No. 779,802. PATENTED JAN. 10, 1905.

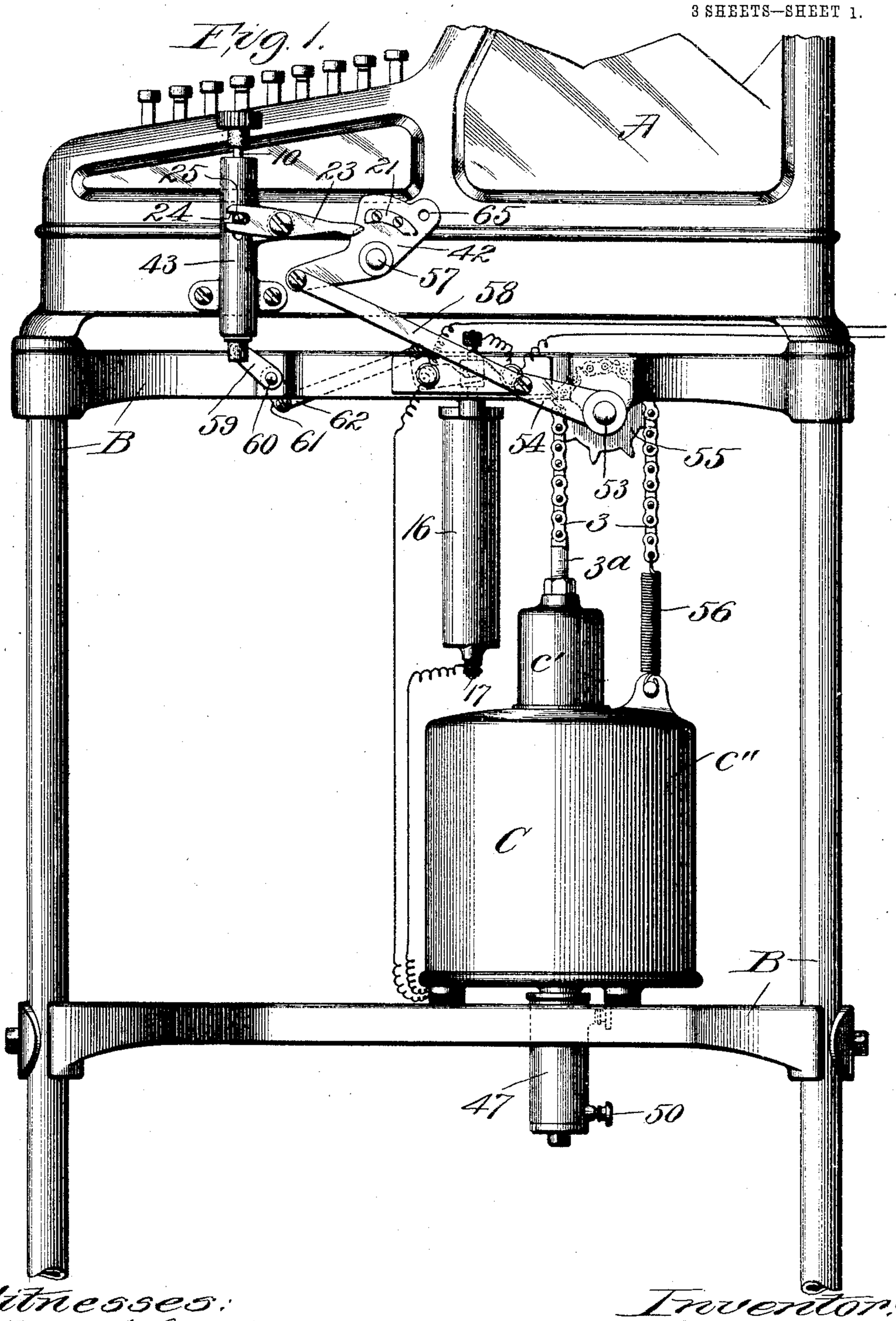
F. C. RINSCHE.

