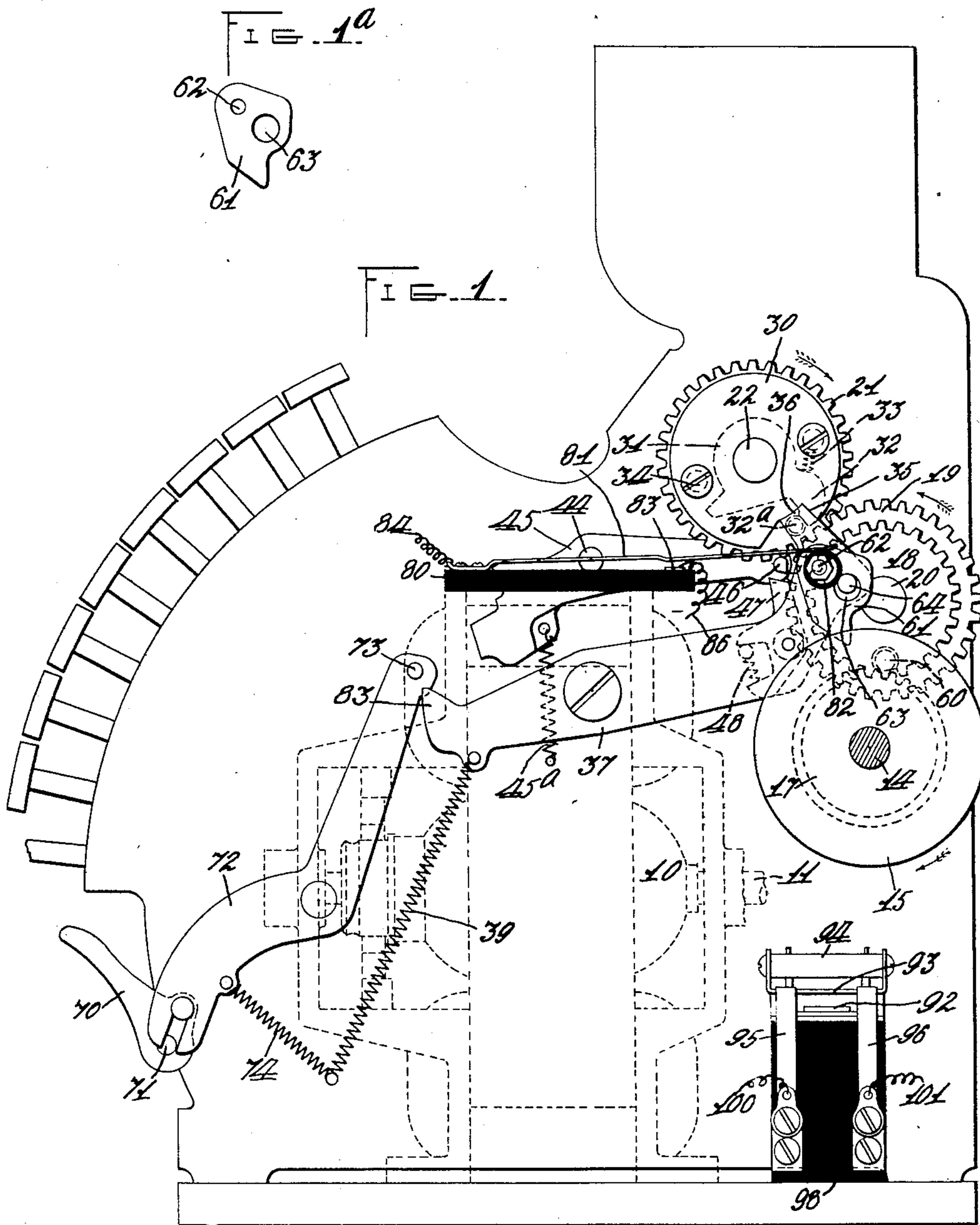


C. F. KETTERING.  
 DRIVING MECHANISM FOR REGISTERING MACHINES.  
 APPLICATION FILED JUNE 9, 1905.

910,690.

Patented Jan. 26, 1909.

