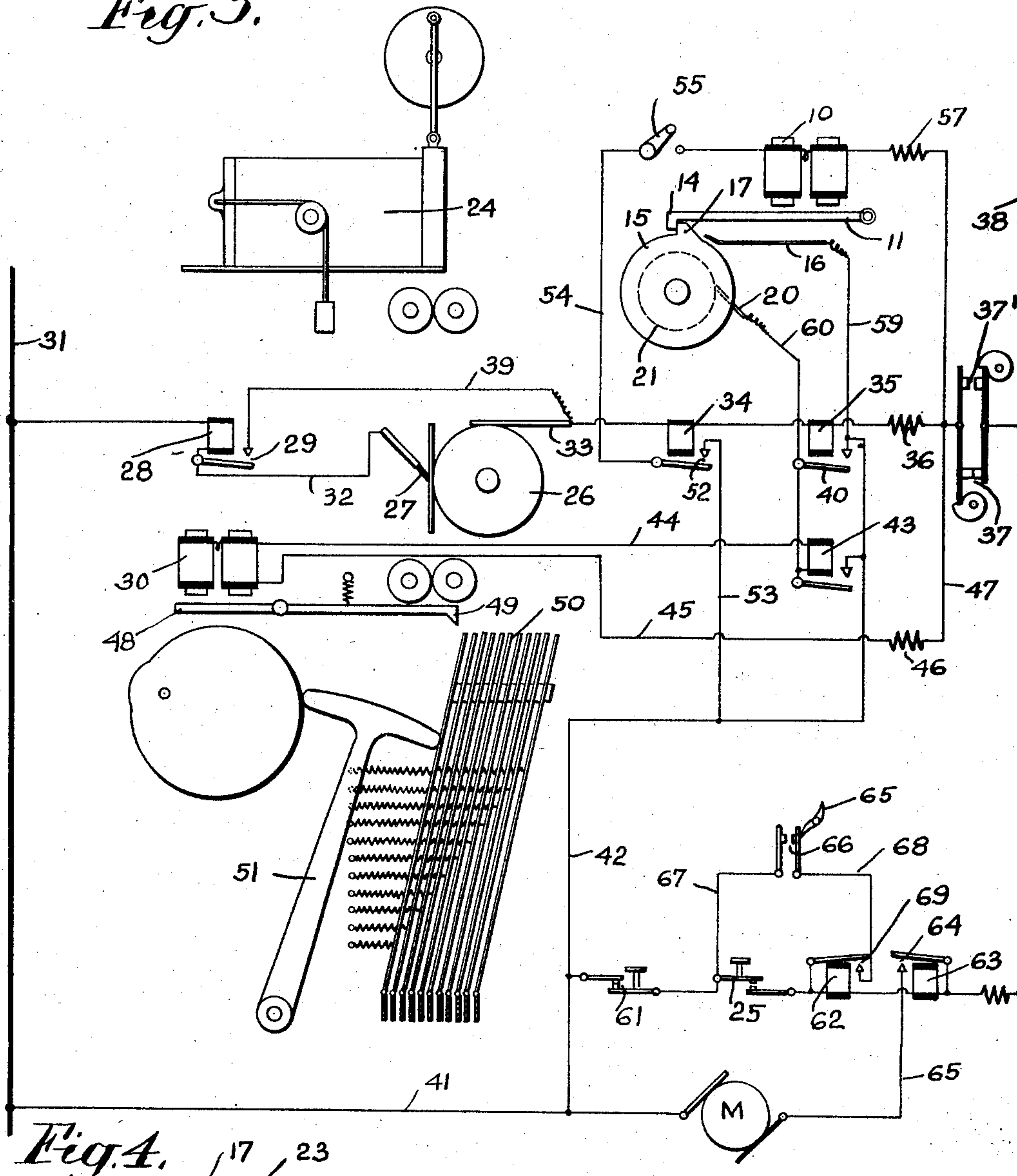
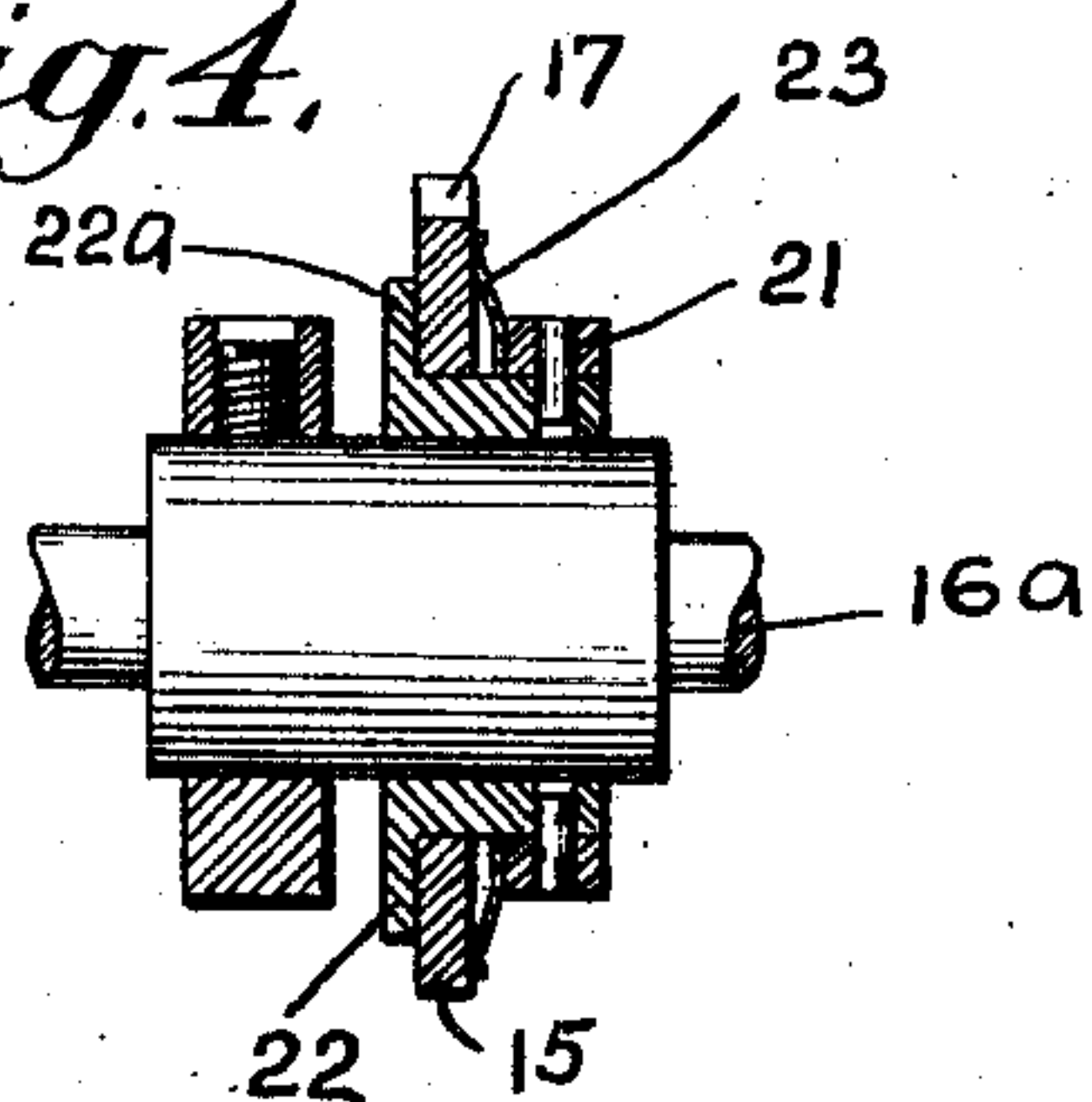