DRIVING MECHANISM FOR CALCULATING MACHINES.

APPLICATION FILED JUNE 15, 1903.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Wm. H. Scott
Gales Rumm,

Inventor:
Frank C. Rinsche,
by Bakewell & Cornwall
Attys.

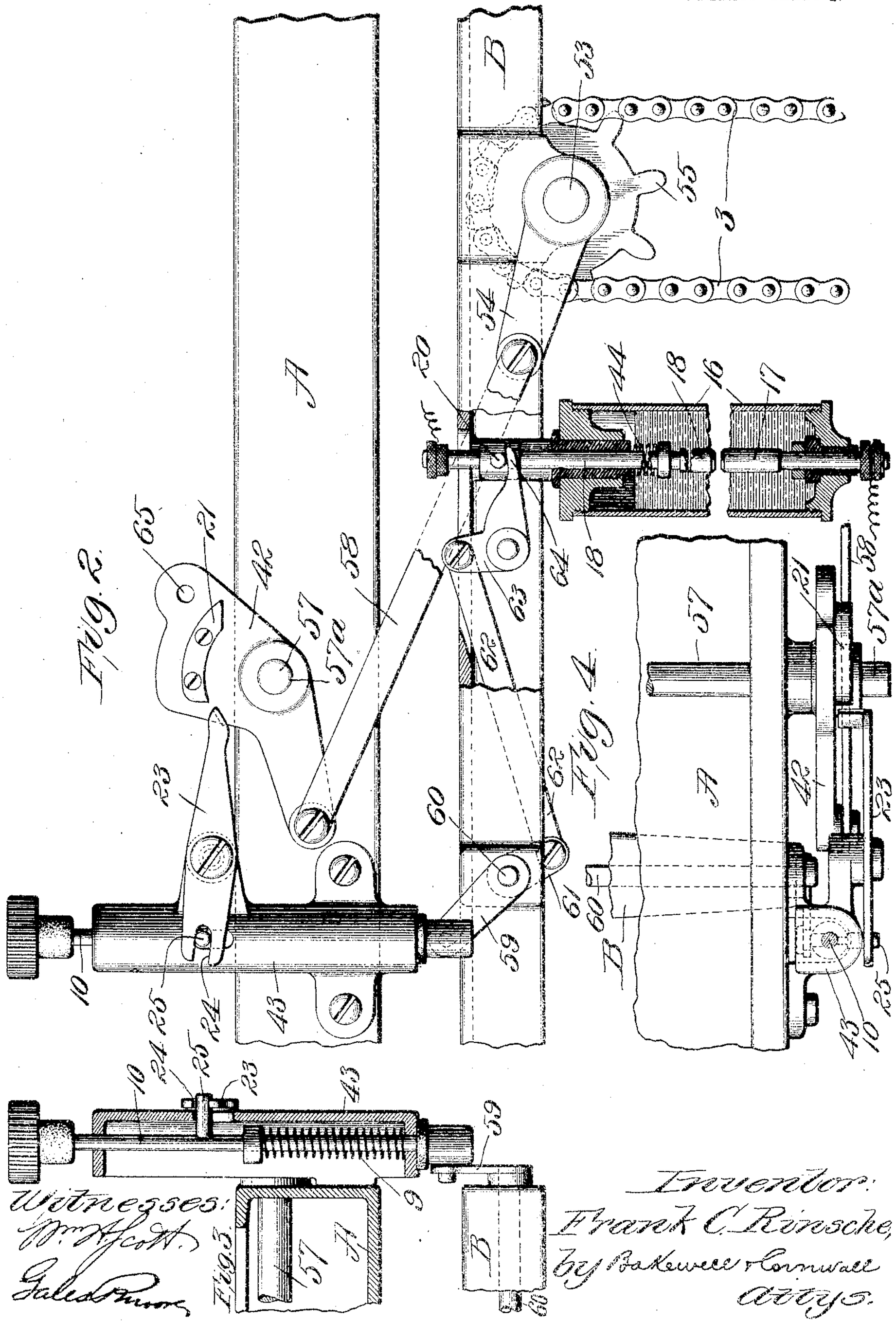
No. 779,802. PATENTED JAN. 10, 1905.

