C. F. KETTERING.

DRIVING DEVICE FOR REGISTERING MACHINES.

APPLICATION FILED NOV. 6, 1905.

976,577.

Patented Nov. 22, 1910.

3 SHEETS—SHEET 1.

Fig. 2.

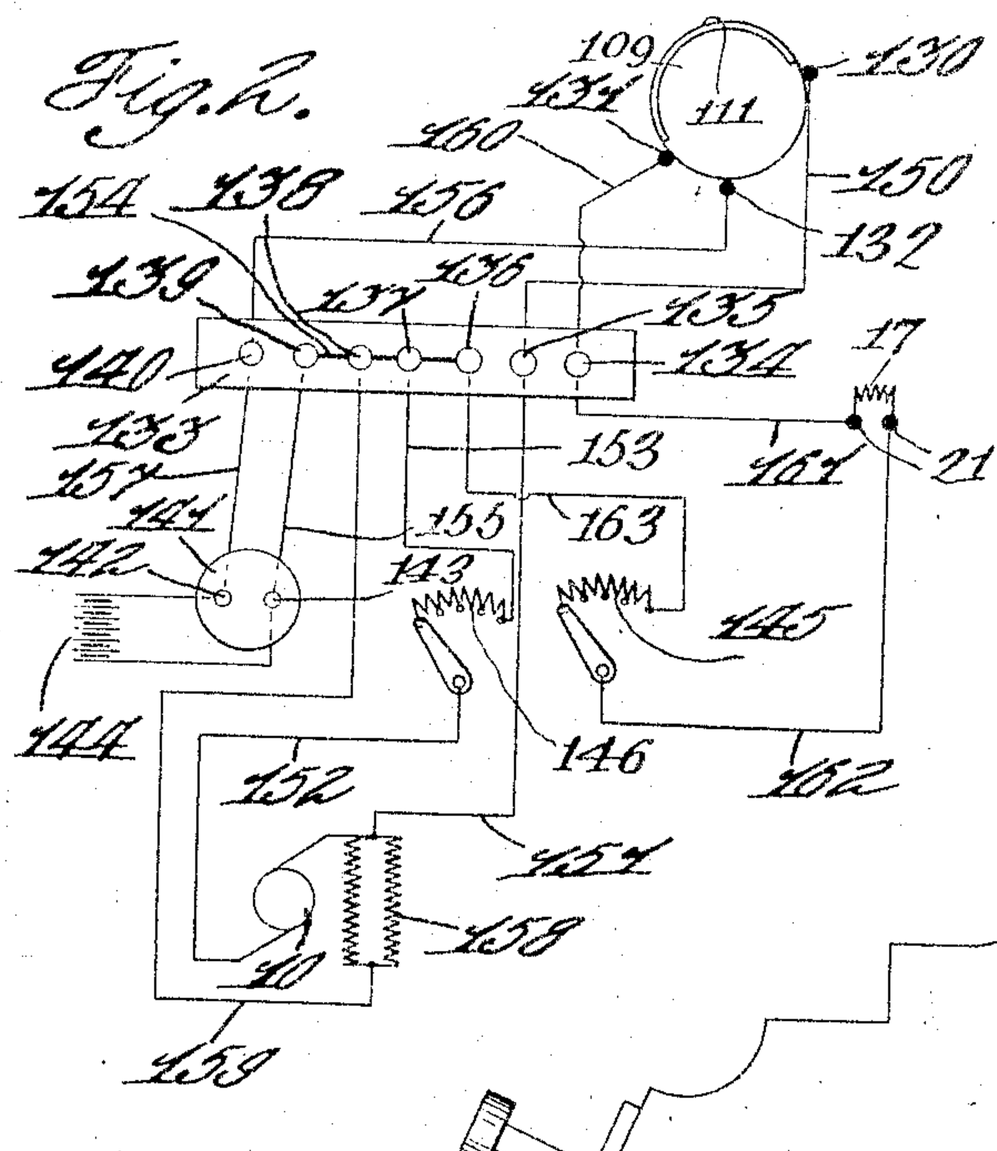


Fig. 1.

Fig. 1a.

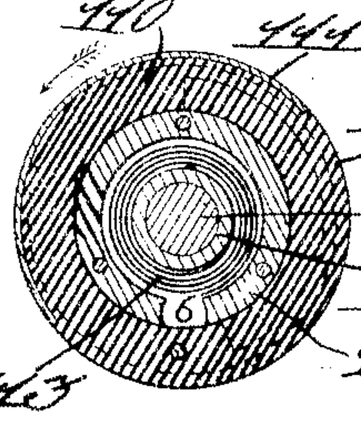
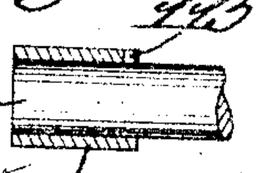


Fig. 1b.



