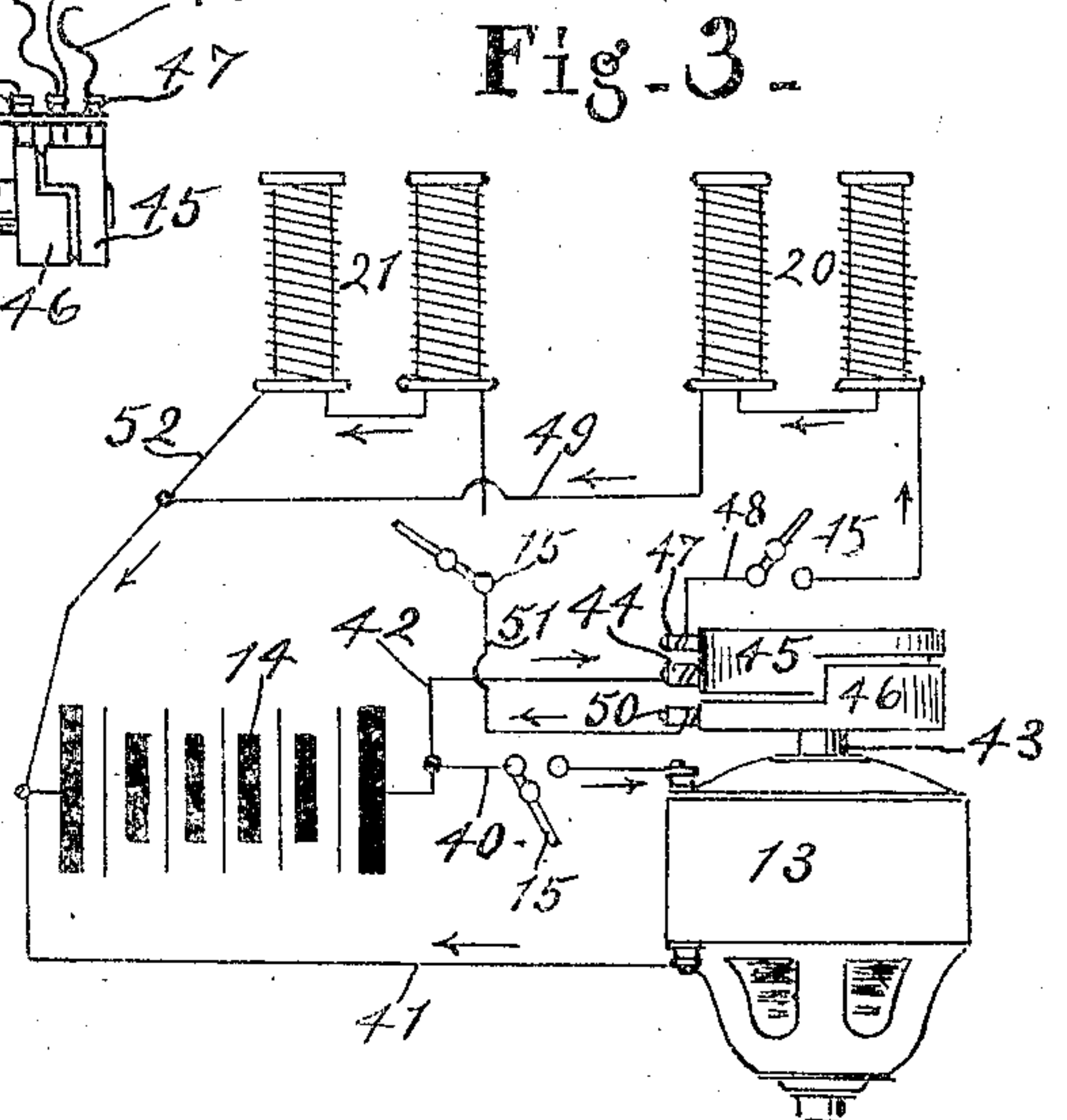