F. C. RINSCHE.

DRIVING MECHANISM FOR CALCULATING MACHINES.

APPLICATION FILED JUNE 15, 1903.

3 SHEETS—SHEET 2.



No. 779,802. PATENTED JAN. 10, 1905.

F. C. RINSCHE.

DRIVING MECHANISM FOR CALCULATING MACHINES.

APPLICATION FILED JUNE 15, 1903.

3 SHEETS—SHEET 3.

Fig. 5.

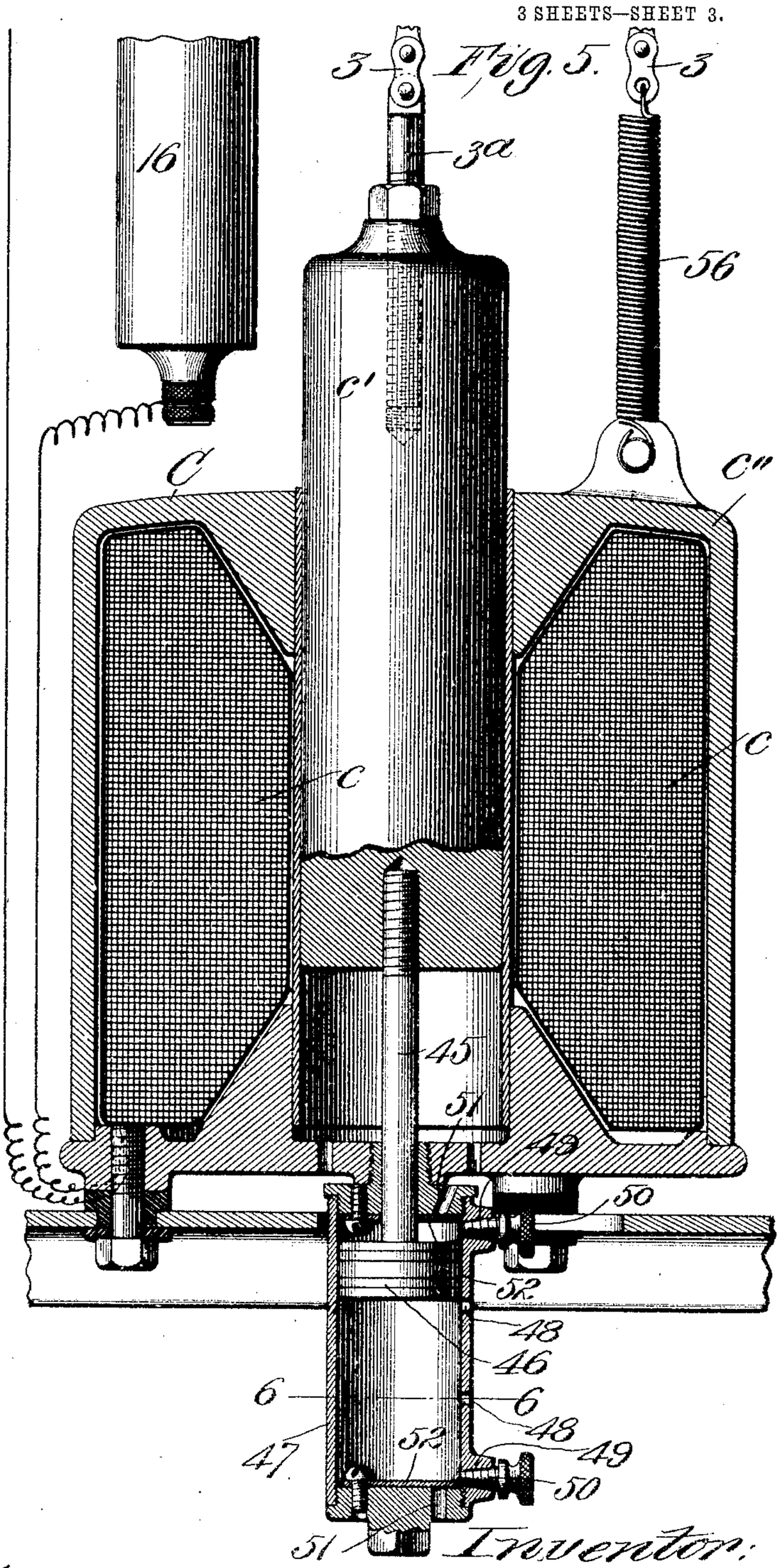
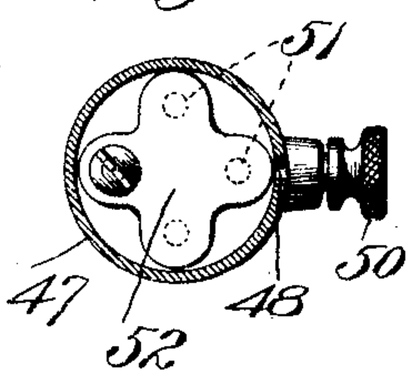