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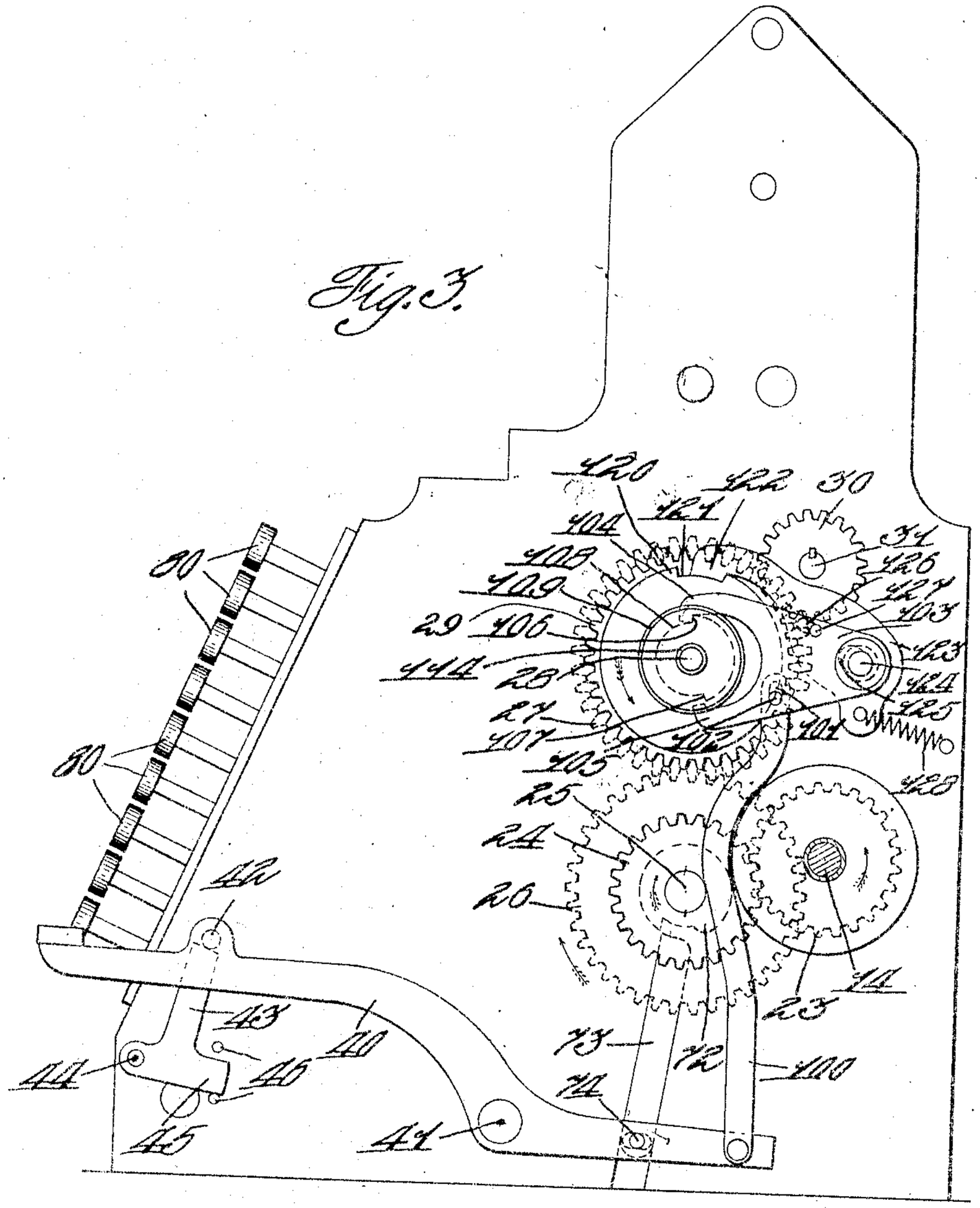
3 SHEETS—SHEET 2.

Fig. 3.



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3 SHEETS—SHEET 3.

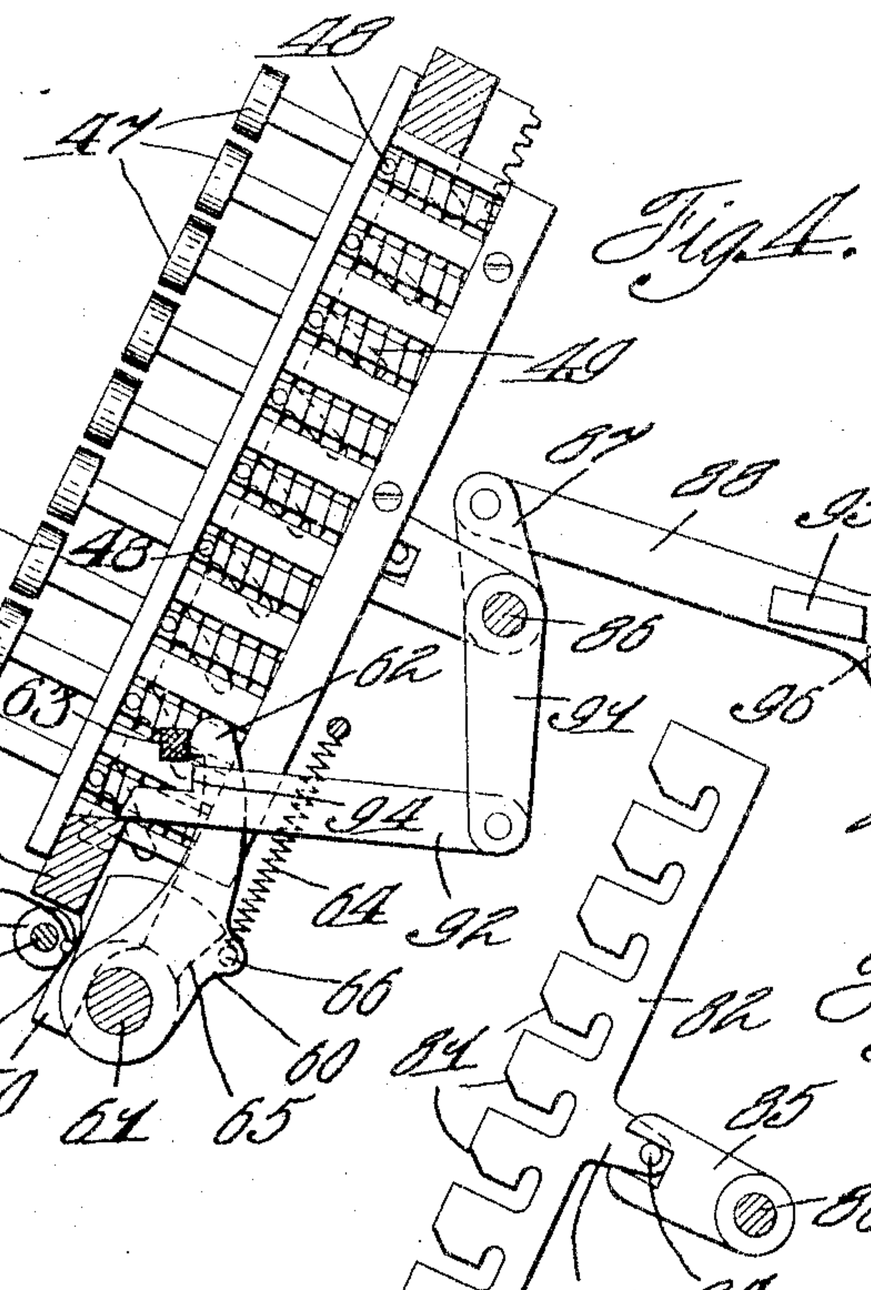

Fig. 4.