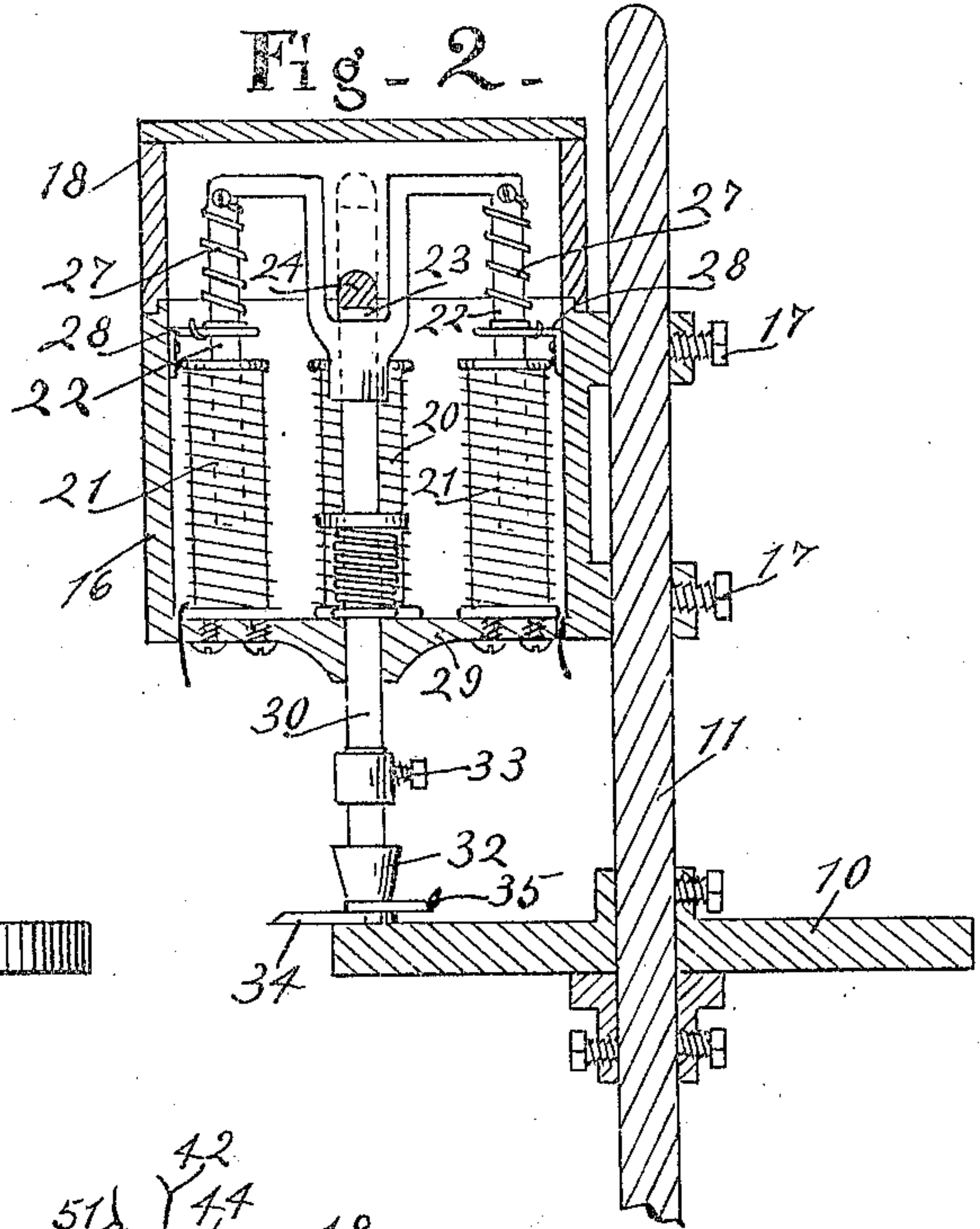
