(No Model.) 2 Sheets—Sheet 1.

F. J. CROUCH.

DYNAMO ELECTRIC MACHINE.

No. 516,298. Patented Mar. 13, 1894.

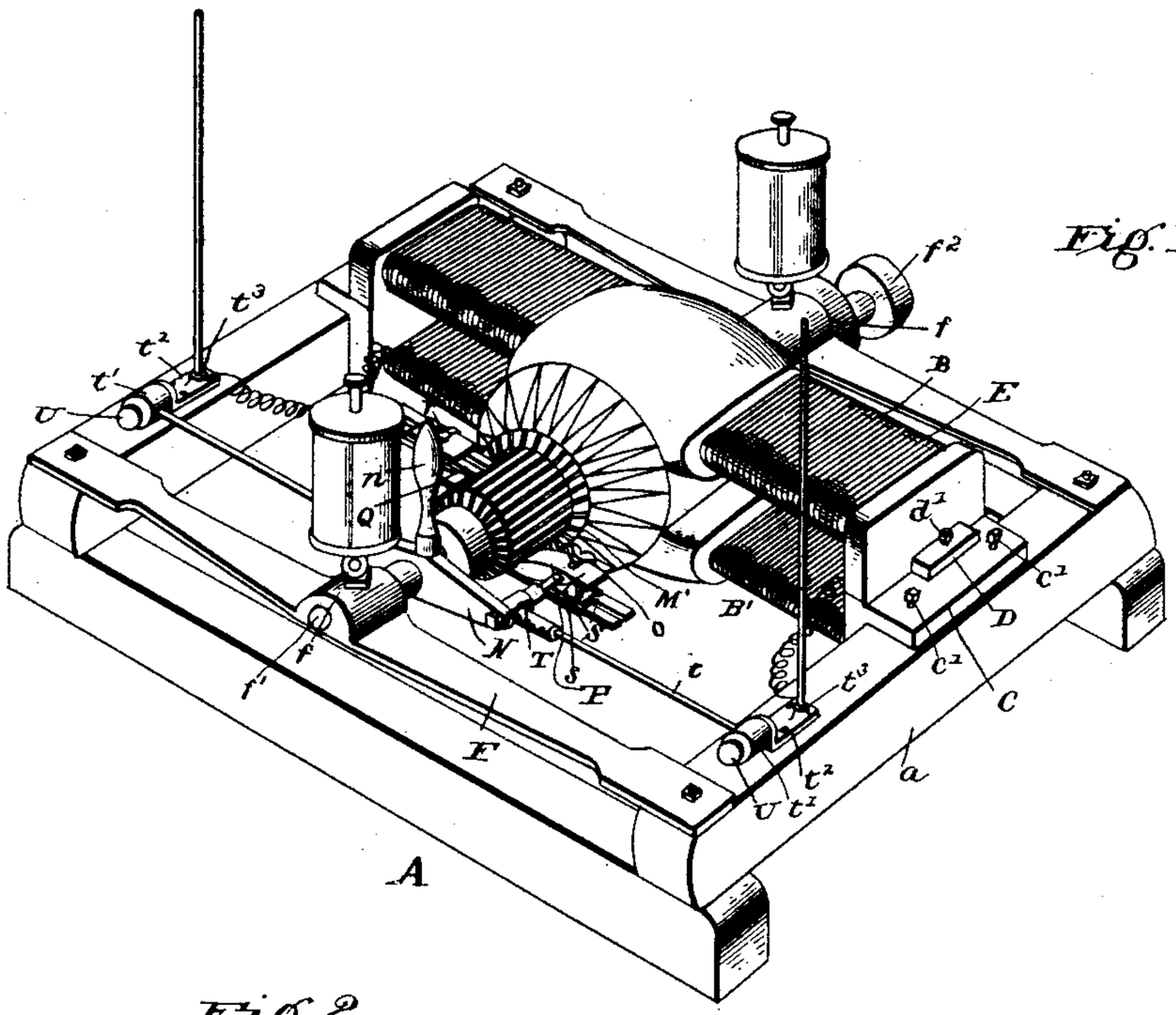


Fig. 1.

Fig. 2.