3 SHEETS—SHEET 1.



Witnesses

*Wm. O. Henderson*

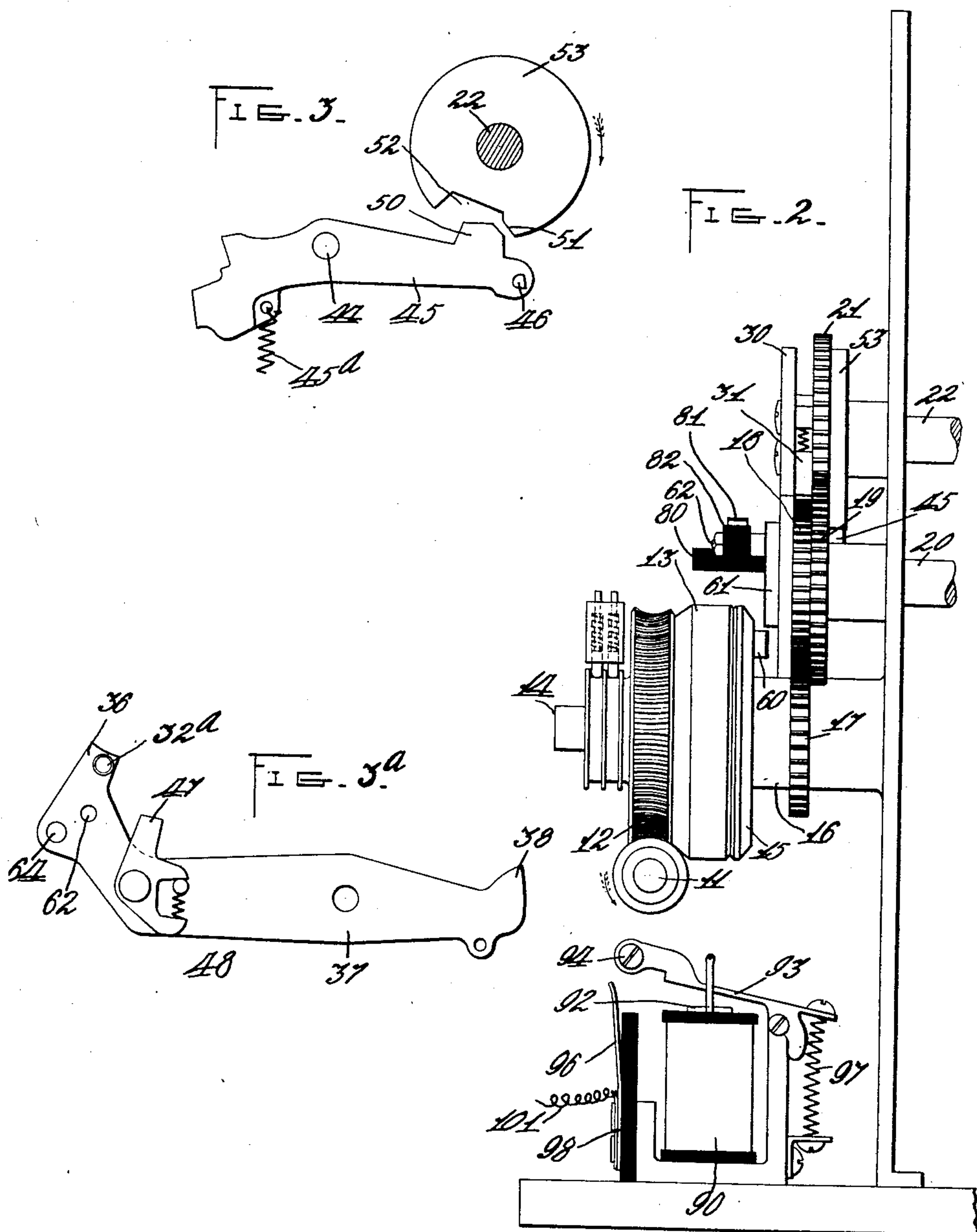
*Charles F. Kettering* Inventor  
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