Fig. 5.

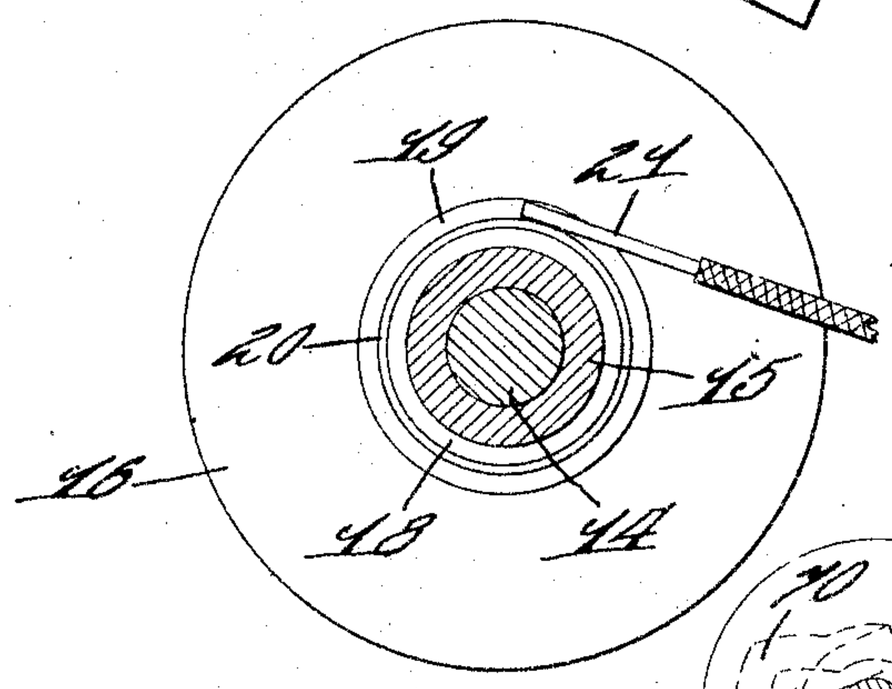

Fig. 6.

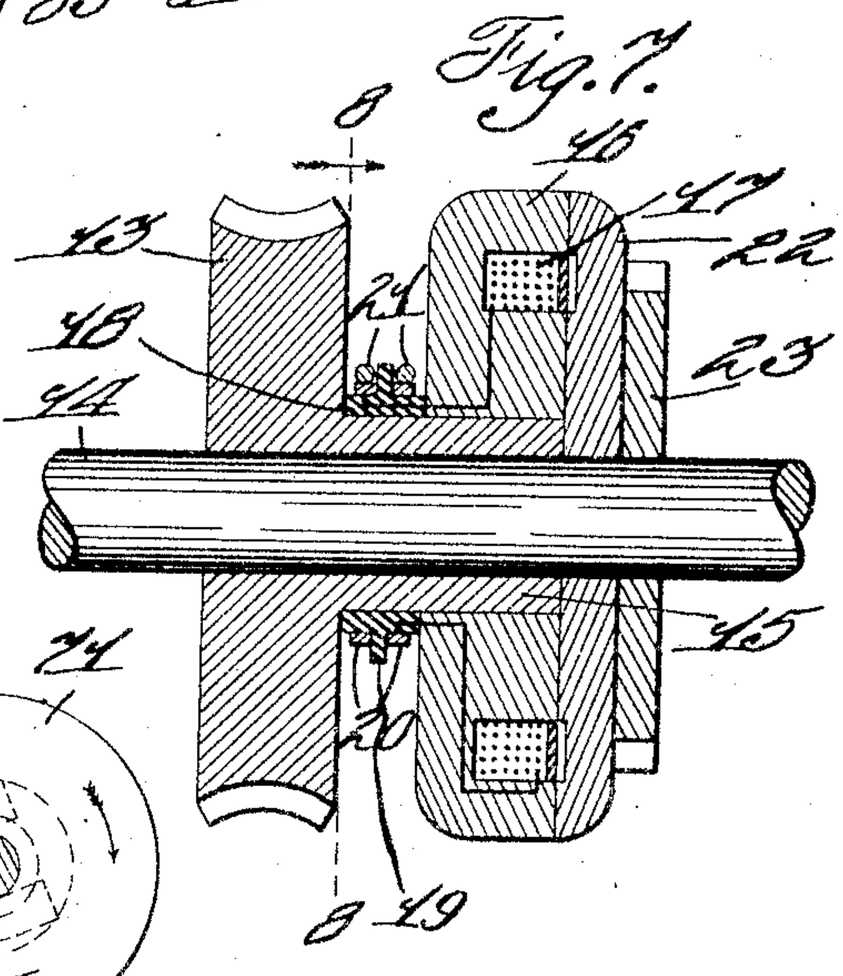

Fig. 7.

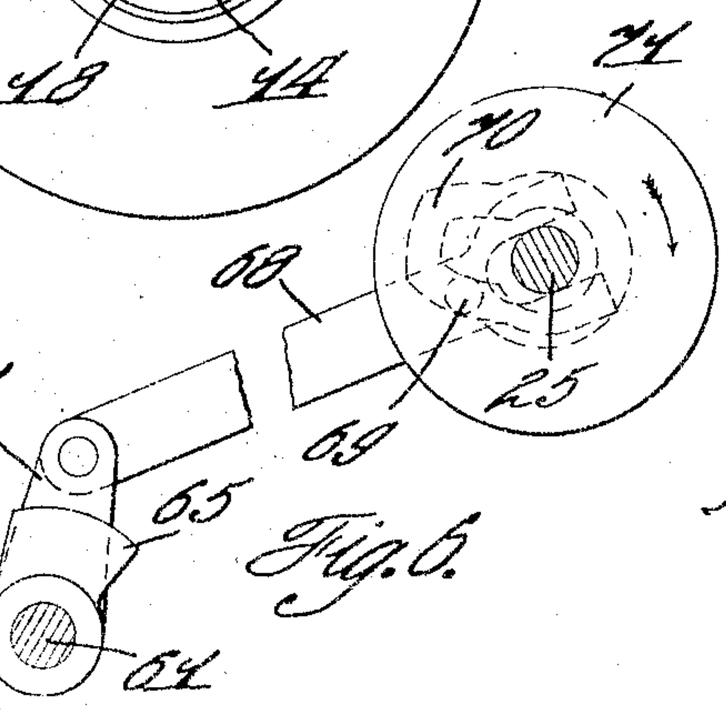

Fig. 8.