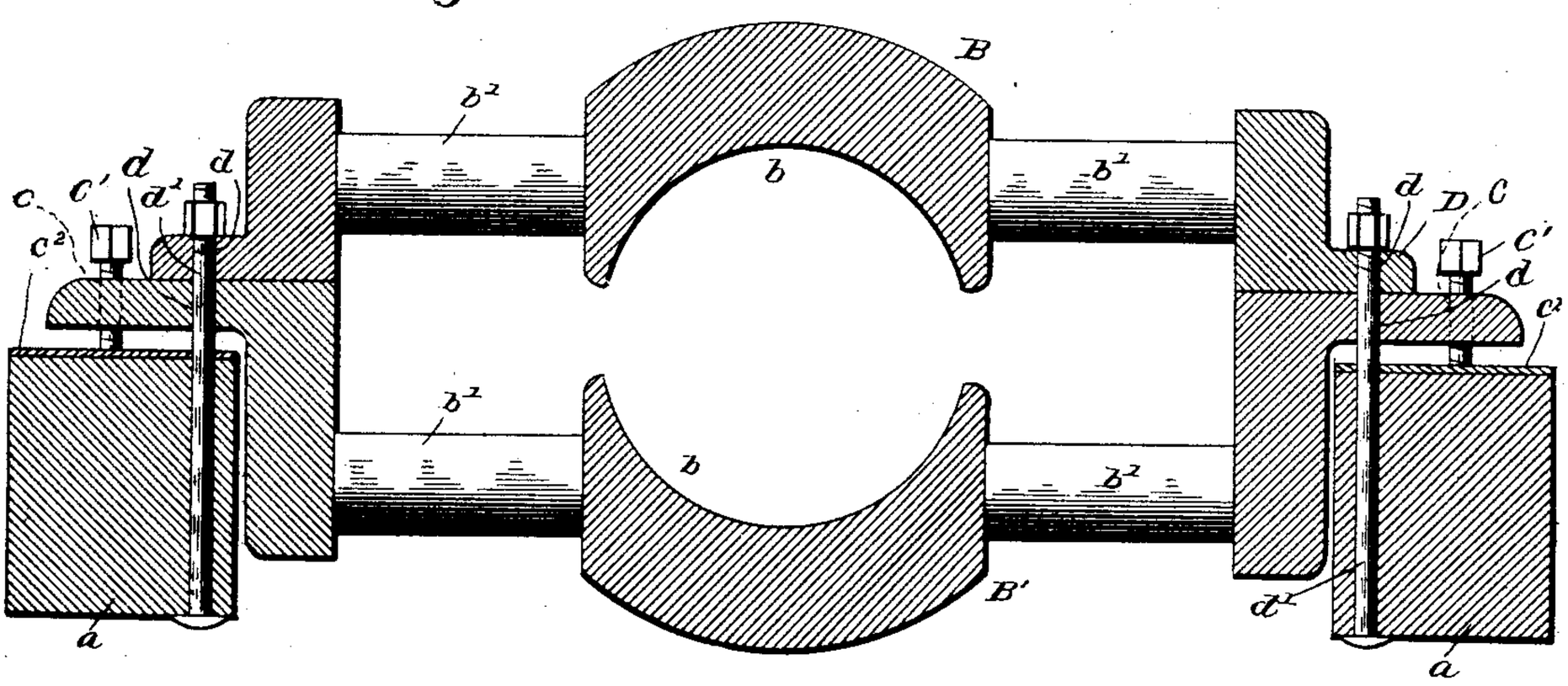
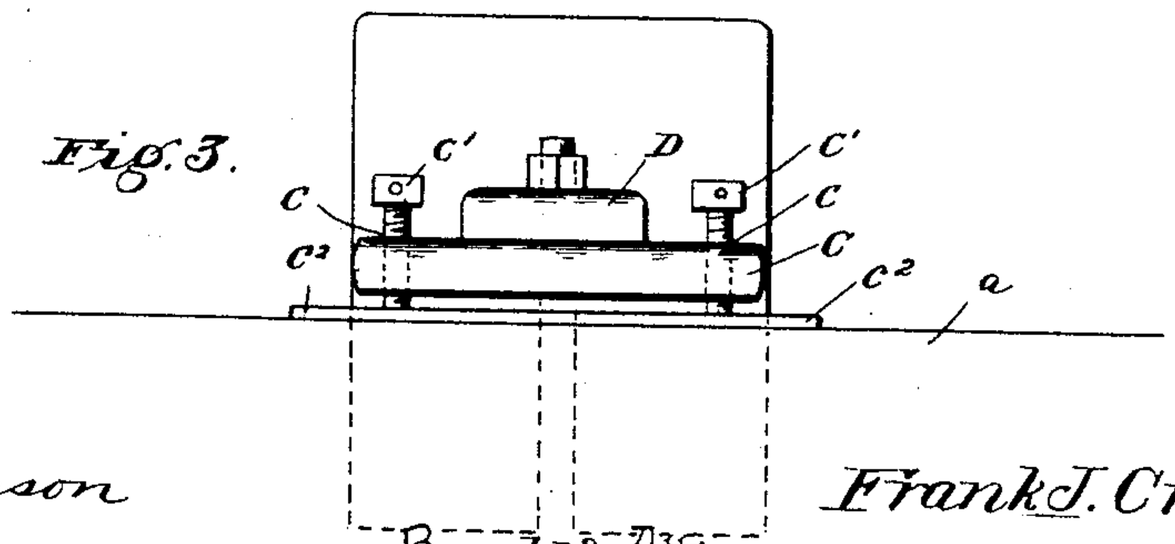