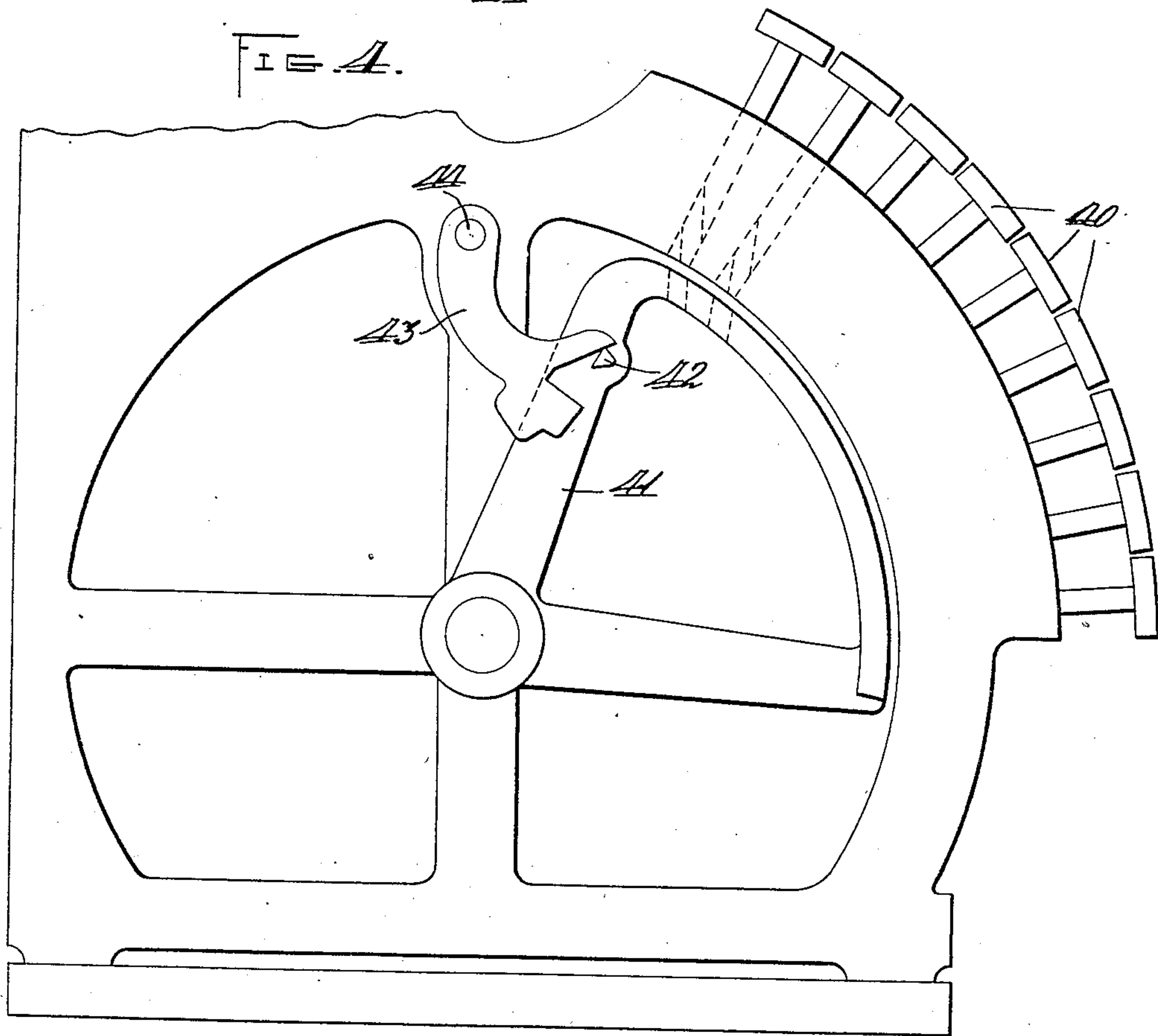
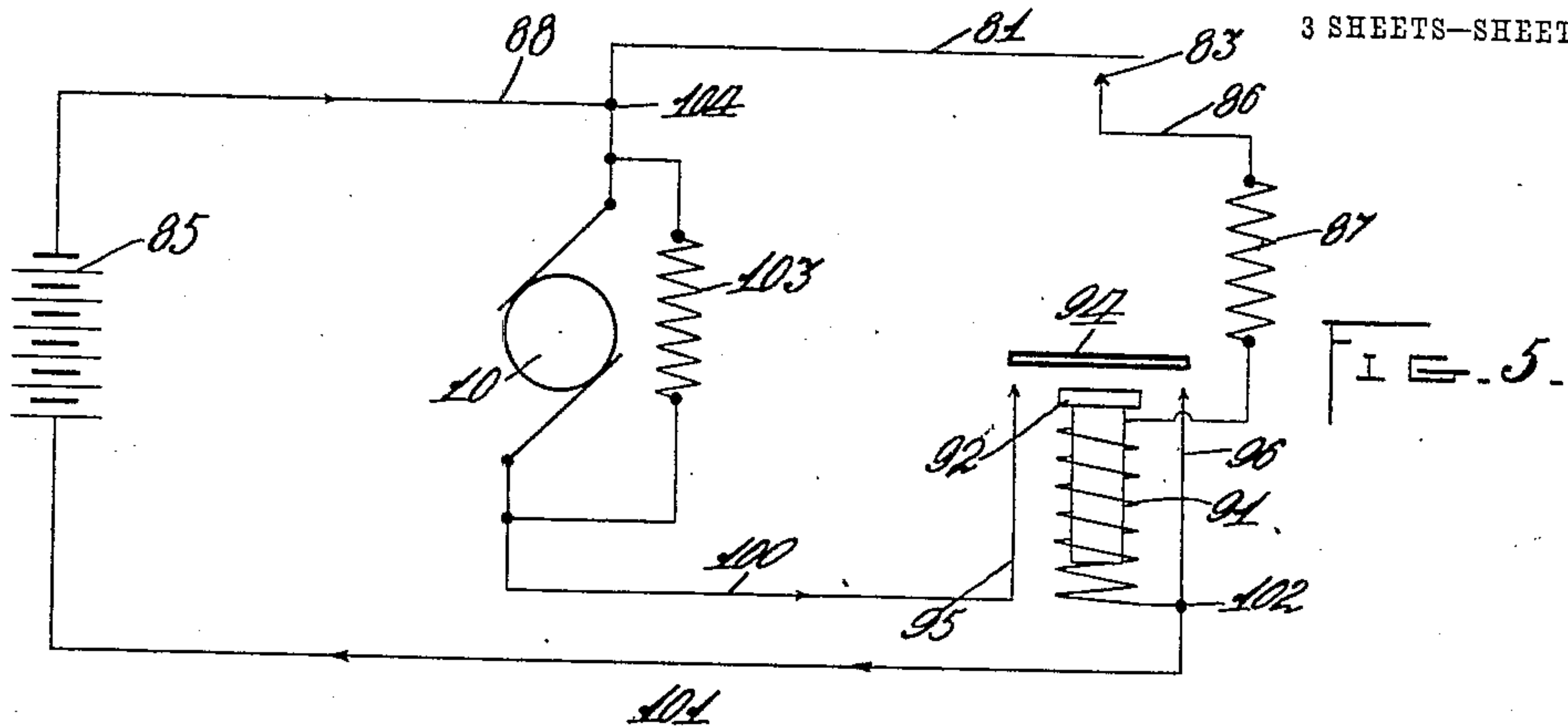
Inventor  
 C. F. Kettering  
 by *[Signature]*  
 and J. B. Hayward  
 Attorneys