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UNITED STATES PATENT OFFICE.

CHARLES F. KETTERING, OF DAYTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL CASH REGISTER COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO, (INCORPORATED IN 1906.)

DRIVING DEVICE FOR REGISTERING-MACHINES.

976,577. Specification of Letters Patent. **Patented Nov. 22, 1910.**

Application filed November 6, 1905. Serial No. 286,063.

To all whom it may concern:

Be it known that I, CHARLES F. KETTERING, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Driving Devices for Registering-Machines, of which I declare the following to be a full, clear, and exact description.

This invention relates to improvements in driving mechanisms for cash registers or similar machines and has among its objects to provide an improved form of electrically operated driving mechanism wherein a special key controls the establishing of a circuit through a normally inactive motor, which motor is connected with the driving shaft mechanism of the machine by means of suitable clutch mechanism, and at the end of the normal cycle of movement of the machine, the current is automatically broken and the machine brought to rest in its normal condition; and to effect the proper coöperation of the various parts of such mechanism, suitable interlocking devices are also provided.

With these and incidental objects in view, the invention consists in certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims and a preferred form of embodiment of which is hereinafter specifically described with reference to the drawings which accompany and form part of this specification.

Of said drawings: Figure 1 represents a side elevation of the machine to which the electrical driving motor is attached. Fig. 1ª represents a sectional view of the spring contact making device. Fig. 1ᵇ represents a detail view partly sectionalized of a portion of Fig. 1ª. Fig. 2 represents a diagrammatic view of the electrical connections. Fig. 3 represents a side elevation of the machine with the electric motor detached therefrom but showing the gearing connected therewith and the special operating key. Fig. 4 represents a detail view partly sectionalized of the key-board of the machine showing certain of the interlocking devices. Fig. 5 represents a detail view of one of the key detents. Fig. 6 represents a detail view of one of the operating cams and its connecting parts for releasing the special operating key. Fig. 7 represents a sectional detail view through the magnetic clutch. Fig. 8 represents a section taken on the line 8—8 of Fig. 7 looking in the direction of the arrow crossing the said line.

For the purpose of a better understanding of the general operation of the machine it may be stated in brief that the electric driving motor is normally inactive, and that the special operating key which controls the making of a circuit through said motor for the purpose of operating the machine, is normally locked from operation but is unlocked by the operation of any one of a bank of special keys; and when the special operating key is thus operated, a spring actuated contact making device is released and assumes such position as to make the electric circuit through the electric motor and also through the magnetic clutch connected to the main operating shaft of the machine so that the movement of the motor will thereby be transmitted to the operating parts of the machine; and as soon as the main operating shaft of the machine has completed its normal cycle of movement it is stopped and locked from further movement by means of a locking device which in itself serves to again release the spring actuated contact device to permit the same to return to normal position and thereby breaks the circuit through the motor and magnetic clutch.

With this description of the general mode of operation of the parts, the specific devices will now be described more in detail.

Referring to Fig. 1 it will be seen that the electric motor 10 (shown in dotted lines therein) is arranged when rotated to turn the shaft 11 upon the rearward end of which is a worm 12 which meshes with a gear wheel 13 fast upon the clutch shaft 14.

Shown in Fig. 7 is the gear wheel 13 which is formed with a hub portion 15 to which is made fast a soft iron disk 16 within which are coiled strands of wire 17 for the purpose of magnetizing the disk 16. Between the gear 13 and the disk 16 is a collar 18 of insulating material having a partition 19 which separates two strips of con-

ducting material 20, one extremity of the wire 17 being connected to one of these electrodes or contact pieces and the other end of the wire 17 being connected to the other electrode. Bearing upon each of these electrodes is a brush 21 for the purpose of transmitting the current to the electrodes and thence to the wire 17 to magnetize the disk 16. Adjacent to and face to face with the disk 16 is another soft iron disk 22 journaled upon the shaft 14 and having fast to its side a gear wheel 23 which as shown in Fig. 3 meshes with a gear wheel 24 fast upon the lower operating shaft 25; and also fast upon this same shaft 25 is a larger gear wheel 26 which meshes with a companion gear wheel 27 fast upon the upper operating shaft 28 of the machine. This shaft 28 has also fast to it another gear wheel 29 which meshes with a similar gear wheel 30 fast to an auxiliary operating shaft 31 which latter constitutes one of the operating shafts of the machine to which this invention is applied, although the said shaft 31 takes no part in the operation of the invention herein described. The direction of rotation of the various shafts is shown by arrows in the various figures.

The special operating key for controlling the making of the electric circuit will now be described. This key 40 as shown in Fig. 3 is pivoted to the main frame at 41. At its forward portion it has formed upon it a pin 42 below which swings a locking dog 43 fast to the rock shaft 44 and formed with a foot 45 swinging between stop pins 46. It will be seen that normally the pin 42 rests upon the dog 43 and the key 40 is therefore normally locked from operation. It is arranged to be released by the operation of any one of the bank of special or clerks' keys 47 in the following manner (see Fig. 4). Each of the keys is provided with a laterally projecting pin 48 which plays in a slot 49 formed in a vertically sliding plate 50 on the lower and forward end of which is formed a notch 51 engaging a pin 52 formed in a disk 53 fast to the aforesaid rock shaft 44. The slots 49 are differentially inclined for purposes not connected with the present invention and not necessary to be here described, but upon the depressing of any key the plate 50 will be vertically raised by means of the pin 48 of the key depressed, and thereby the notch 51 will act upon the pin 52 to rotate the disk 53 and shaft 44 and thereby rock the dog 43 backward out of the path of the pin 42 and thereby release the special operating key. The extent of rocking of the shaft 44 for this purpose need be only small, and when the lowermost key 47 is depressed the plate 50 is elevated to such an extent that the notch 51 is carried farther than is necessary, but in such case the straight, forward side of the plate 50 simply rides by the pin 52 after having rocked the shaft to the necessary extent, and upon the return of the plate 50 to normal position the pin 52 again registers with the notch.