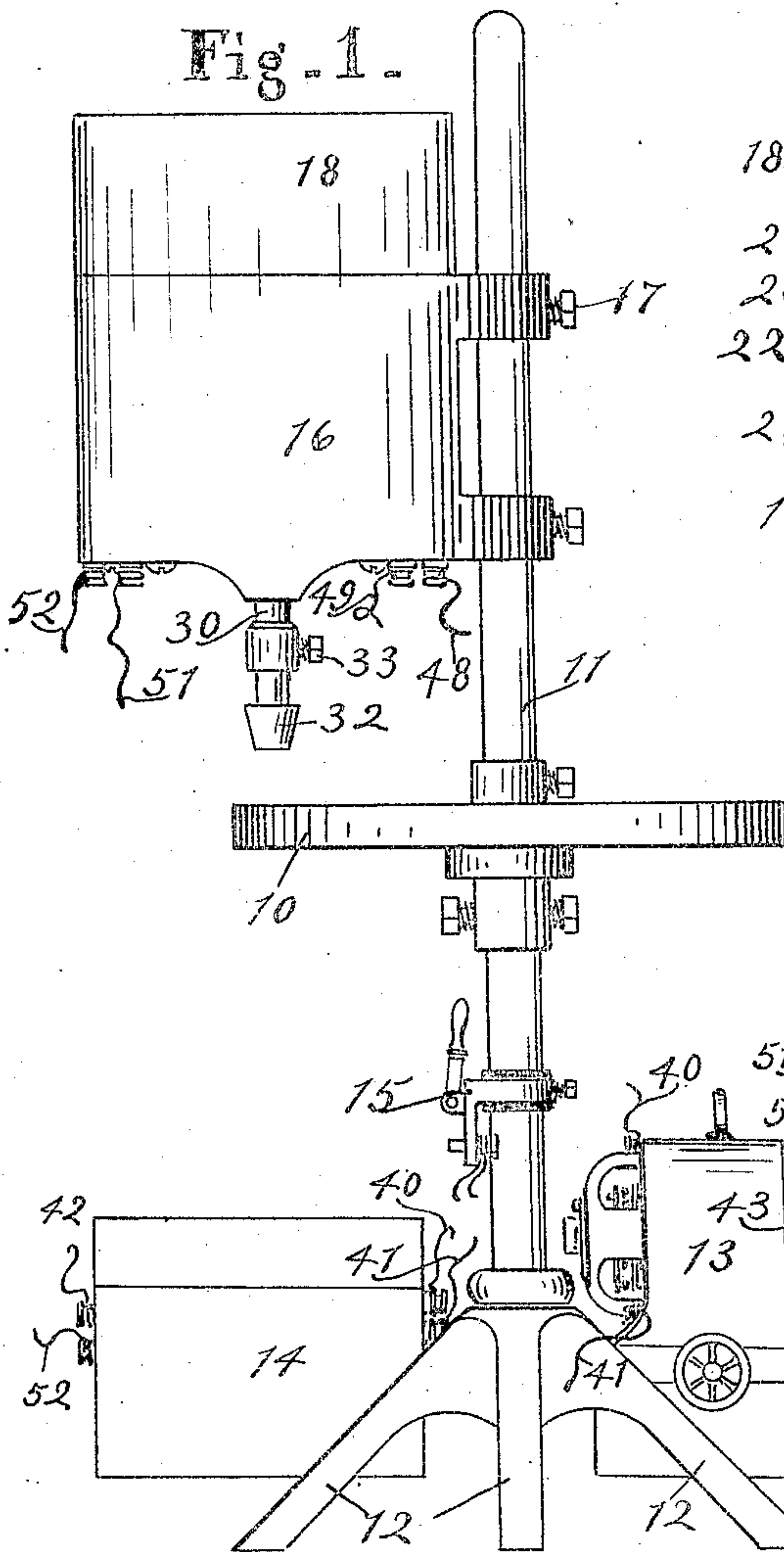