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3 SHEETS—SHEET 3.



Witnesses  
C. F. Kettering  
Wm. O. Henderson

Inventor  
Chas. F. Kettering  
By Frank Parker Davis  
and J. B. Hayward  
Attorneys



# 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 MECHANISM FOR REGISTERING-MACHINES.

No. 910,690.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed June 9, 1905. Serial No. 264,412.

*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 Mechanism for Registering-Machines, of which I declare the following to be a full, clear, and exact description.

10 This invention relates to improvements in driving mechanism for cash registers, adding machines and analogous machines, and has among its objects to provide an electric form of driving mechanism which shall be economical and efficient in construction and capable of great durability and shall be free from undesirable and excessive sparking upon the making and breaking of the electric currents.

20 In the specific form which the present invention has assumed there is an electric motor which is adapted to drive the main driving shaft of a cash register, the connection between the motor and the driving shaft being effected by means of a magnetic clutch, and upon the depression of one of a series of special keys of the cash register, an auxiliary circuit is made through this clutch and likewise through a magnetic switch which is in series with the clutch, which switch thereupon makes the main circuit through the motor to start the latter and thereby operate the machine, the magnetic clutch having been previously excited; and at the end of a complete operation of the machine, the circuit through the magnetic clutch and magnetically operated switch is first broken so that upon the return of the switch to normal position the current through the electric motor is broken but in the meantime the magnetic clutch has become dead so that upon the breaking of the motor circuit there is practically no load upon the motor and the sparking at the switch electrodes is thereby

45 minimized to a marked degree.

The invention also comprises certain improvements in the method of establishing the circuit through said clutch upon the depression of one of the special keys, and also includes certain improvements connected with the circuit establishing devices controlled by said special keys.

With these and incidental objects in view, the invention consists in certain novel fea-

tures of construction and combination 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 an end elevation of the cash register to which this electric driving mechanism is applied showing the electric motor in dotted outline and certain of the driving gears. Fig. 1<sup>a</sup> represents a detail view of a restoring pawl. Fig. 2 represents a rear elevation of a portion of the driving gearing, the motor and certain other parts being omitted for the sake of clearness. Figs. 3 and 3<sup>a</sup> represent detail views of certain of the machine unlocking and circuit establishing devices. Fig. 4 represents a fragmentary detail view of the bank of special keys for unlocking the machine and establishing the circuit for operating the machine. Fig. 5 represents a diagrammatic view of the electrical connections.

The particular type of cash register to which this invention is shown as applied in the present case, is now well known in the art and appears in a large number of prior patents such for example as patent to Cleal and Reinhard, No. 580,378, dated April 13, 1897: and hence it will not be necessary to go into a detailed description of the construction and operation of the cash register proper, for the present invention is concerned primarily with the electric driving mechanism, which driving mechanism may well be applied to any form of cash register or analogous registering machine, only one of the various banks of keys being utilized in the present improvements, for the purpose of establishing the motor circuit to cause the motor to operate the cash register in place of a crank handle such as hitherto has been customarily used to drive the machine.

The electric driving motor 10 is shown in dotted outline in Fig. 1. The main shaft 11 of this motor drives the worm gear 12 (see also Fig. 2), which gear is fast to a hollowed disk 13 containing the coils of a magnetic clutch. This worm gear 12 and clutch disk 13 revolve loosely upon a shaft 14, and side by side with said clutch disk 13 is a soft iron disk 15 fast to a collar 16 surrounding said



shaft 14 and turning loosely thereon, to the other end of which collar is made fast a gear wheel 17 which meshes with the gear wheel 18 fast upon the side of a larger gear wheel 19 both fast to a shaft 20 which is the main driving shaft of the machine; and the gear wheel 19 meshes with an upper gear wheel 21 which is fast upon the end of a second transverse shaft 22 of the machine. Thus when the circuit is established through the motor and the magnetic clutch, the driving of the worm gear 12 and clutch disk 13 will carry therewith the soft iron disk 15 and thus drive the gears 17, 18, 19 and 21 and thus operate the driving shaft 20 and 22 of the cash register to perform the various functions which are customarily performed in machines of this character by the operation of the machine subsequent to the operation of the transaction determining elements. The main driving mechanism of the machine however is ordinarily locked and is unlocked by the operation of any one of a bank of special keys, which may be clerks' keys or department keys or any other classification which may be desired, and these special keys also, as an accompaniment to the unlocking of the machine, causes the making of certain circuits to cause the motor to operate and excite the clutch to connect the motor to the main driving shaft of the cash register. This normal locking of the driving mechanism of the cash register is effected by means of a locking disk 30 which is fast upon the aforesaid shaft 22 and slightly spaced apart from the aforesaid gear wheel 21 so as to permit room for the intervening latching pawl 31, which is pivoted loosely on the shaft 22 and is provided with a latching nose 32 and is spring pressed by means of a spring 33 to rotate the pawl to carry the projection on the opposite side thereto against the stop pin 34. The locking disk 30 is formed with a locking shoulder 35 which is engaged by an upwardly projecting nose 36 of a locking lever 37 shown in detail in Fig. 3<sup>a</sup>, which lever has a forwardly extending foot 38 which coöperates with certain release key mechanism as will later be described. A spring 39 normally holds the lever 37 so as to carry the nose 36 into engagement with the locking shoulder 35 so that the advance rotating movement of the gear wheel 21 (as shown by the direction of the arrow) is prevented and the machine is thereby normally locked. The mechanism for releasing this lock by the operation of one of the special keys will now be described. The bank of special keys 40 (see Fig. 4) coöperate with a key detent 41 so that upon the depression of any key the detent will be moved upward slightly in a well known manner, the detent being subsequently locked to retain the key in depressed position, by mechanism not shown herein