In order to lock the special operating key in depressed position there is provided a pawl 60 pivoted upon the rock shaft 61 and formed at its upper end with a nose 62 arranged to engage a square lug 63 formed upon the end of the afore mentioned pin 42 which projects from the key 40 as previously described. A spring 64 normally draws the locking pawl 60 forward so that as soon as the special key is depressed the pawl will lock over the lug 63 and lock the key in depressed position. In order to release the key, the pawl 60 is rocked rearward in the following manner. Fast upon the rock shaft 61 is an arm 65 arranged to engage a pin 66 to which the spring 64 is attached, this pin being upon the pawl 60. Also fast to the shaft 61 is another arm 67, (see Fig. 6), to which is pivoted a link 68 which extends rearward to straddle the lower operating shaft 25, and the link has formed upon it a pin 69 which projects into a cam groove 70 formed in the disk 71 fast to the shaft 25, the shape of the groove being such that immediately after the machine has been started in operation the link 68 will be pulled rearward and thereby the shaft 61 will be rocked and the arm 65 will strike the pin 66 and force the pawl 60 rearward to release the special operating key, which may if desired, be drawn to normal position by a suitable spring, but the positive return of which key is in this case secured by means of a cam 72 (see Fig. 3) fast upon the shaft 25, which cam strikes an arm 73 having a slot and pin connection at 74 with the rear end of the key 40 and being suitably guided in its vertical movement by a guide piece formed in the main frame of the machine, so that at the beginning of the revolution of the shaft 25 the key 40 will be positively returned to normal position.

The machine is provided with a series of amount keys 80 (see Fig. 1) which have ordinary lateral pins projecting therefrom similar to the pins 48 shown on the clerks' keys 47, shown in Fig. 4, and these pins play in slots 81 (see Fig. 5) formed in detent plates 82, there being one detent plate for each bank of amount keys, and there also being a similar plate for the special keys 47, and the shape of the slot 81 is such that the plate 82 will be moved by any key and then the lower angular portion of the slot will engage the key pin and hold the key in depressed position. Extending downward from each detent plate is an arm 83 formed on which is a pin 84 engaged by an arm 85 fast to the rock shaft 86. Fast to the rock shaft 86 is an upward extending arm

87 (see Fig. 4) to which is attached a link 88, which at its rearward end straddles the lower operating shaft 25 and has formed upon it an anti-friction roller 89 arranged to be engaged by a single tooth 90 carried by a disk fast to the shaft 25. Near the end of the operation of the machine the tooth 90 strikes the roller and by retracting the link 88 rocks the shaft 86 to rock all of the arms 85 and thereby by moving the detent plates 82 releases all of the previously operated keys; also fast to the shaft 86 is a downwardly extending arm 91 to which is pivoted a link 92 resting at its forward end upon a stationary cross bar 93 of the machine. The link 92 is formed with a locking shoulder 94 which coöperates with the previously described lug 63 formed upon the special operating key 40. Thus it will be noticed that upon the operation of any amount or special key, while the key is in the process of being depressed and before it has reached complete depressed position its detent plate will be displaced from normal lower position and therefore the shaft 86 will be rocked so as to carry the link 92 forward and bring the shoulder 94 below the lug 63 and thus prevent the operation of the special operating key while the amount key is being depressed. Likewise it will be apparent that after the special operating key 40 has been started downward the lug 63 will pass in front of the shoulder 94 and prevent the subsequent operation of any key, whereby fraudulent or improper use of the machine is prevented. The link 88 is also provided with a lug 95, so that when any amount key is being depressed the lug 95 moves rearward and engages the locking shoulder 96 of a disk 97 fast upon the shaft 25 to prevent the turning of this shaft, and also after the shaft 25 has been partially operated the lug 95 would abut against the periphery of the disk 97 and prevent the operation of any key, even though the special operating key had returned to normal position.

The mechanism for starting the motor by the special operating key will now be described. Pivoted to the rear end of the special key 40 (see Fig. 3) is an upwardly extending link 100 which at its upper end is slotted at 101, into which slot projects a pin 102 formed upon a bifurcated pawl 103, formed with upper and lower locking fingers 104 and 105 respectively. The upper finger 104 normally engages the locking shoulder 106, and the lower finger 105 normally stands just below the recess 107 formed in the disk 108 which is fast to a spring actuated contact making disk 109 shown in cross section in Fig. 1ª. This disk comprises a collar of insulating material 110, on the upper and left-hand portion of which is a strip of metal or conducting material 111. This insulating collar surrounds a sleeve 112 to which is attached a spring 113 which is coiled within the disk and at its other end is attached to a collar 114 (see also Fig. 1ᵇ), which surrounds the operating shaft 28, said collar 114 normally rotating with the shaft 28 by reason of a pin 115 which projects from the shaft 28 into a slot formed in the collar 114. The spring 113 normally tends to rotate the contact disk 109 in the direction shown by the arrow in Fig. 1ª, that is, when the disk is released and the shaft 28 remains stationary. This release of the disk is effected by the pressing of the special operating key 40 which raises the link 100 and thereby through the pin 102 raises the pawl 103 to carry the finger 104 forward out of contact with the locking shoulder 106, (the recess 107 permitting the upward movement of the pawl 105), and thereupon the disk 108 carrying with it the contact disk 109 rotates until the locking shoulder 106 now strikes the lower finger 105, so that the contact disk remains in this position so long as the special key 40 remains depressed and the finger 105 remains raised in contact with the shoulder 106, the contact disk having during this movement been rotated half of one complete turn. This release and half turn of the contact disk 109 as just described brings the metallic strip 111 into such position as to complete the circuit through the electric motor which then becomes operative to rotate the shaft 14 in a manner to be later described, and for mechanism to break the circuit at the end of one complete revolution of the operating shaft, or the normal cycle of movement of the machine, the following device is provided.