Fig. 3.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

F. J. CROUCH.

DYNAMO ELECTRIC MACHINE.

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Fig. 4.

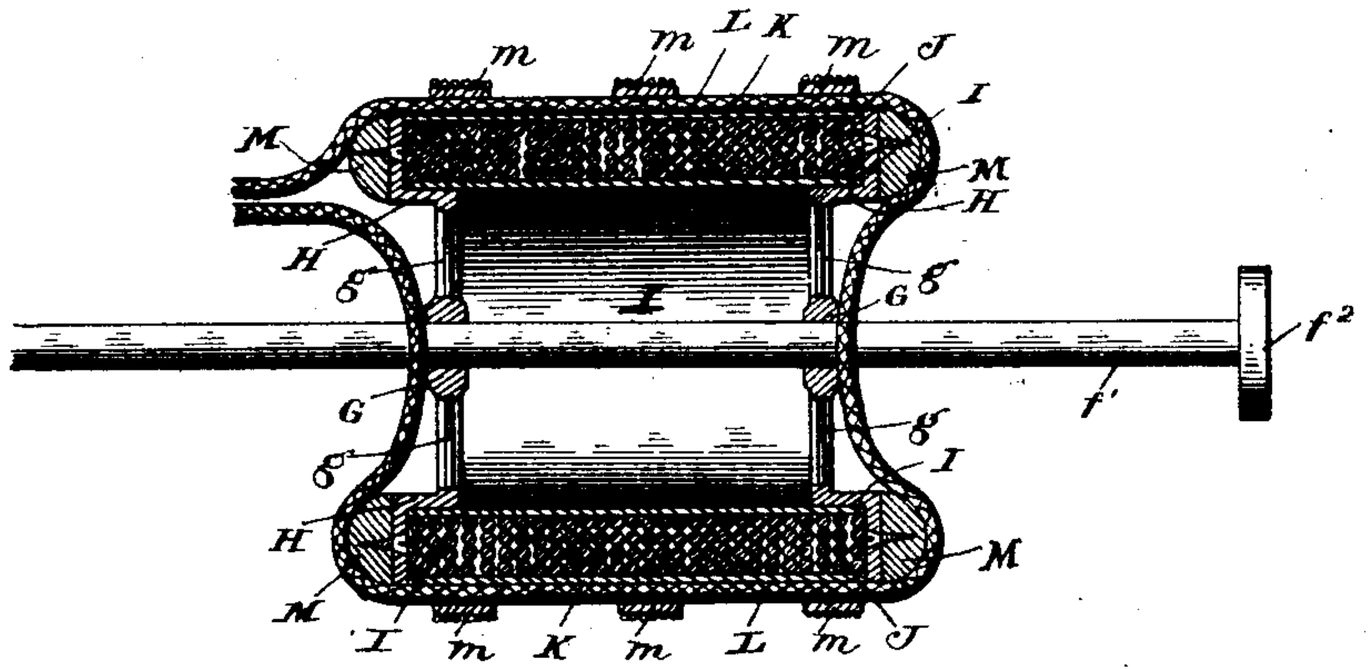


Fig. 5.