but described in the aforesaid patent. This detent carries a lug 42 which acts upon the beveled edge of a curved arm 43 when the detent is raised by the depression of the key whereby to rock the shaft 44. This shaft 44 extends through to the other side of the machine and, as shown in Fig. 1 has fast upon its right hand end a tripping lever 45, shown also in detail in Fig. 3. On the rearward end of this tripping lever is a laterally projecting pin 46 which normally stands just above a dog 47 which is pivoted upon the side of the aforesaid locking lever 37, as shown in Fig. 3<sup>a</sup>, and a spring 48 normally holds the upper end of the dog 47 forward in the position shown in Figs. 1 and 3<sup>a</sup>. The tripping lever 45 is also formed with an upwardly extending beveled nose 50 which coöperates with a beveled wall 51 of a recess 52 formed in a disk 53 fast upon the upper shaft 22 (see also Fig. 3).

When one of the special keys is depressed and the shaft 44 rocked in the manner just described, the rearward end of the tripping lever 45 is rocked downward, and the pin 46 strikes the upper end of the dog 47 and thereby forces downward the rearward end of the locking lever 37 so as to withdraw its locking nose 36 from contact with the locking shoulder 35 and thereby unlock the machine; and the nose 36 is carried downward far enough to permit the latching pawl 31 to spring forward and over the anti-friction roller 32<sup>a</sup> projecting laterally from such locking nose 36 so as thereby to hold the locking lever 37 in depressed and unlocking position. The driving gears of the cash register are now unlocked and free to be rotated by the electric motor, in the direction shown by the arrows, and prior to the complete rotation of the shaft 22 the clerks' keys 40 are released in a well known manner and the shaft 44 returns to normal position thereby permitting the tripping lever 45 to return to normal upper position under the tension of its spring 45<sup>a</sup> attached to the forward end thereof; and this also permits the locking lever 37 to return to normal locking position under the tension of its spring 39 so that when the locking disk 30 completes its revolution, the nose 37 forces itself up into its corresponding recess in said disk and again locks the shoulder 35, and at the same time the roller 32<sup>a</sup> carries the latching pawl 31 back to normal position against the tension of its spring 33 so that the machine is now locked at the end of such complete revolution.

In order to prevent the machine from remaining unlocked by retaining the special key 40 in depressed position, which might occur either through intentional manipulation or carelessness by holding down on the special key, the aforesaid disk 33 is provided. By reference to Fig. 3 it will be seen that when the shaft 22 revolves in the direction of



the arrow, the beveled wall 51 strikes the nose 50 and carries the tripping lever 45 still further downward, and the location of the pin 46 with reference to the dog 47 upon which it impinges, is such that this further or secondary movement of the tripping lever 45 and pin 46 causes the pin to wipe past the forward edge of the dog 47 so as now to assume a position in front of said dog and thus afford no blocking obstruction to the return of the locking lever 37 to normal locking position. Thus the disk 53 performs no function as a locking disk but is merely for the purpose of giving the tripping lever this secondary movement to insure the locking at the end of a complete operation of the machine irrespective of whether the special key is held depressed or not, for if such key is held depressed, and the tripping lever 45 is thereby maintained in its downward position, its effectiveness upon the locking lever 37 has been disabled, and the machine cannot again be operated until this special key is released to allow the pin 46 to return to normal upper position, in which case it again wipes by the dog 47 and the dog springs forward under the pin and thereby the parts are in normal position.

For the purpose of positively restoring the locking lever 37 to locking position near the completion of the operation of the machine, the aforesaid soft iron disk 15 is provided with a laterally projecting anti-friction roller 60 which strikes a dog 61 pivoted upon a laterally projecting pin 62 extending from the side of the rearward end of the lever 37. The dog 61 is formed with an enlarged aperture 63 which surrounds a pin 64 projecting laterally from the lever 37 so as to permit a slight degree of movement of the dog. Near the end of the rotation of the disk 15 the pin 60 strikes the lower end of the dog 61 and carries the same against the pin 64, swinging about the pivotal pin 62 and thereby lifts the locking lever 37 positively into locking position, and then the pin 60 wipes by the dog 61 and the dog drops back under its own weight to normal position as shown in Fig. 1.