No. 847,741.

PATENTED MAR. 19, 1907.

W. A. DENNY.
ELECTRIC HAMMER.
APPLICATION FILED JULY 26, 1906.

2 SHEETS—SHEET 1.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 4

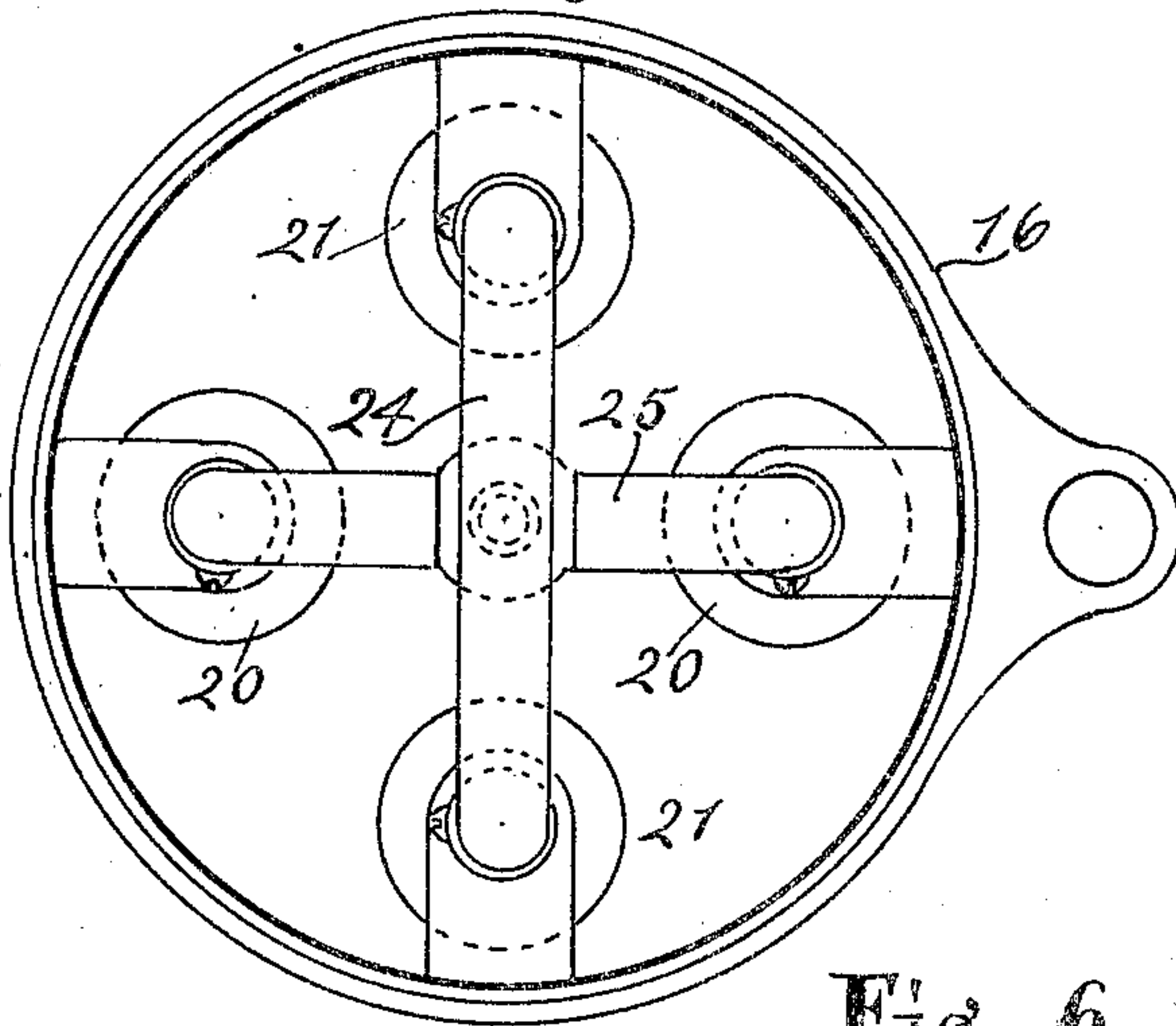