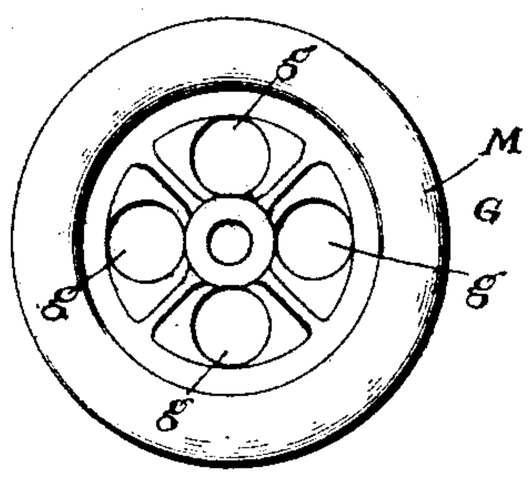


Fig. 7.

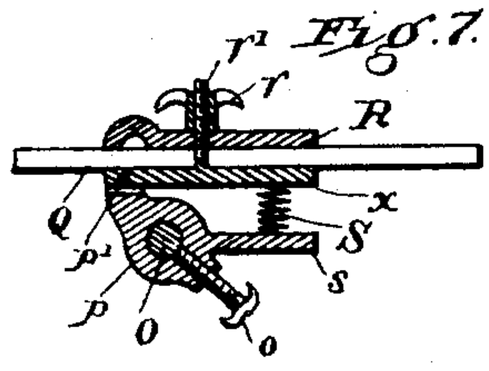
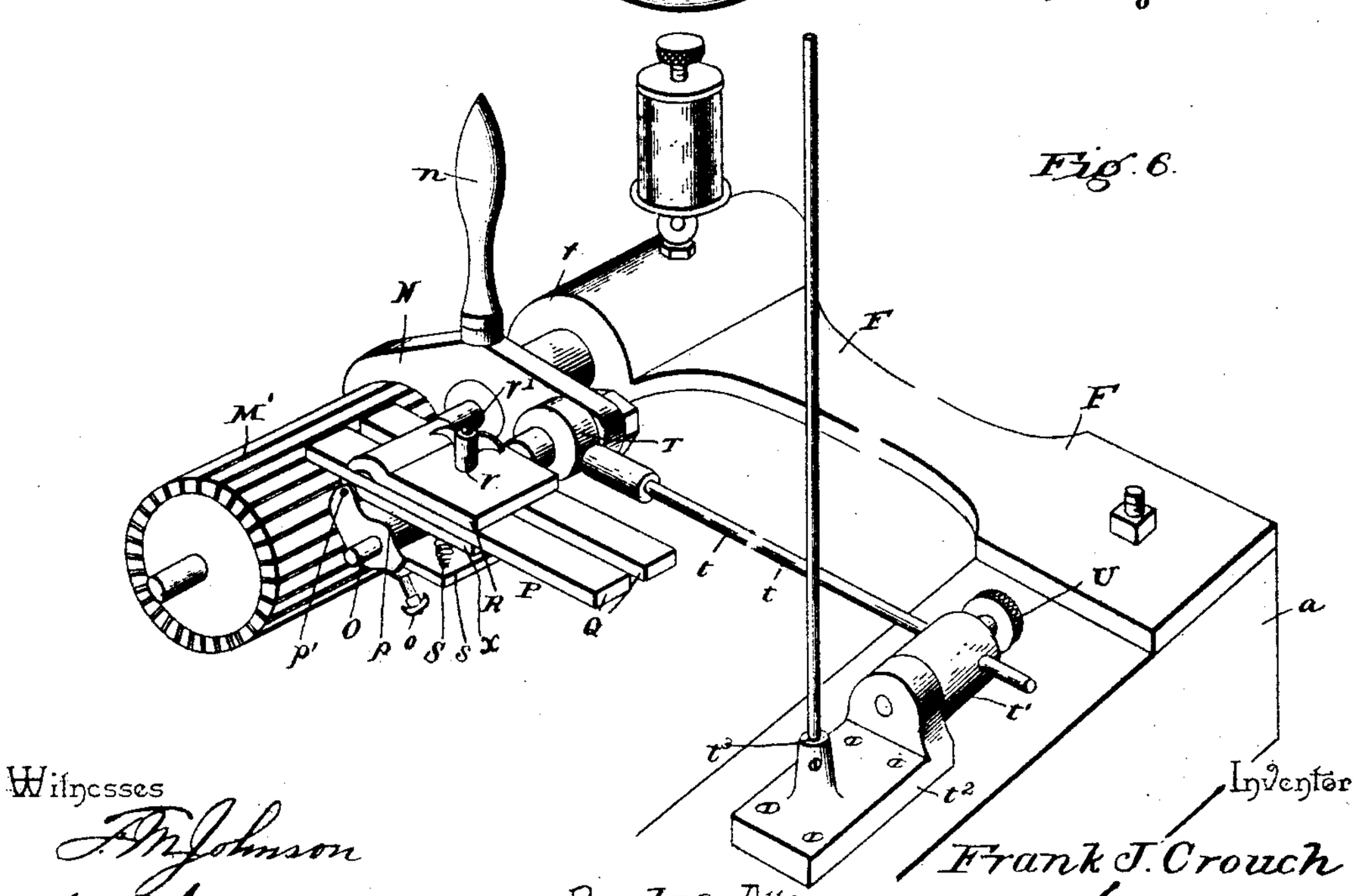