The ordinary form of key release is provided comprising a hand lever 70 mounted upon a rock shaft 71 and having a slot and pin connection with the lower end of a lever 72 which is pivoted at its middle point and at its upper end carries a pin 73 which cooperates with the aforesaid foot 83 of the lever 37. This key release lever 70 when depressed rocks the shaft 71 to release all of the key detents of the machine so as to restore to normal position any of the previously depressed keys and thus permit the correction of errors, which mechanism is well known in the art, and the addition of the lever 72 is for the purpose of preventing the unlocking of the machine by the special keys while the key release is being operated, this taking place by

reason of the fact that the pin 73 is thereby carried over the foot 38 and prevents the rocking of the locking lever 37 to unlock the machine; and reversely, when the locking lever 37 is once depressed to unlock the machine the foot 38 stands in the rear of the pin 73 and prevents the key release from being operated. A spring 74 normally holds the lever 72 in the position shown in Fig. 1.

The electric connections for starting the motor will now be described with the aid of the diagrammatic Fig. 5. Fastened at one end upon the insulation block 80 (see Fig. 1) is a spring electrode strip of metal 81 which extends rearward and rests upon an insulated cam roller 82 carried upon the aforesaid pin 62 which projects laterally from the side of the aforesaid locking lever 37. Upon the opposite end of the block 80 is a raised electrode or terminal 83. A lead-wire 84 connects the spring 81 with the main battery 85 (see Fig. 5), and a lead-wire 86 connects the terminal 83 with the coils of the magnetic clutch 87. These coils 87 of the magnetic clutch are contained within the aforesaid clutch disk 13, and are in series with a magnetic switch which will now be described. This switch comprises a casing 90 (see Figs. 1 and 2) containing the magnetic solenoid coil 91 (see Fig. 5); this coil being in series with the magnetic clutch coils 87 and the battery 85. The energizing of the solenoid coil 91 magnetizes its core 92 and draws downward the pivoted armature 93 carrying the contact making roller 94, which roller when carried downward strikes against two spring contact terminals 95 and 96. The lead-wire 100 connects the electrode 95 with the motor 10 (see Fig. 5), and the lead-wire 101 connects the electrode 96 with the main battery 85, and the solenoid coil 91 is also connected at the point 102 with said electrode and said lead-wire 101. 103 (see Fig. 5) constitutes the original shunt field for the motor 10. The operation of these circuit making devices will now be described. When the locking lever 37 is rocked downward in the manner heretofore described to unlock the machine, the insulated roller 82 is of course also carried downward, and the spring electrode 81 resting thereon is now free to descend under its own spring tension and make the contact with the terminal 83. From Fig. 5 it will be seen that this completes the circuit through the battery 85 the magnetic coils 87 the magnetic switch solenoid 91 and the lead-wire 101, and thereby the core 92 of the magnetic switch is magnetized and draws downward the armature 93 against the tension of its spring 97, and this causes the roller 94 to bridge across the contact between the spring contact electrodes 95 and 96 which of course are mounted upon a suitable insulated block 98. This making of the connection between the elec-



trodes 95 and 96 now establishes the main circuit through the motor 10, this motor circuit being now a divided circuit between the points 102 and 104 (see Fig. 5), the other  
 5 branch of the divided circuit being the magnetic clutch and the magnetic switch solenoid coil. The circuit now being made through the motor the motor revolves its shaft 11 and through the gearing above described operates the machine to turn the  
 10 main driving shafts thereof one complete revolution, and as above set forth, near the end of such revolution the locking lever 37 is forced backward to normal locking position,  
 15 and the insulated cam roller 82 is then carried upward again to force the spring contact strip 81 off of its terminal 83 and thus break the circuit through the magnetic clutch and the magnetic switch solenoid, so that the  
 20 spring armature 92 is immediately released and thus the current through the motor is then broken, and the machine thereby is automatically locked and the motor circuit broken so that the machine cannot again be  
 25 operated until the same sequence of operation is repeated.

From the above described connections it will be seen that the operation of any one of the special keys by permitting the spring  
 30 electrode 81 to make contact with its terminal 83, thereby first establishes the current through the clutch and through the magnetic solenoid coil, so that the motor circuit is thereby made subsequently to the making of  
 35 this circuit through the clutch; and likewise the clutch circuit is broken, near the end of the operation of the machine before the motor circuit is broken, so that when the motor circuit is broken the magnetic clutch is practically  
 40 dead and there is no load upon the motor. Although of course these intervals of time between the making of the clutch circuit and the main motor circuit are practically inappreciable, yet there is nevertheless  
 45 such a sequence in the making of these two circuits that the making of the motor circuit subsequently to the clutch circuit minimizes the sparking at the spring electrode strip 81 and terminal 83, and the breaking of the  
 50 motor circuit subsequently to the breaking of the clutch circuit when there is no load on the machine also minimizes the sparking both at the terminal 83 and at the motor circuit terminals 95 and 96.