Fig. 6.



Witnesses:
W. H. Scott.
Caleb S. Morse.

Inventor:
Frank C. Rinsche,
by Bakewell & Cornwall
Attys.

No. 779,802. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

FRANK C. RINSCHE, OF ST. LOUIS, MISSOURI, ASSIGNOR TO UNIVERSAL ACCOUNTANT MACHINE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

DRIVING MECHANISM FOR CALCULATING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 779,802, dated January 10, 1905.

Application filed June 15, 1903. Serial No. 161,607.

To all whom it may concern:

Be it known that I, FRANK C. RINSCHE, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Driving Mechanisms for Calculating-Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation, certain of the parts being broken away. Fig. 2 is a detail elevation, certain of the parts being shown in section. Fig. 3 is a sectional elevation of certain mechanisms shown in Fig. 2, the view being taken from the left of Fig. 2. Fig. 4 is a fragmentary top plan view. Fig. 5 is a sectional view illustrating the motor, and Fig. 6 is a detail sectional view on about the line 6 6 of Fig. 5.

This invention relates to driving mechanisms for calculating-machines and the like, the primary object being to provide means whereby the calculating-machine can be properly driven by a simple and efficient motor, the proper operation of the motor being effected merely by the depression of a suitable key by the operator.

To this end and also to improve generally upon mechanisms of the character indicated the invention consists in the various matters hereinafter described and claimed.

Referring now more particularly to the accompanying drawings, A represents a calculating-machine of well-known construction, such as the machine fully described in my Patent No. 654,181, dated July 24, 1900. B represents the supporting-frame, which can be of any suitable construction, and C indicates the motor. This motor is merely a solenoid and comprises the helix *c* and the core *c'*. Extending downwardly from the core is a rod 45, which carries a piston-head 46, operating in a cylinder 47. This cylinder is provided in its side wall with suitable vents 48, which are open at all times, and also with vents 49, which lie near the heads of the cylinder and are controlled by suitable screw-valves 50. The heads of the cylinder are provided with openings 51, which are covered by flap-valves 52. In the operation of the core *c'* the air in the cylinder 47 is gradually expelled therefrom by the piston-head 46, so that gradual movement of the said core is provided for, and the core is compelled to move slowly at the limits of its stroke, whereby jamming and jarring of the operative mechanism of the calculating-machine are rendered impossible.

Suitably journaled upon the supporting-frame B is a rock-shaft 53, provided with a rock-arm 54 and also with a sprocket-wheel or other suitable driving element 55. A link chain or other appropriate driving member 3 has one end connected to the core *c'* and its other end connected to a recovering-spring 56, which is secured upon the solenoid-casing *c''*. It will be manifest that under ordinary conditions the spring 56 holds the core *c'* in what may be termed its "retracted" position and that when the helix is energized the core is moved and moves the driving connection 3 in opposition to the spring 56, the sprocket-wheel 55 being thus moved about its pivot and the rock-arm 54 being thereby rocked. As soon as the helix is deënergized the recovering-spring 56 asserts itself and moves the core *c'* into its retracted position, the sprocket-wheel 55 and its rock-arm being reversely operated by such movement of the core.