Fig. 4.



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## UNITED STATES PATENT OFFICE

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## SORTING MACHINE

Application filed March 16, 1927. Serial No. 175,743.

This invention relates to improvements in machines adapted for sorting perforated record cards used in tabulating systems and more particularly to a device for automatically depositing an unpunched record card into the same station or box as the punched record card preceding it.

For the purpose of clearly disclosing my invention I have shown same as applied to the well known Hollerith vertical sorter which electrically sorts and deposits each predetermined class of record cards into their proper stations.

The principal object of my invention is to automatically sort a card into the same receiving station into which a card has been previously sorted.

Various other objects and advantages of my invention will be obvious from the following particular description of the mechanism embodying the invention and from an inspection of the accompanying drawings in which the particular embodiment of my invention is disclosed but as such illustration is primarily for the purpose of disclosure it will be understood that my invention may be made by those skilled in the art without departing from the broad spirit and scope of the invention as hereinafter defined and claimed.

In the accompanying drawings I have shown for the purpose of illustration one form of mechanism embodying my invention in which

Fig. 1 is a side sectional view of the mechanism taken on line 1—1 of Fig. 2;

Fig. 2 is a sectional plan view of the mechanism taken on line 2—2 of Fig. 1; these two views showing the mechanism for controlling the disposition of the unpunched card in accordance with the disposition of the previous punched card, the device being adapted to be applied to the sorting machine.