55 A further advantage to be pointed out in the use of the spring contact strip 81 is that the strip makes its contact by reason of its own spring tension, and the pressure of the special key for releasing the machine does  
 60 not have to be utilized to exert additional force to carry the circuit making contacts together; and more especially does its spring strip construction present an advantage in that it permits the contact surfaces to be  
 65 free from excessive wear due to excessive

pressure thereon by any positively actuated circuit making devices. In such cases as the present instance where the key operated locking device (the tripping lever 45) has to be given a further movement to disable the effect of the tripping lever upon the locking lever in the manner described, if this further or secondary movement gave also a still further movement to any contact making devices it would cause undue pressure between the same and also a sliding of the contact points over each other which would cause rapid wear of such contact points and make the same unsatisfactory from a commercial standpoint of durability; and thus it is obvious that the making of the contact by the spring strip due to its own tension has these decided advantages over any positively operated contact making devices.

It is to be observed from Fig. 1 that the aforesaid insulated cam roller 82 is eccentrically pivoted upon this pin 62, and the purpose of this is so that the roller may be adjusted about its pivotal point and held in adjusted position by a suitable nut and thus normally hold the contact making strip 81 nearer or further away from its terminal 83 so as thereby to regulate the time of making and breaking the circuit through the magnetic clutch relatively to the unlocking and locking movement of the lever 37, and this also avoids the necessity of constantly bending the spring strip 81 to secure the proper timing adjustment.

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 intended to confine the invention to the one form of embodiment herein disclosed, for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. 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 including clutch coils; a magnet operated switch containing magnetic coils; a circuit including said clutch coils and said magnet coils in series; and a circuit including said motor, which circuit is made and broken by said magnetically operated switch.

2. 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 magnetically operated switch containing magnetic coils; and a divided circuit arrangement comprising in one branch the driving motor, and in the other branch the clutch coils and the magnetic coils, said magnetic switch serving to



make and break the circuit in the motor branch of the divided circuit.

3. 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 controlling the making and breaking of the motor circuit by the making and breaking of the clutch circuit.

4. In an electric driving device for registering machines, the combination with a driving motor, of a driven member of said registering machine; a magnetic clutch connecting said motor and said driven member, said clutch including clutch coils; a magnetically operated switch including magnetic coils; a circuit including said clutch coils and said magnetic coils in series; a circuit including said motor, which circuit is made and broken by said magnetically operated switch; manipulative means connected with the registering machine for making the circuit in the clutch coils and the magnetic coils; and means for automatically breaking the latter circuit at the end of the complete operation of the machine.

5. In an electric driving device, the combination with a driving motor, of a normally locked mechanism operated thereby; a circuit including said motor, a spring contact device for completing said circuit, manipulative means for controlling the position of said contact device and unlocking said mechanism, and means operated by said mechanism for restoring the spring contact device to normal position and again locking the mechanism.

6. In an electric driving device, the combination with an electric motor, of a normally locked mechanism driven thereby, a circuit including said motor, a spring contact arranged to close said circuit, manipulative means and connections for permitting said contact to close said circuit and also releasing said mechanism, and an anti-friction roller carried by said mechanism and serving to restore said spring contact and again lock the mechanism.

7. 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 magnetically operated switch containing magnetic coils; a circuit including said clutch coils and said magnetic coils in series; a circuit including said motor which circuit is made and broken by said magnetically operated switch; a spring contact making device for establishing the circuit in the clutch coils and magnetic coils; and means for controlling the position of said spring contact device.

8. In an electric driving device, the combination with a driving motor, of a normally locked driven member; a circuit including said motor; a contact making device for controlling the establishment of the circuit through the motor, said contact device comprising a spring strip and a contact making terminal in proximity thereto; means for normally retaining said strip from contact making position with said terminal; and manipulative means for disabling said retaining means to permit said strip to rest upon said terminal and serving to unlock the driven member.

9. In an electric driving device for registering machines, the combination with a driving motor, of a driven member of said machine; a circuit including said motor; a locking member for said driven member; a tripping member for operating said locking member; manipulative means for giving said tripping member an initial movement to actuate said locking member and thereby unlock said driven member and effect the making of the motor circuit; and means for giving said tripping member a secondary movement, with provisions for causing this secondary movement to disable the effectiveness of the tripping member upon said locking member.

10. In an electric device for registering machines, the combination with a driving motor, of a driven member of said registering machine; a circuit for said motor; a locking lever for engaging said driven member to normally lock the same; a tripping lever for operating said locking lever to unlock the machine; a dog carried by said locking lever and operated upon by said tripping lever; manipulative means for giving said tripping lever an initial movement to act upon said dog and unlock the machine and effect the making of the motor circuit; and means connected with said driven member for giving said tripping lever a secondary movement whereby to free the same from said dog and permit the locking lever to automatically return to locking position.

11. In an electric device for registering machines, the combination with a driving motor, of a driven member of said registering machine; a circuit for said motor; a locking lever for engaging said driven member to normally lock the same; a tripping lever for operating said locking lever to unlock the machine; a dog carried by said locking lever and operated upon by said tripping lever; manipulative means for giving said tripping lever an initial movement to act upon said dog and unlock the machine and effect the making of the motor circuit; a spring contact strip and cooperating terminal in proximity thereto with electrical connections for controlling the making of the motor circuit; and



provisions connected with said locking lever for normally holding said strip out of contact with its cooperating terminal when the locking lever is in locked position and to permit the strip to make contact with its terminal when the lever is in unlocked position.