Fast upon the operating-shaft 57 of the calculating-machine is a rock-plate 42, which is connected by the link 58 with the before-mentioned rock-arm 54, so that by the movements of the sprocket-wheel 55 resulting from the forward movement of the core *c'* and the action of the spring 56 the driving-shaft 57 of the calculating-machine is operated in a manner similar to the well-known operation of the same by the usual operating-handle and the recovering-spring ordinarily connected to said operating-shaft.

The switch herein illustrated for controlling the solenoid comprises a fixed terminal

17 and a movable terminal 18, said terminals being inclosed in a casing 16, adapted to contain oil. A spring 44 is preferably placed between the upper end of the casing 16 and a suitable collar upon the movable terminal, said spring tending to force said movable terminal into engagement with its coöperating terminal. Guided in a suitable casing 43 supported upon the frame of the calculating-machine is a slidable rod 10, which forms a switch-key, said rod being normally held in its upper position by means of a suitable spring 9. The lower end of this rod 10 is connected to a rock-arm 59 upon a rock-shaft 60, suitably journaled in the supporting-frame B, and a second rock-arm 61 upon said rock-shaft is connected by a link 62 to one arm of a bell-crank lever 63, the other arm of said lever being adapted to operate the movable terminal 18 in opposition to the spring 44, as by means of a pin 20 upon said movable terminal which lies above a finger 64 on the appropriate arm of said bell-crank lever, said finger lying below and out of engagement with said pin when the bell-crank lever is rocked and the movable terminal is in contact-making position. It will now be manifest that upon depression of the switch-key 10 by the operator the movable terminal will be thrown into contact with the fixed terminal, whereupon the circuit through the helix of the solenoid will be completed and the core will be operated to cause the operating-shaft 57 of the calculating-machine to be properly rocked in one direction, while when the switch-key is permitted to be returned to normal position by the spring 9 the movable terminal 18 is thrown out of contact with the coöperating fixed terminal and the circuit through the core of the solenoid is broken, whereupon the recovering-spring 56 asserts itself and the operating-shaft 57 of the calculating-machine is rocked backwardly to its normal position.

A lever 23 has one arm provided with a slot 24, in which is received a pin 25 upon the switch-key 10, said pin projecting through a suitable slot in the guide-casing 43, and the other arm of said lever 23 when the parts are in their normal inoperative positions lies slightly in advance of a supporting-plate 21, secured upon the side of the rock-plate 42. When the switch-key 10 is depressed, the inner arm of the lever 23 (*i. e.*, the arm adjacent the rock-plate 42) is elevated slightly above the supporting projection 21, and as the rock-plate commences its forward movement said supporting projection 21 moves under the said arm of the said lever 23, and the switch-key is thus held in depressed position to cause contact between the terminals 17 and 18 until the operating-shaft 57 of the calculating-machine has completed its forward movement, when the said arm of the lever 23 slips off of the rear end of the supporting projection 21 and the switch-key rises under the action of its spring 9, the said arm of the lever being thrown downwardly out of the path of movement of the said supporting projection 21, whereupon the circuit through the helix of the solenoid being broken the recovering-spring 56 rocks the rock-plate 42 and the operating-shaft 57 backwardly into normal position. Preferably the rock-plate 42 is provided with an opening 65, adapted to receive a suitable pin or screw, so that should the operative mechanism heretofore described become ineffective an ordinary operating-handle can be readily slipped over the projecting end 57^a of the operating-shaft of the calculating-machine and a pin or screw passed through the said opening 65 and engaged with said operating-handle. Thus the calculating-machine can be operated by hand in a manner which is well understood.