Fast upon the upper operating shaft 28 is a locking disk 120 (see Fig. 3) formed with a notch 121 into which projects a nose 122 of a locking pawl 123, pivoted upon the same stub shaft 124 upon which the previously described bifurcated pawl 103 is mounted, and the locking pawl 123 is formed with a slot 125 at its pivotal connection in order to permit rearward movement of the pawl. Formed in the middle portion of the pawl 123 is a slot 126 into which projects a pin 127 projecting laterally from the bifurcated pawl 103. A spring 128 normally draws the pawl 123 rearward and its nose 122 downward. Upon the operation of the special key 40 and the raising of the bifurcated pawl 103 in the manner previously described the pin 127 acts through the slot 126 to raise the locking pawl 123 so as to carry its nose 122 out of the recess 121 of the locking disk 120 and thereby unlock the revolution shaft 28, so that since the contact making disk 109 is revolved as hitherto described and the circuit is made through the motor the shaft 28 will be free to turn under

the influence of the motor. The locking pawl 123 is immediately pulled rearward as soon as it is raised in this manner so that its nose 122 rests upon the periphery of the disk 120 just in the rear of the notch 121 so that the disk 120 remains unlocked, and in such position the pawl 123 acts through the slot 126 and pin 127 to hold the bifurcated pawl 103 in raised position independently of the link 100, so that said link may drop and the special key 40 be restored to upper position as previously described, but as soon as the disk has made one complete turn with the shaft 28 the notch 121 is again brought around to register with the locking nose 122 and the nose snaps into place in the notch and the pawl is pulled forward into its normal position as shown in Fig. 3 and of course the engagement of the nose 122 with the notch 121 effectually locks the shaft 28 from further revolution. Of course since the shaft 28 is now locked from further movement it is essential that the current shall have simultaneously been broken, and this effect is produced upon the final forward and dropping movement of the pawl 123, this forward and dropping movement of the pawl acting through the slot 126 and pin 127 to force the bifurcated pawl 123 again downward, thereby releasing the lower finger 105 from contact with the shoulder 106 of the disk 108 and bringing the upper finger into the path of the shoulder 106, so that as soon as the disk has made another half turn, thereby completing its entire revolution, the contact making disk 109 is now brought back to normal position and the circuit through the motor is broken as will be later described.

It will be observed that the preliminary unwinding of the spring 113 gives the contact disk 109 its first half turn, and the second half to return to normal position is effected as follows: The making of the circuit through the motor gives the shaft 28 a complete turn while the contact disk remains stationary, and since the shaft 28 rotates in the same direction as the disk 109, this complete revolution of the shaft 28 has the effect of winding up the spring 113 to practically one-half a turn in excess of its normal condition; but as soon as the shaft 28 has stopped and the circuit is broken by the return of the contact disk to normal position, such return of the contact disk to normal position takes up this additional half turn of its spring given to it by the shaft 28 and leaves the parts in normal condition, this operation being one of a partial release of the spring, then a re-winding of the spring in excess of its necessary tension, followed by a further unwinding of the spring to restore the same to normal condition as soon as the contact disk has completed its entire revolution. The slot 101 formed in the upper end of the link 100 permits the restoring of the key 40 to normal position in the manner previously described independently of the retention of the bifurcated pawl 103 in upper position.

The connections coöperating with the contact making disk 109 for controlling the electric circuits are as follows. Referring to Fig. 1, it will be seen that there are three electrodes 130, 131 and 132 which impinge upon the contact disk 109. The various connections can be followed up more clearly by the aid of the diagrammatic view shown in Fig. 2. Attached to the main frame of the machine just above the motor is a binding post block 133, in which are seated binding posts 134 to 140 inclusive. Below this binding post block is a plug 141 of insulated material formed with two binding posts 142 and 143 to which the wires leading from the battery 144 are arranged to be attached in a suitable manner. The connections are such as to establish two operating circuits, one the motor circuit, and the other the magnetic clutch circuit. A resistance 145 is provided for varying the current in the magnetic clutch circuit and another resistance 146 is provided for varying the current in the motor circuit. Connected with the electrode 130 is a wire 150 which goes to the binding post 135 and thence by a wire 151 to the motor 10 and then by a wire 152 to the resistance 146 and thence by a wire 153 to the binding post 137. All four binding posts 136, 137 138 and 139 are connected by a conducting strip 154, so that thereby the aforesaid wire 153 is connected with the binding post 139 and thence through the wire 155 with the binding post 143 which is connected with the battery 144.

The electrode 132 is connected by a wire 156 with the binding post 140 and thence by a wire 157 to the binding post 142. The previously mentioned wire 151 is also connected with the field 158 of the motor, this field being connected through a wire 159 with the binding post 138 and thence connected to the battery by means of the aforesaid wire 155.

The electrode 131 is connected by means of a wire 160 with the binding post 134 and thence by means of a wire 161 with one of the previously described brushes 21 which makes contact with the wire convolutions of the magnetic clutch, and the return wire 162 from this magnetic clutch leads to the resistance 145 and thence by a wire 163 to the binding post 136 and thus through the strip 154 is connected with the battery wire 155. The electrode 132 with its connecting wire thus forms the portion of the circuit common to both the motor and the magnetic clutch circuit, the wire 150 extending from the electrode 130 going to the motor circuit and the

wire 160 extending from the electrode 131 going to the magnetic clutch circuit.