Fig. 6.



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UNITED STATES PATENT OFFICE.

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DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 516,298, dated March 13, 1894.

Application filed February 27, 1893. Serial No. 463,855. (No model.)

To all whom it may concern:

Be it known that I, FRANK J. CROUCH, a citizen of the United States, residing at East Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Dynamo-Electric Machine, of which the following is a specification.

This invention relates to dynamo electric machines; and it has for its object to provide a simple, inexpensive machine of this character which shall possess especial merit as an efficient generator, particularly for lighting purposes, while at the same time being so constructed as to avoid the danger of shocks, and also still generate current of sufficient ampèrage to render the machine useful for lighting purposes, and for attendance by unskilled persons.

To this end the main and primary object of this invention is to generally improve upon the construction of dynamo electric machines.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts, hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a perspective view of a dynamo electric machine constructed in accordance with this invention. Fig. 2 is an enlarged central longitudinal sectional view of the field, the armature being removed. Fig. 3 is a detail end view of the construction shown in Fig. 2. Fig. 4 is an enlarged detail longitudinal sectional view of the armature. Fig. 5 is a detail end view of the armature. Fig. 6 is an enlarged detail in perspective of one of the brush holders and its connections. Fig. 7 is a detail sectional view of one of the brush holders.

Referring to the accompanying drawings, A represents a hard wood base frame, which is employed in order to avoid all current leakage or shunting, which is usual in metallic base frames, and said base frame is rectangular in shape and is provided with the raised end pieces *a*, which are designed to form supports for the upper and lower fields B and B′. The upper and lower fields B and B′ are of the ordinary general construction, having the usual central pole pieces *b* and the cores *b*′, but in the present invention the upper and lower fields are separable from each other and the lower of which B′, is provided at opposite ends thereof with the widened supporting flanges C, provided with the threaded perforations *c*, to receive the supporting and adjusting screws *c*′, the lower ends of which work on the metallic wear plates c^2, on top of the raised end pieces *a*, so as to provide means for preventing the screws from sinking into the wood under the weight of the fields. The upper field B, is also provided at each end thereof with the flanges D, which flanges are smaller than the flanges C, of the lower field, but rest thereon and are provided with the perforations *d*, through which pass the connecting bolts *d*′. The connecting bolts *d*′, couple the two fields together and pass through the raised end frame pieces *a*, to hold the same in proper position thereon, while by means of the screws *c*′, and by loosening the nuts of the coupling bolts, the fields may be raised or lowered as the case may require in the adjustment of the armature, or at least for its clearance of the fields. By this means the armature needs no adjustment as in other dynamos. The cores of the fields are wound with the ordinary coils E, arranged thereon in the usual manner and shunted from, or in series with the main circuit as desired.