I am aware that minor changes in the construction, arrangement, and combination of the several parts of my driving mechanism may be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

It will be noted that the present mechanism employs as the power member a magnet and its armature as distinguished from a rotary electric motor. As the movement of the core or armature is of course limited, there is no danger of too great movement, as exists with a motor having a rotatable armature, and the solenoid is of course much simpler in its construction than is a motor having the usual armature, together with means for limiting the maximum movement of such armature.

Preferably the core c' is adjustably connected to the driving connector or chain 3, whereby the position of the core in the helix can be adjusted to suit currents of different force and also to suit the particular resistance offered by the calculating-machine to which the motor may be connected, said adjustable connection being herein illustrated as effected by means of threaded engagement between the core and the connecting-rod 3^a, connected to the chain 3.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. The combination with a calculating-machine including a driving-shaft, of a magnet, an armature therefor, a driving member, a flexible driving-connector about said driving member and having one end connected to said armature, a recovering-spring connected to the other end of said driving-connector, and operative connection between said driving member and said operating-shaft, substantially as described.

2. The combination with a calculating-machine including a driving-shaft, of a solenoid including a helix and a core, a driving mem-

ber, operative connection between said driving member and said operating-shaft, a flexible driving-connector about said driving member and having one end connected to said core, and a recovering-spring connected to the other end of said driving-connector and to the casing of said solenoid; substantially as described.

3. The combination with a calculating-machine including a driving-shaft, of a rock-plate upon said driving-shaft, a second shaft, a driving member upon said second shaft, a rock-arm upon said second shaft, connection between said rock-arm and said rock-plate, a driving-connector about said driving member upon said second shaft, and means for driving said driving-connector; substantially as described.

4. The combination with a calculating-machine including a driving-shaft, of a solenoid, a circuit including said solenoid and also including a switch, driving connection between said solenoid and said driving-shaft, and means controlled by said solenoid for maintaining said switch in circuit-forming position; substantially as described.

5. The combination with a calculating-machine including a driving-shaft, of a motor, a switch having a movable terminal, a circuit including said switch and said motor, a switch-key, a lever connected to said movable terminal, a rock-shaft, a rock-arm upon said shaft connected to said switch-key, a second rock-arm upon said shaft, a link connecting said second rock-arm to said lever connected to said movable terminal, and driving connection between said motor and said driving-shaft of the calculating-machine; substantially as described.

6. The combination with a calculating-machine including movable elements, of a driving member therefor, a cylinder having vents adjacent its ends, and a piston working in said cylinder and connected to said driving member, whereby said piston can move rapidly during the body of its stroke but is compelled to move slowly during the terminal portion of its stroke; substantially as described.

7. The combination with a calculating-machine including a driving-shaft, of a magnet, an armature therefor, a driving connection between said armature and said driving-shaft, a cylinder having ports in its heads, inwardly-opening valves controlling said ports, vents intermediate said heads, valve-controlled vents intermediate said first-mentioned vents and said heads, and a piston-head working in said cylinder and connected to said armature; substantially as described.

8. The combination with a calculating-machine including a power-shaft, of a motor including as elements a magnet and a reciprocatory armature coöperating therewith, driving connection between said armature and said power-shaft, and means for adjusting one of said motor elements toward and away from the other thereof to vary the extent of throw of said armature; substantially as described.

9. The combination with a calculating-machine including a power-shaft, of a magnet, a reciprocatory armature therefor, and driving connection between said armature and said power-shaft and adjustably connected to one of said last two-mentioned elements; substantially as described.

10. The combination with a calculating-machine including a power-shaft, a solenoid including a core, and a driving-connector connected to said power-shaft and including a connecting-rod threaded into said core; substantially as described.

11. The combination with a calculating-machine including a power-shaft, of a rock-plate connected to said shaft and provided with a screw-opening, the end of said shaft projecting beyond said plate, a motor, and driving connection between said motor and said plate; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 6th day of June, 1903.

FRANK C. RINSCHE.

Witnesses:
GALES P. MOORE,
GEORGE BAKEWELL.