From these connections it results that when the contact making disk 109 is given its half revolution as heretofore explained, the metallic strip 111 is brought into its lower position so that all three of the electrodes 130, 131 and 132 impinge upon said metallic plate. Thus the connecting of the electrodes 130 and 132 establishes the circuit through the electric motor 10 and its field as will readily be seen from following out the connections in Fig. 2, and the connecting of the electrodes 131 and 132 results in the establishing of the circuit through the brushes 21 and the magnetic clutch, and therefore as soon as the motor begins to turn and the soft iron disk 16 begins to turn with the shaft 14 in the manner previously described the energizing of the soft iron disk 16 will cause the soft iron disk 22 to rotate with the disk 16, this being a well known operation of magnetic clutches. The revolution of the disk 22 and the gear 23 effect the revolution of the main operating shafts 25 and 28 by means of the intervening gears as already set forth, and at the end of the complete revolution of the shaft 28 the spring actuated contact disk 109 is again released as hitherto explained and flies back to normal upper position thereby breaking the contact at the electrodes 130, 131 and 132, and thus the current through the motor and the magnetic clutch is broken, and the parts brought to rest practically simultaneously. The proper relationship between the circuits may be adjusted by varying the resistances 145 and 146.

If it becomes necessary to tighten the spring 113 which actuates the contact making disk 109, this may be accomplished when the machine is at rest by shifting the collar 114 (see Fig. 1[b]) laterally to such an extent as to withdraw the collar from engagement with the pin 115, and then giving the collar a turn to wind up the spring until the slot in said collar is again opposite the pin 115 and the collar is shifted back to engage the pin so that thereafter both the collar and shaft will turn together.

One of the features of the arrangement of the circuit herein is that the magnetic clutch circuit is separate from the motor circuit so that when the circuit is broken after the motor has been running, the counter electro-motive force of the motor has no effect upon the magnetic clutch circuit during the continued revolution of the motor by its own momentum, since this magnetic clutch circuit is at this time entirely broken and forms no integral part of the motor circuit; whereas if the clutch circuit had formed such integral part of the motor circuit, then the continued revolution of the motor in this manner after its operating circuit had been broken would cause this counter electro-motive force to affect the magnetic clutch circuit thereby still retaining the magnetic effect in the clutch and preventing the same from becoming dead, so that in such case the driving power would remain applied to the machine even after it had been brought to locked home position, which would of course produce undue racking and straining of the machine.

While the form of mechanism here shown and described is admirably adapted to fulfil the objects primarily stated, it is to be understood that it is not desired to confine the invention to the one form of embodiment of the invention here disclosed for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

As a further advantage arising from the construction of the switch mechanism and the contact making device, it will be noted that the direction of revolution of the spring contact plate 111 is such that the circuit is made first through the magnetic clutch and then through the motor, and the circuit is also broken first through the clutch before it is broken in the motor circuit, so that at the time when the motor circuit is broken, the clutch circuit has already been broken and the magnetic clutch is practically dead. This results in throwing the load off of the motor before the motor circuit is broken, and this materially assists in decreasing the sparking at the contact points. Even though a mechanical clutch were used, this same sequence might be followed in which the breaking of the motor circuit takes place as an immediate subsequent accompaniment to the breaking of the clutch connection between the motor and the driven machine.

The subject matter claimed is as follows:

1. In an electric driving device, the combination with an electric motor and a machine driven by said motor, of a circuit for said motor, a magnetic clutch for connecting said motor to said driven machine, a shunt from said motor circuit including said clutch, and a spring operated contact piece for opening and closing said shunt and said motor circuits successively.

2. In an electric driving device, the combination with an electric motor, and circuit therefor, of a machine driven by said motor, a circuit divided from said motor circuit and containing a magnetic clutch, which clutch connects the motor to the machine driven thereby; and a spring operated contact device for automatically breaking said motor circuit as an immediate subsequent accompaniment to the breaking of the clutch circuit.

3. In an electric driving device, the com-

bination with an electric driving motor, a machine driven by said motor and a magnetic clutch for connecting the motor to the driven machine, of a main circuit including the source of electric energy; a divided circuit containing in one branch the motor, and in the other branch the magnetic clutch; and a rotating three point contact piece connecting the main circuit, the motor circuit, and the magnetic clutch circuit, constructed to disconnect said clutch circuit and said motor circuit separately and in immediate succession, from said main circuit.

4. In an electric driving device, the combination with an electric driving motor, a machine driven by said motor and a magnetic clutch for connecting the motor to the driven machine, of a main circuit including the source of electric energy; a divided circuit containing in one branch the motor, and in the other branch the magnetic clutch; a three point switch between the main circuit, the motor circuit, and the magnetic clutch circuit, whereby when said switch is open said motor and said clutch will be disconnected both from the main circuit and from each other; and means for automatically operating said switch to break the motor circuit subsequently to the breaking of the clutch circuit.

5. In an electric driving device, the combination with a driving motor, of a driven member; a magnetic clutch connecting said motor and said driven member, said clutch containing clutch coils; a circuit including said clutch coils; a circuit including said motor; and means for automatically making and breaking said motor circuit subsequently to the making and breaking of said clutch circuit.

6. In an electric driving device, the combination with a driving motor, of a driven member; a clutch for connecting said motor to said driven member to drive the latter by the former; a circuit for said motor; and means for automatically breaking said motor circuit as an immediate subsequent accompaniment to the breaking of the clutch connection between said motor and said driven member.

7. In an electric driving device, the combination with a driving motor, of a driven member; a clutch for connecting said motor to said driven member to drive the latter by the former; a circuit for said motor; and means for automatically making and breaking said motor circuit sequentially to the corresponding making and breaking of the clutch connections between said motor and said driven member.

8. In an electric driving device, the combination with a driving motor, of a circuit including said motor; a contact device for establishing the circuit through the motor; a spring for actuating said contact device; means for releasing said spring to make the circuit through said motor; means connected with the motor for restoring the tension in the spring beyond its normal amount; and means for subsequently releasing said spring to again actuate the contact device to break the circuit through the motor.

9. In an electric driving device, the combination with a driving motor, of a circuit including said motor; a revoluble contact plate for establishing a circuit through said motor; a revoluble shaft on which said contact plate is mounted; a spring connected to said plate and to said revoluble shaft; means for releasing said spring to permit the contact plate to move to establish the circuit; and means connected with the motor for driving said revoluble shaft and thereby rewinding said spring.

10. In an electric driving device, the combination with a driving motor, of a circuit including said motor; a revoluble contact plate for establishing a circuit through said motor; a revoluble shaft on which said contact plate is mounted; a spring connected to said plate and to said revoluble shaft; means for releasing said spring to permit the contact plate to move to establish the circuit; means connected with the motor for driving said revoluble shaft thereby rewinding said spring beyond its normal tension; and means for subsequently releasing said spring to cause the contact plate to move out of contact making position.