Fig. 5

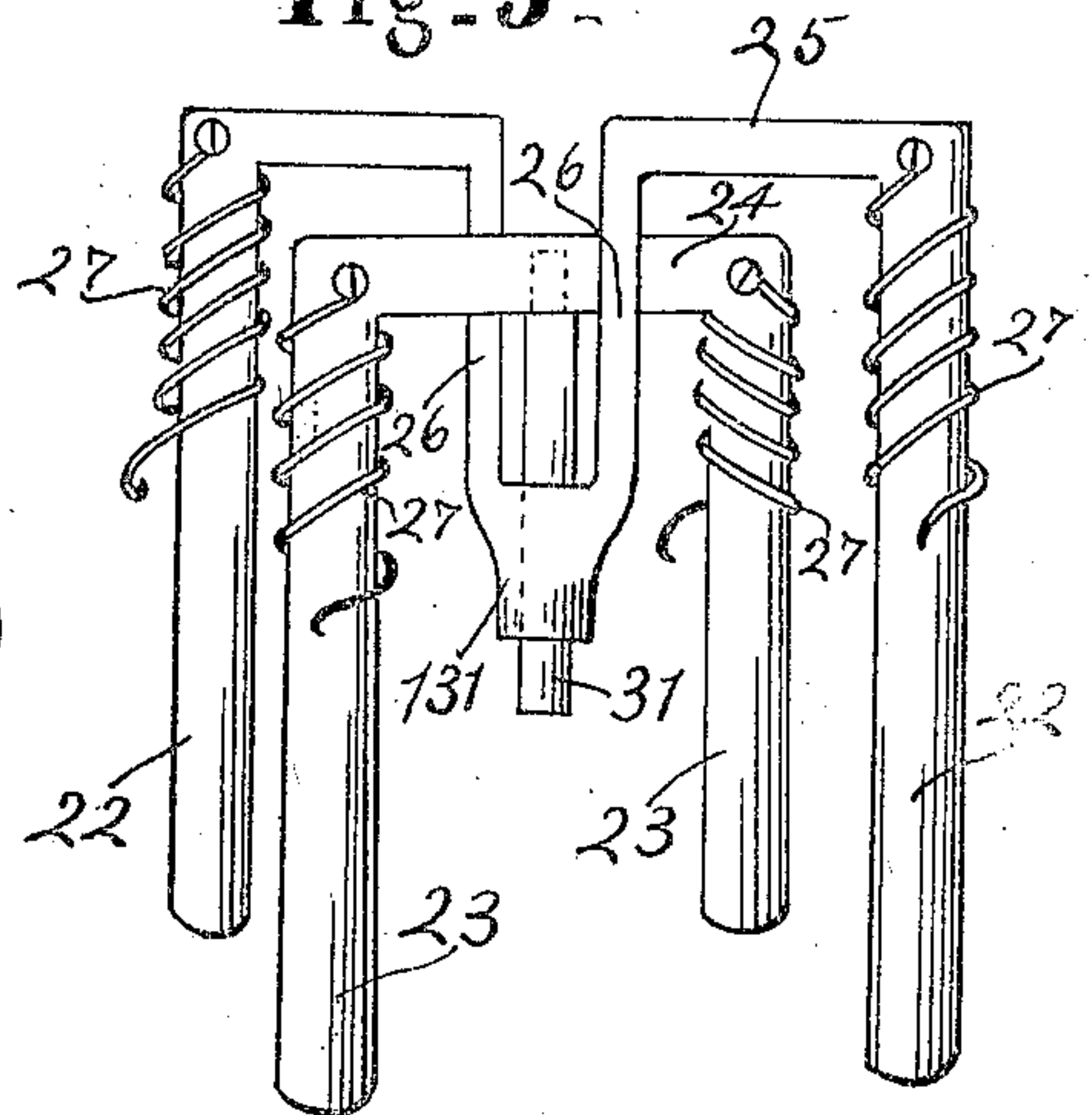
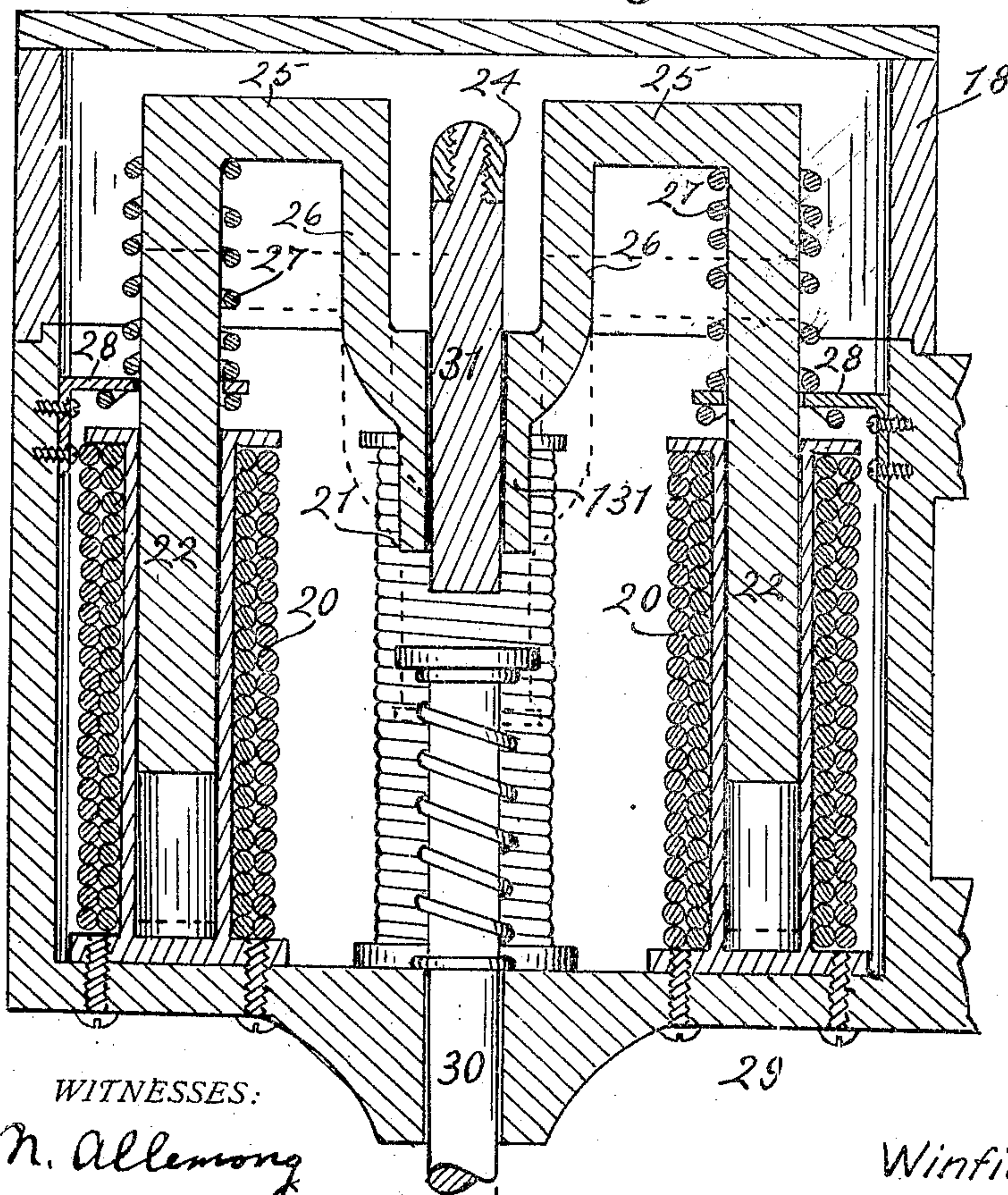