Connecting the opposite raised end pieces *a*, from end to the end, are the opposite longitudinally disposed bearing bars F, provided with the centrally disposed bearings *f*, in which is mounted to turn the transverse armature shaft *f*′, driven by a belt on the usual band pulley f^2, arranged on one end thereof. The armature shaft *f*′, of course rotates in the fields and carries the armature therebetween. Securely keyed on the armature shaft are the opposite perforated armature heads G. The said opposite armature heads G, are preferably of cast iron and are provided near their hubs with ventilating openings *g*, which provide for the circulation of air inside of the armature, in order to keep the parts sufficiently cool so as to prevent the impairment of the coils by burning. The said opposite armature heads G, are also provided with the interior offsets or shoulders H, the base of which receives the sheet iron tube I, which

forms a core for the coil of annealed iron wire J, which is wound thereon to a depth varying from one and a half to two or three inches and which is incased in an insulating shell or covering K, over which are wound the induction coils L.

There are as many induction coils as there are commutator bars on the commutator, and in the present invention each of the induction coils are only one wire deep, and in order to avoid the usual bulk of wire at the ends of the armature, which is therefore unnecessarily lengthened, I secure to the opposite heads G, the off-standing rings M, of suitable insulating material. The off-standing rings M, serve to make depressions or concavities at the ends of the armature, so that the ends of the induction coils L, may be forced inward into such depressions or concavities, in order to shorten up the ends of the armature as well as to allow all of the induction coils to be made of the same length. The longitudinal induction coils L, covering the armature shell described, are suitably held in position thereon by the ordinary bands *m*, encircling the same, and as previously referred to, one terminal of each induction coil is connected to one of the metal bars of the commutator M′ on the shaft of the armature, and the other terminal of the same coil is attached to the next commutator bar following. Since there are just as many coils as there are commutator bars, the end of one coil, attached to one commutator bar, would be the beginning of the next coil attached to the same bar and so on, the number of induction coils of course depending upon the size of the armature and the ampérage carrying capacity required of them, in order to conduct the current therein without undue heating. Now by reference to the specific structure of the armature just described, it will be readily seen that owing to the annealed wire drum together with the induction from the fields, heavy currents can be generated in the armature while at the same time all possibility of burning out of the armature is avoided.

Between the commutator M′, and one of the bearings of the armature shaft is arranged the rocker arm N. The said rocker N, is of ordinary construction and suitably insulated from the shaft on which it is designed to turn, being controlled by the ordinary handle *n*. Secured in each end of the rocker arm N, are the opposite brush holder rods O, on which are fastened by means of the set screw *o*, the brush holders P. The said brush holders P, are of suitable conducting metal and in electric contact with the rods O. The said brush holders P, comprise the separate members *p*, and *x* hinged at one end as at *p′*, so that one of said members *x* will be free to move, while the other *p* is fast on the rods O, and the movable holder member is adapted to support in position the brushes Q, clamped thereon by means of the metallic clamp caps R, held in position by means of the clamping thumb nuts *r*, engaging the threaded studs *r′*, projecting from the movable brush holder plates *x* and through the clamping caps. The inner projecting ends of the brushes Q, beyond the brush holders are normally held in contact with the commutator bars by means of the springs S, attached to the off-standing spring supporting plate *s*, projecting from the brush holder members *p* on the rods O, and by means of these springs any suitable pressure of the brushes on the commutator may be secured. It is of course understood that the brush holders, and the brushes carried thereby, at opposite ends of the rocker arm are disposed directly opposite each other to simultaneously connect directly opposite portions of the commutator in the usual manner.

Loosely mounted on the rods O, between the brush holders and the rocker arm are the connecting collars T, which are joined to the rod so as to make a good electrical contact and have connected therewith the conducting rods *t*. The conducting rods *t*, which are connected at their inner ends to the collars T, have their other outer ends loosely passed through the perforations in the oscillating binding posts *t′*, which binding posts are mounted to turn on the attachment brackets t^2. The attachment brackets t^2, may be provided with the sockets t^3, in which may be attached the conductors for the external circuit, and it will of course be understood that from these plates or brackets the current may be shunted through the fields, or may be arranged in series with the external circuit as will be readily understood. Now an important point to be noted is that by means of the connections described, all cumbersome heavy conducting cables, which are a source of annoyance to dynamo attendants, are avoided. After the proper adjustment of the brushes by the rocker arm, the conducting rods *t*, are held firmly in position, and therefore hold the brushes, by means of the screws U, passing through the outer ends of the oscillating binding posts, and impinging on said conducting rods. The current generated in the armature coils passes first in to the brushes and from the metallic holders thereof to the rods O. From either of the rods O, as the direction of the current may happen to be, the same passes into the connecting collar on one of said rods into the conducting rod *t*, thence to the flanged plate or bracket t^2, and into the external circuit if the machine is shunt wound, or into the fields in case the machine is series wound.