11. In an electric driving device, the combination with a driving motor, of a driven member; a circuit for said motor; a locking member for said driven member; a spring contact device and electrical connections for controlling the establishment of the motor circuit; manipulative means for operating said locking member and said spring contact making device; and adjustable means for varying the relative timing between the unlocking of said locking member and the contact making of said spring device.

12. In an electric driving device, the combination with a driving motor, of a driven member; a circuit for said motor; a locking member for said driven member; a spring contact device and electrical connections for controlling the establishment of the motor circuit; manipulative means for operating said locking member and said spring contact making device; and means for adjusting the tension of said spring contact device whereby to vary the relative timing of the unlocking of the driven member and the making of the contact by the spring device.

13. In an electric driving device, the combination with a driving motor, of a circuit including said motor; a spring actuated revoluble contact cylinder for making and breaking the motor circuit; a pallet for engaging said cylinder to effect an intermit-

tent motion thereof to make and break said circuit; and a motor key for controlling said pallet.

14. In an electric driving device, the combination with a driving motor, of a circuit including said motor; a spring actuated revoluble contact cylinder for making and breaking the motor circuit; a pallet for engaging said cylinder to effect an intermittent motion thereof to make and break said circuit; a locking pawl for locking the machine driven by said motor; and means for controlling said pallet by said locking pawl.

15. In an electric driving device, the combination with a driving motor, of a circuit including said motor; a spring actuated revoluble contact cylinder for making and breaking the motor circuit; a pallet for engaging said cylinder to effect an intermittent motion thereof to make and break said circuit; a locking pawl for locking the machine driven by said motor; a motor key for operating said pallet to release the contact cylinder to make the motor circuit; and means connecting said locking pawl and said pallet to operate the latter to again release said cylinder to break the motor circuit.

16. In an electric driving device for registering machines, the combination with a driving motor, of a driven member; a circuit for said motor; a locking member for locking said driven member; and means operated by said locking member for breaking the motor circuit.

17. In an electric driving device for registering machines, the combination with a motor, of a driven member operated by said motor; a circuit for said motor; a locking pawl for locking the driven member; a switch for said motor circuit; manipulative means for operating said switch to close the motor circuit; and means connected with said pawl to operate said switch to break the motor circuit.

18. In an electric driving device for machines the combination with a series of keys, a driven machine, a motor for driving said machine, a circuit for said motor, and a motor key for controlling said motor circuit; of means for locking said motor key while any one of said first keys is being depressed and for also locking said first keys after the motor key has been operated.

19. In an electric driving device, the combination with a driven machine, an electric motor for driving same, and a motor circuit including a switch contact, of a rotatable contact making disk, a latch normally holding said disk, a spring for moving said disk when the same is released to cause making of said contact, means for releasing said latch, and means for finally permitting the return of said latch to its original position, thereby causing breaking of said switch contact.

20. In an electric driving device, the combination with a driven machine, an electric motor for driving same, and a motor circuit including a switch contact, of a spring actuated contact controlling device, means normally holding said controlling device against movement with the spring under tension, devices for moving said holding means to releasing position and thereby permitting said controlling device to cause closing of said switch contact, and means for again tensioning the spring by movement of said motor.

21. In an electric driving device, the combination with a driven machine, an electric motor for driving same, and motor circuit including a switch contact, of a rotating switch contact controlling disk, a spring normally under tension to rotate said disk, a latch normally holding said controlling disk against rotation, a manually operated element for releasing said latch to permit said contact controlling device to rotate and thereby to close said switch contact, and means for restoring said latch to position to obstruct said contact controlling disk and thereby permit opening of said switch contact.

22. In an electric driving device, the combination with a driven machine, a driving motor therefor, and a circuit for said motor including a switch contact, of a movable switch contact controlling device having a spring for operating same normally under tension, a latch normally holding said switch controlling device, manipulative means for releasing said latch, connections whereby movement of said motor tensions said spring, and devices whereby said latch is restored to latching position to obstruct said switch controlling device and thereby permit said switch contact to break said circuits.

23. In an electric driving device, the combination with a driving motor and a circuit for same including a switch contact, of a rotatable switch contact controlling plate, a spring for rotating said controlling plate normally under tension and means for giving tension to said spring by movement of said motor.

24. In an electric driving device, the combination with a driving motor and a circuit for same including a switch contact, of a rotatable switch contact controlling plate, a spring actuating said controlling plate, means for tensioning said spring by movement of the motor, and hand operated devices for controlling said controlling plate.

25. In an electric driving device, the combination with a driving motor, of a circuit including said motor, a member driven by the motor, a spring actuated contact device for establishing the circuit through the motor to drive the driven member, means normally locking the driven member,

manipulative devices controlling the operation of the locking means, and means controlled by the return of the locking means to locking position for disestablishing the circuit through the motor.

26. In an electric driving device, the combination with a driving motor, of a circuit including said motor, a contact device for establishing the circuit through the motor, a spring for actuating said device, a member driven by said motor, means connected with the member for tensioning the spring, means normally locking said member, manipulative devices and connections for operating the locking means, and means controlled by the return of the locking means to locking position for disestablishing the circuit through the motor.

27. In an electric driving device, the combination with a driving motor, of a driven member, a normally inoperative clutch between the said motor and driven member, a circuit for the motor, means normally locking the driven member, manipulative devices rendering the clutch operative, establishing the circuit for the motor and unlocking the driven member, and means controlled by the locking means for breaking the motor circuit and rendering the clutch inoperative.

28. In an electric driving device, the combination with a driving motor, of a circuit including said motor, a rotatable element driven by said motor, a plate mounted on said element and controlling the establishment of the circuit through the motor, a normally tensioned spring for driving said plate, means normally latching the device from movement by the spring, manipulative devices controlling the unlatching of said device to enable the latter to be moved by its spring to close the circuit through the motor, and means actuated by the element when driven by the motor rewinding the spring.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES F. KETTERING.

Witnesses:

WM. O. HENDERSON,

CARL W. REUST.