Fig. 6



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UNITED STATES PATENT OFFICE.

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TO BENJAMIN D. EMANUEL AND ONE-THIRD TO CLEMENT W. HOOVEN,
OF ANDERSON, INDIANA.

ELECTRIC HAMMER.

No. 847,741.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed July 26, 1906. Serial No. 327,894.

To all whom it may concern:

Be it known that I, WINFIELD A. DENNY, of Anderson, county of Madison, and State of Indiana, have invented a certain new and useful Electric Hammer; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters refer to like parts.

The object of this invention is to actuate a hammer, punch, or other tool by giving it longitudinal reciprocatory movement by the direct action of solenoids, magnets, or like electrical means.

The result sought is the provision of a very simple, small, efficient, and economical device for operating hammers, punches, and the like in various situations and remote from the source of electricity. The device may be relatively so small that for many purposes it may be conveniently handled or carried by hand while using it. The device can be used for riveting, seaming, chiseling, calking, darning, punching, and the like. It can be mounted so as to swing an anvil under a plunger or plate carrying dies for punching and as a hand-tool.

The chief feature of the invention consists in directly connecting a hammer, plunger, or the like with cores of solenoids and the like, so that said hammer will be reciprocated at each energization of the solenoids.

Another feature of the invention consists in utilizing two sets of solenoids with two sets of cores that are alternately operated by the current and with hammers associated so as to act upon a single plunger or the like, whereby great rapidity of stroke is obtained.

Another feature of the invention consists in providing the solenoids with a soft-iron base and connecting the soft-iron cores of the solenoids at their outer ends, so that there will be a continuous magnetic circuit through them, and the action of the magnetic circuit upon the cores will increase in power as the inner ends of the cores approach the soft-iron base and as the hammer is ready to give its blow. This merely increases the force of the blow and the effectiveness of the device.

The full nature of the invention will be more fully understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a side elevation of the device. Fig. 2 is a central vertical section through the upper portion thereof, showing the position of the parts at actuation. Fig. 3 is an electrical diagram of the wiring. Fig. 4 is a plan view of the solenoids and surrounding casing. Fig. 5 is a perspective view of the cores of the solenoids. Fig. 6 is a central vertical section through the solenoids and casing with the cores in their unoperated position.

The form of device herein shown to illustrate the nature of my invention is as follows: A table 10 is mounted on a post 11, supported by legs 12 in proximity to a motor 13, and a storage battery 14. A switch 15 is secured on the post 11 below the table, and above the table an electrical hammer mechanism is mounted in a casing 16, said casing being fastened on the post 11 by a set-screw 17 and having a lid 18.

Coming now to the real invention, I provide within the casing 16 two pairs of solenoids or coils 20 and 21, having cores 22 and 23, respectively. The pair of cores 23 is secured to a yoke 24, while the cores 22 are secured to a yoke 25. These yokes are arranged at right angles to each other, the yoke 25 having a central downwardly-extending loop 26 and the yoke 24 extending and operating loosely through said loop. The loop 26 extends down far enough to permit the free and independent movement of both pairs of cores. Each core is returned and normally held in its upward position by springs 27, that are coiled around the upper ends of the core and bear against the yoke above, and a bracket 28, secured to the inner surface of the casing 16.

A plunger 30 is mounted within a base 29 of the casing and is vertical and reciprocates longitudinally of its length, it being forced downward alternately by a hammer 31 from the yoke 24 and a hammer 131 from the yoke 25. The hammer 131 is integral with the loop 26. The hammer 31 passes loosely through a central aperture in the lower part of the loop 26 and the hammer 131. As each pair of solenoids is energized the plunger is given a blow on its head by the hammers. To the lower end of the plunger any suitable tool, such as 32, may be secured by a set-screw 33. In Fig. 2 the tool is shown

as welding pieces 34 and 35, of metal, that are on the table 10, the tool and plunger being in their downward positions and actuated by the rod and yoke 24 for the cores 23.