Fig. 3 is a wiring diagram showing the operation and control of the machine;

Fig. 4 is a detail sectional view of the cam and frictional driving elements included in Figs. 1 and 2.

In the operation of the well known Hollerith vertical sorter to which this invention

is shown as applied in Fig. 3, a stack of cards to be sorted are placed in the feeding magazine of the machine. The operator manually sets the analyzing brush so that it will traverse the desired index column on the cards as they pass under it. The machine is then started being driven by a motor and the record cards are fed one by one from the stack into the analyzer whence passage of each card is directed to one of the receiving stations. As the operation of this sorter is fully described in the Hollerith Patent No. 945,236, issued January 4, 1910, it is therefore unnecessary to go into detail.

My mechanism or repeating device according to the invention is illustrated in Fig. 1 and by way of example is shown as being integral with the sorter but it is obvious that it may be used as an accessory.

To visualize the use of my repeating device we will apply it to pay roll purposes. The problem of checking identification numbers on pay rolls is one that receives serious consideration. In order to have a check on such identification numbers I have devised a mechanism which will be hereinafter described. As an example, a set of guide or identification cards will be addressographed for each man's name, address, etc., appearing on the pay roll sheets. These cards may then be punched to show the man's identification number in a field on the guide card which will coincide in location with the man's identification number punched in the same field on the record cards bearing punched information pertaining to the pay roll. We will now assume that the guide cards and pay roll cards have all been punched, the guide card bearing only punched information pertaining to the man's identification number, it being obvious that the pay roll cards will bear information pertaining to that particular pay roll. In large corporations each pay roll receives a serial number and this number is key punched only on the pay roll cards, the guide cards not being punched as to pay roll serial number due to the fact that the serial number obviously will be different for each pay roll. In checking identification numbers on pay rolls, the



group of punched pay roll cards of a single pay roll are placed together with the group of guide cards in the magazine of a sorting machine, the guide cards being placed behind punched pay roll cards. It is understood that for each pay roll, there is but one pay roll serial number on the pay roll cards corresponding to the guide card bearing the same identification number. In the present case, it will be assumed that there is only one pay roll card for each guide card. The groups of guide cards and pay roll cards being placed in the magazine, the operator then sets the analyzing brush so that it will traverse the index column bearing the identification numbers on the guide and pay roll cards, it being understood that the identification numbers on both the guide and pay roll cards are punched in the same field. The sorting machine is then started and the cards are sorted in the well known manner. After this operation has been completed and the cards taken from their respective stations we will have alternate punched pay roll cards and guide cards. The pay roll and guide cards are again placed into the magazine of the sorter, the switch 55 (see Fig. 3) being closed so that the repeating device will function. The analyzing brush of the sorting machine is then set to traverse the desired index column on the pay roll cards. The sorting machine is then started and by means of my invention the guide cards are automatically sorted into the same stations as the punched pay roll cards preceding them. It is obvious that the identification numbers or any other data pertaining to the original entry on the guide cards may be readily checked against the information perforated on the pay roll cards, thus assuring the accuracy of both the man's identification number and other punched information. The second sorting operation is done for the purpose of arranging the pay roll cards with their serial numbers in numerical order. Since the guide cards are unpunched in the field corresponding to the one on the pay roll cards bearing the serial numbers, they would in an ordinary sorting machine be fed to the reject magazine. For the purpose heretofore set forth, namely that of checking the guide cards against the serial pay roll cards, it is desired to have the guide card, instead of going to the reject magazine, enter the same pocket as its corresponding pay roll card. The means for accomplishing this is in detail as follows:

Referring now to Fig. 1 my invention as disclosed comprises a set of magnets 10 mounted in the well known manner. When these magnets receive an impulse they are energized and attract armature 11 pivoted to the frame of the repeating device at 12. Affixed to the right end of armature 11 by means of insulation 13 is a latching member

14 adapted to hold cam 15 against clockwise rotation on the shaft 16<sup>a</sup> upon which it is frictionally mounted. After the latch 14 has been raised to release the member 15 and the magnets 10 have become deenergized the latch 14 will fall back into position to again latch member 15. A constantly rotating cam 15<sup>a</sup> may be timed to depress the latch 14 after deenergization of magnets 10 to insure positive restoration of the latch 14. The frictional mounting of this cam will be hereinafter described. Mounted directly beneath the armature 11 in the well known manner by means of insulation 11<sup>a</sup> is a contact member 16 which makes contact with the high portion 17 of the cam 15 when the cam is allowed to rotate in a clockwise direction on the shaft 16<sup>a</sup>. As heretofore stated this cam is held against rotation on shaft 16<sup>a</sup> by means of latching member 14 and rotates only when the magnet 10 attracts its coacting armature 11. In other words upon the completion of a cycle of the cam 15 a circuit is closed. Rigidly held in position at the bottom of insulation 11<sup>a</sup> in the well known manner is a brush holder 18 carrying a wiping brush 20 which constantly rides upon the periphery of a collar 21 (see Fig. 4) fixed to a sleeve 22 which sleeve is fixed on the shaft 16<sup>a</sup>. Although I have stipulated a wiping brush it is obvious that other well known means may be employed to traverse the periphery of collar 21.