From the foregoing it is thought that the construction, and many advantages of the herein-described dynamo electric machine are apparent, and it will be seen that many of the cumbersome parts of ordinary dynamos are greatly simplified as well as the danger of shock therefrom being avoided by the present construction, and owing to the ventilated character of the armature burning out is effectually prevented.

Changes in the form, proportion and minor

details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a dynamo electric machine, the combination with a base frame; of separable fields having flanged ends removably connected together, and means for vertically adjusting the connected fields within said base frame, substantially as set forth.

2. In a dynamo electric machine, the combination with a base frame; of separable fields each having flanged ends removably connected together, the flanges of one field being widened, and having threaded perforations, and combined supporting and adjusting screws adapted to pass through said threaded perforations and bear on opposite ends of said base frame, substantially as set forth.

3. In a dynamo electric machine, the combination with the base frame having raised end pieces, and the armature mounted for a fixed rotation on said frame; of the separable fields embracing said armature and having flanged ends removably connected together and bolted to said raised end pieces, the flanges of one field being widened and having threaded perforations, metallic wear plates on said end pieces, and combined supporting and adjusting screws adapted to pass through said threaded perforations and work on said metallic wear plates, substantially as set forth.

4. In a dynamo electric machine, the combination of a wooden base frame having opposite raised end pieces, opposite longitudinally disposed bearing bars connecting said opposite end pieces and provided with centrally disposed bearings, the armature having the journal ends thereof bearing in said bearings, and the vertically adjustable fields mounted on said base frame and embracing said armature, substantially as set forth.

5. In a dynamo electric machine, the combination with the fields and the commutator devices; of an armature comprising opposite perforated heads having interior off-sets or shoulders, a sheet iron tube fitting the base of said interior off-sets, a coil of annealed iron wire wound on said tube, an insulating shell or covering incasing said annealed iron wire coil, and separate longitudinal induction coils wound one wire deep over said shell and the opposite heads, the terminals of each coil being connected to adjacent commutator bars, and the ending of one coil being the beginning of the next, substantially as set forth.

6. An armature comprising opposite ventilating heads having an intermediate coil drum portion, off-standing rings secured to said opposite heads to form depressed or concaved ends, and the longitudinal induction coils embracing the heads and intermediate drum portion and disposed at their ends within the depressed or concaved portions, substantially as set forth.

7. The combination with the armature shaft and the commutator thereon; of the brush holder rocker arm mounted on said shaft adjacent to the commutator and carrying brush holder rods at its opposite ends, metallic uninsulated brush holders secured to said holder rods and having spring actuated clamp portions carrying brushes, and rigid conductors leading from said holder rods, substantially as set forth.

8. The combination with the armature shaft and the commutator thereon; of the brush holder rocker arm arranged on said shaft and carrying holder rods at its opposite ends, metallic uninsulated brush holders comprising separate members hinged at one end, one of said members being clamped on the holder rod and provided with an off-standing spring supporting plate carrying springs bearing under the other member which is movable, and metallic clamp caps arranged over the movable members to clamp thereon the commutator brushes, and adjustable rigid conductors leading from said holder rods, substantially as set forth.

9. The combination with an armature shaft and the commutator thereon; of the brush holder rocker arm mounted on said shaft and carrying holder rods at its opposite ends, metallic uninsulated brush holders removably secured to said holder rods and having spring-actuated clamp portions carrying brushes, metallic connecting collars loosely turning on the holder rods adjacent to the brush holders, suitably arranged attachment brackets or plates having sockets for wire or rod connections, oscillating binding posts connected to said brackets or plates, and conducting rods rigidly connected at one end to said connecting collars and adjustably engaging the oscillating binding posts at their other end, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FRANK J. CROUCH.

Witnesses:
C. E. FIELDS,
A. L. RUMSEY.