5 The wiring is shown in Fig. 3, where the current from the battery 14 through a wire 40 drives a small motor 13 and returns by a wire 41. The current passes also to the coils or solenoids through the wire 42 and an
10 automatic circuit-changing or make-and-break switch actuated by a shaft 43 of the little motor. The wire 42 goes to a stationary brush 44, that engages alternately the wheels 45 and 46, that are in said shaft.
15 One-half of these wheels are alternately engaged by said brush 44. A brush 47 engages the wheel 45 all the time, and from it a wire 48 leads to the coils 20 on the cores 22 and from said coils through a wire 49 back to
20 the battery. From a brush 50 a wire 51 leads to the coils 21, about the cores 23, and thence over a wire 52 to the battery. The switch shown in Fig. 1 is a three-way switch and operates to shut off the circuit between
25 the battery and motor, and thus stop both hammers. In another position said switch also breaks the line 48 and stops one of the hammers. In another position the switch breaks the current through the line 51 and
30 stops the other hammer. Any other well-known form of circuit-changing or make-and-break switch may be employed beside that shown herein.

By referring to Fig. 3 it is observed that
35 the length of cores are such that in the downward movement thereof they come very close to the iron base 29 and that in the actuating movement of said cores they approach said iron base as they approach their limit of
40 movement. The cores are engaged at the top by a yoke, and the cores, yoke, and the base 29 are all formed of soft iron, so that a continuous magnetic circuit will exist through said soft-iron base, cores, and yoke and the
45 magnetic power of said circuit will increase as the cores approach the base and their limit of movement or the point at which the blow of the hammer is given. Hence the power of said blow is materially increased by
50 this feature of the construction. The rapidity of blows of the hammer depend upon the rapidity of the alternations of the passage of the current through the respective coils. The current is alternated by any cus-
55 tomary contrivance first in the one set of coils and then the other; but I do not wish to be limited to this arrangement, as the same effect may be produced by allowing the current to flow through both sets of coils shunt-
60 ed and then throwing in a resistance first on one side and then the other, so that the coils at each change in resistance will lose or regain their magnetic pull.

While I have shown herein two sets of solenoids and two hammers, it is obvious that

only one set of solenoids and one hammer may be used, if desired; also, while I have shown a plunger that is actuated by the hammer it is obvious that the plunger may be dispensed with and the hammer extended
70 through the base and come in contact with the thing to be treated.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a pair of solenoids
75 or the like, parallel cores, a hammer between said cores and connected with them so as to be reciprocated longitudinally by them.

2. The combination of a pair of solenoid or the like, parallel cores, a rigid connection
80 between said cores, and a hammer connected with said rigid connection so as to move therewith.

3. The combination of a pair of parallel solenoids, soft-iron cores, a soft-iron plate on
85 which the solenoids are mounted at one end, a soft-iron connection between the other ends of the cores, and a hammer actuated by said connection, said parts being arranged so that the cores will approach said soft-iron plate as
90 they approach their limit of movement.

4. A plurality of pairs of solenoids or the like, a core for each solenoid, a connection
between the cores of each pair, and a hammer connected with each core connection,
95 said hammers being associated so that they will act upon the same object.

5. A plurality of pairs of solenoids or the like, a core for each solenoid, a connection
between the cores of each pair, and a hammer
100 connected with each core connection, said hammers being associated so that they will act upon the same object, and means for energizing the different pairs of solenoids in succession.
105

6. The combination of two pairs of solenoids or the like, a core for each solenoid, a connection between the cores of each pair, a
hammer connected with each core connection, said two hammers associated so as to
110 act upon the same object, and means for alternately energizing said two pairs of solenoids.

7. The combination of two pairs of parallel solenoids, a core for each solenoid, a connection
between each pair of cores, said connections being arranged at right angles to each other and being independent of each other, a
hammer connected with each core connection, one of said hammers being movable cen-
120 trally through the other, and means for energizing said two pairs of solenoids alternately.

In witness whereof I have hereto affixed my signature in the presence of the witnesses herein named.

WINFIELD A. DENNY.

Witnesses:

LUELLA COSTELLO,
ELIZABETH ARMSTRONG