As previously mentioned cam 15 is frictionally mounted on the shaft 16<sup>a</sup>. That is, as the shaft rotates the cam tends to rotate with it but may be held against rotation. As disclosed in Fig. 4 a spider spring 23 is placed between the collar 21 and the cam 15. The collar 21 as heretofore mentioned is fixed to the sleeve 22 and revolves continually with the shaft during the operation of the machine, the sleeve 22 being rigidly mounted on the shaft 16<sup>a</sup>. The pressure of the spider spring 23 against the cam 15 forces the cam against the flange 22<sup>a</sup> of the sleeve 22, tending to rotate the cam with the shaft, but permits the cam to be held stationary by the latch 14.

Reference will now be had to Fig. 3 for a detailed explanation of the operation of my device. As previously stated a stack of guide cards and punched pay roll cards to be sorted are placed in the magazine 24 of the sorting machine, it being understood that the pay roll cards pertaining to the particular pay roll have the serial number of the pay roll punched therein and the guide cards simply bear addressographed information and punched information pertaining to the man's identification number, the identification number on the guide cards and pay roll cards being in the same field. The switch 55 is then closed in order to have a circuit through the repeating mechanism. The current is then turned on through start key 25 and the sorting machine begins to function. The operation of



the sorter is the same as the Hollerith type of sorter. As the punched pay roll cards pass over the roller 26 the brush 27 will make contact with the roller through a hole punched in the particular index column to which the analyzing brush has been set. We will assume that the brush makes contact with the roller through a hole designated as 6. This contact will energize relay 28 for an instant and will energize the sorting magnet 30 to select the 6 pocket for depositing the card and will also at this moment release the cam 15 permitting it to commence rotating in the counterclockwise direction as viewed in Fig. 3. This cam is timed to engage the contact 16 at the moment that the brush reaches the position on the guide card corresponding to the hole 6 punched on the pay roll card. This will again energize the sorting magnet 30 to select the six pocket for depositing of the guide card. In other words the guide card is automatically deposited into the same pocket as the pay roll card with which it cooperates.

A detailed operation of the circuits is as follows: Assuming that the card has a punched hole at 6 as heretofore mentioned, when the brush 27 comes in contact with the roller 26 through the hole in the card the following circuit will be established; from the positive side of the line 31, through magnet 28, wire 32, brush 27, metallic roller 26, brush 33, magnet 34, magnet 35, resistance 36, contact 37 and back to the negative side of the line. Energization of magnet 28 closes contacts 29 so that when the brush 27 has passed by the hole in the card the following circuit is maintained: from the positive side of the line 31 through magnet 28, contacts 29, wire 39, magnet 34, magnet 35, resistance 36, contact 37 and back to the negative side of line 38. Energization of magnet 35 closes contacts 40 and establishes the following circuit: from the positive side of the line 31, through wire 41, wire 42, contacts 40, magnet 43, wire 44, sorting magnet 30, wire 45, resistance 46, wire 47, contacts 37, back to the negative side of the line 38. When magnet 30 is energized the armature 48 causes latching member 49 to dip in between the blades 50 holding the blade cooperating with the 6 pocket from following the cam wiper 51 as is fully disclosed in the Hollerith patent heretofore referred to. Energization of magnet 34 closes contacts 52 establishing a circuit from the positive side of the line 31, through wire 41, wire 42, wire 53, contacts 52, wire 54, switch 55, magnets 10, resistance 57, contacts 37 and back to the negative side of the line 38. Energization of magnet 10 attracts armature 11 lifting the latching member 14 out of cooperation with the high portion 17 of cam 15 allowing it to rotate in a counterclockwise direction. As previously stated this cam is so timed that the high