12. In an electric device for registering machines, the combination with a driving motor, of a driven member of said registering machine; a circuit for said motor; a locking lever for engaging said driven member to normally lock the same; a tripping lever for operating said locking lever to unlock the machine; a dog carried by said lock lever and operated upon by said tripping lever; manipulative means for giving said tripping lever an initial movement to act upon said dog and unlock the machine and effect the making of the motor circuit; a restoring dog carried by said locking lever; and provisions connected with said driven member for actuating said restoring dog to positively restore the locking lever to normal locking position.

13. In an electric driving device, the combination with a driving member, of a driven member, a circuit for said motor; a locking member for said driven member; a spring contact making strip in proximity to a terminal and having electrical connections for effecting the establishment of the motor circuit; provisions connected with said locking member for normally holding said strip out of contact with its terminal; and means connected with said provisions for varying the normal extent of separation between said strip and its terminal whereby to vary the timing between the unlocking movement of the locking member and the contact making of said spring strip.

14. In an electric driving device, the combination with a driving motor, and an operating mechanism driven thereby, of a magnetically controlled clutch for connecting said motor and operating mechanism, a magnetically controlled switch, a circuit for operating said clutch and switch, and a motor circuit including said switch.

15. In an electric driving device, the combination with a driving motor and an operating mechanism driven thereby, of a magnetically controlled clutch for connecting said motor and operating mechanism, a magnetically controlled switch, a circuit for operating said clutch and switch, and having a branch including the switch and the motor.

16. In an electric driving device, the combination with a driving motor and a mechanism driven thereby, of a magnetic clutch for connecting the mechanism to the motor, a switch and a controlling magnet for same and a circuit including said clutch and said controlling magnet and having a branch including said switch and said motor.

17. In an electric driving device, the com-

bination with a driving motor, of a mechanism driven thereby, a clutch for connecting said mechanism to the motor, a circuit closer for the motor, and a circuit operating said clutch and circuit closer, thereby serving to close the motor circuit.

18. In an electric driving device, the combination with an electric motor, of an operating mechanism driven thereby, a clutch for connecting said mechanism to the motor, a circuit closer, a circuit operating said clutch and circuit closer and a branch circuit including said circuit closer and motor.

19. In an electric driving device, the combination with an electric motor, and an operating mechanism arranged to be driven thereby, of a magnetic clutch for connecting said mechanism to said motor, a circuit closer for said motor, and a circuit including said clutch and serving to operate the circuit closer.

20. In an electric driving device, the combination with a motor and a mechanism arranged to be driven thereby, of a magnetic clutch for connecting said mechanism to said motor, a circuit closer for said motor, and a circuit including said clutch and serving to operate the circuit closer and having a branch including the circuit closer and the motor.

21. In an electric driving device, the combination with an electric motor, of a device driven thereby and including a gear, a main circuit closer for said motor with means for controlling same and a disk carried by said gear having a depression and serving to prevent the return of the circuit closer until the movement of the machine has been completed.

22. In an electric driving device, the combination with an electric motor, of an operating mechanism arranged to be driven thereby, a disk having a depression and movable with the operating mechanism, a main circuit closer for said motor with means for operating it, said means being prevented from operation except after the disk has made a complete movement.

23. In an electric driving device, the combination with an electric motor, of a mechanism driven thereby, a circuit closer for said motor, an arm normally holding said closer in circuit breaking position but which when moved permits closing of the circuit, and means operated by said driven mechanism for positively restoring said arm to normal position and thereby positively moving said circuit closer to circuit breaking position.

24. In an electric driving device, the combination with an electric motor, of a mechanism driven thereby, a spring circuit closer for said motor normally under tension, means normally holding said closer in circuit breaking position, but which when moved permits such circuit closer to follow it to closing position, and means for positively restoring said



holding means to normal position, and thereby positively moving said circuit closer to circuit breaking position.

25. In an electric driving device, the combination with an electric motor, and a mechanism driven thereby, of a closer for the circuit of said motor comprising a spring contact, an arm carrying a roller for engaging said spring contact and having a projection, a second arm and a pawl thereon engaging said projection, and means operated by said driven mechanism for moving said second arm in one direction to restore said circuit closer to breaking position.

26. In an electric driving device, the combination with an electric motor, and a mechanism driven thereby, of a circuit closer for said motor, a pivoted arm controlling said circuit closer, said arm carrying at one end a locking device for the driven mechanism and at the other end being pointed, and a manipulative device having a projection positioned

to be engaged by said pointed end when said arm has been adjusted, and prevent movement of said manipulative device. 25

27. An electric driving device comprising the combination with manipulative means, of a cam lever operated by said means, operating mechanism and a lever normally locking same, connections between said cam lever and said locking lever, an electric motor and a circuit therefor, a clutch device for connecting said motor to said operating mechanism, a circuit closer controlled from said locking lever, and means actuated by the operating mechanism for restoring the locking lever to locking position and thereby moving said circuit closer to circuit breaking position. 30 35

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

CHARLES F. KETTERING.

Witnesses:

WM. O. HENDERSON,  
S. P. DAVIS.