portion 17 of the cam will not make contact with the contact member 16 until the brush 27 is in a position on the blank or unpunched card which coincides with the hole punched in the pay roll card preceding it. Near the completion of a cycle of cam 15 the high portion 17 makes contact with the contact member 16 establishing a circuit from the positive side of the line 31, through wire 41, wire 42, wire 59, contacts 16, cam 15, collar 21, brush 20, wire 60, magnet 43, wire 44, sorting magnet 30, wire 45, resistance 46, wire 47, contacts 37 and back to the negative side of the line 38. The contacts 37 and 37' in the normal operation of the sorter both open between succeeding cards and deenergize magnets 28, 34 and 35. To start the sorting machine a key 25 is depressed establishing a circuit from the positive side of the line 31, through wire 41, wire 42, stop key 61, start key 25, now normally closed, magnet 62, magnet 63, and back to the negative side of the line 38. Energization of magnet 63 closes contacts 64, establishing a circuit from the positive side of the line 31, through wire 41, through driving motor M, wire 65, contacts 64, magnet 63 and back to the negative side of the line 38. When the start key 25 is depressed the operator holds the key down until after the first card has been fed and thereafter as the cards feed they abut against a lever 65 fixed to one of the contact members 66 establishing the following circuit which keeps the sorter functioning while the cards continue to feed. The circuit is as follows: from the positive side of the line 31, through wire 41, wire 42, stop key 61, wire 67, contacts 66, wire 68, contacts 69, magnet 62, magnet 63 and back to the negative side of the line 38. As soon as the cards are all fed into the machine the contacts 66 open deenergizing magnets 62 and 63 stopping the motor M. To hold the repeating means inoperative, it is only necessary to open switch 55 thus opening the circuit through magnets 10 and preventing energization thereof to attract armature latch 11.

While I have 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. I intend to be limited therefore only as indicated by the scope of the following claims.

I claim:

1. In a sorting machine, a plurality of receiving pockets, means controlled by perforated cards for selectively depositing such cards into said pockets and means controlled by said selective means for causing a card following a control card to be fed into the pocket selected by said control card, said last



named means including a constantly rotating shaft, a contact member frictionally mounted thereon, means for normally holding said member against rotation, means controlled by said selective means for releasing  
 5 said contact member for operation, and a cooperating contact member adapted to be engaged by said first named contact member for controlling the disposition of said second card with respect to said pockets.

10 2. In a sorting machine, a plurality of receiving pockets, means controlled by perforated cards for selectively depositing such cards into said pockets, a time controlled element adapted to be brought into operation  
 15 by said selecting means to cause a subsequent operation of the selecting means to control the disposition of a subsequent card with respect to said pockets.

20 3. In a sorting machine, receiving pockets, a sorting magnet for controlling the disposition of cards with respect to said pockets, and means adapted to be brought into operation whenever said sorting magnet is energized  
 25 for causing repetition of energization of said magnet at a predetermined subsequent operation of the machine.

4. In a sorting machine, including receiving pockets and card control means for controlling the disposition of a card with respect to said pockets, means for selectively  
 30 depositing cards in said pockets, means for selecting the disposition of a card with respect to said pockets in accordance with a previous depositing operation of a card into said pockets and means for rendering said  
 35 last named means inoperative.

5. In a cyclically operable machine, a device for reading the data on tabulating cards, a circuit established during one cycle by said  
 40 device in accordance with the readings of the cards, means operated by said circuit in accordance with the data on said card, and means set in operation by said device during said cycle for causing said circuit to be established subsequent to said cycle whereby the  
 45 operation of the first-named means is repeated.

6. In a cyclically operable machine, receiving pockets, means controlled by a tabulating  
 50 card for selecting a pocket for the card in accordance with the data on said card, and a device set in operation by the same card at a point in the cycle corresponding to the data on said card for subsequently controlling said means to select the same pocket for  
 55 another card.

7. In a sorter, means for reading tabulating cards, means controlled by said reading  
 60 means to sort the cards in accordance with their designations, a device for controlling said sorting means independently of and subsequently to said reading means, and means controlled by said reading means for setting  
 65 said device in operation.

8. In a sorter, means for reading cards, means set in operation by the reading means for sorting the cards, and a device set in operation simultaneously with said sorting means by said reading means for subsequently controlling said sorting means independently  
 70 of said reading means.

9. In a sorting machine, means for reading tabulating cards, a circuit controlled by said  
 75 reading means, means controlled by said circuit for sorting the cards, and a device for controlling said circuit independently of the reading means to cause said sorting means to subsequently repeat its operation.

10. In a machine as set forth in claim 9, said device being set in operation by said  
 80 reading means.

11. In a machine as set forth in claim 9, said device comprising a movable member, means for restraining movement of said member, and means controlled by said reading  
 85 means for rendering said restraining means ineffective.

12. In a machine such as described in claim 9, said device and said reading means alternating in controlling said circuit.  
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In testimony whereof I hereto affix my signature.

ALVIN E. GRAY.

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