No. 735,848. PATENTED AUG. 11, 1903.

E. M. WARING.

CLOTH CUTTING MACHINE.

APPLICATION FILED FEB. 5, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

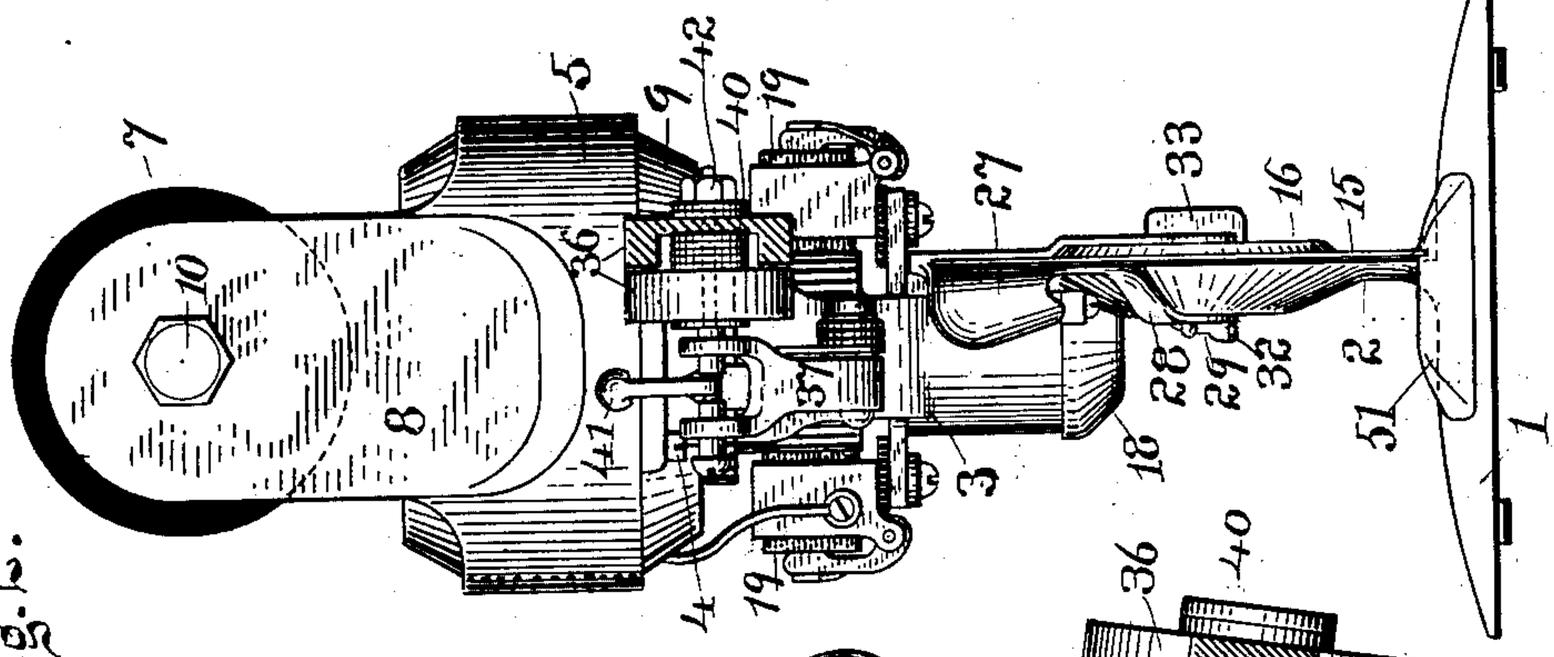


Fig. 7.

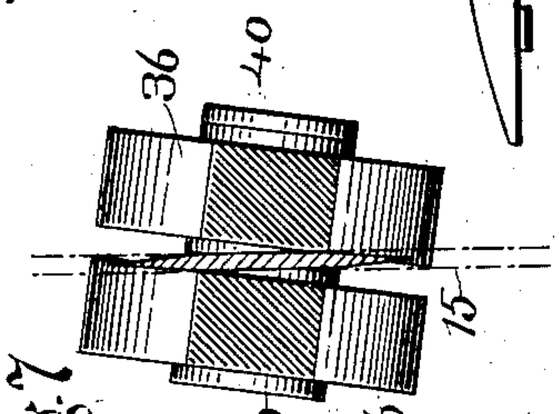
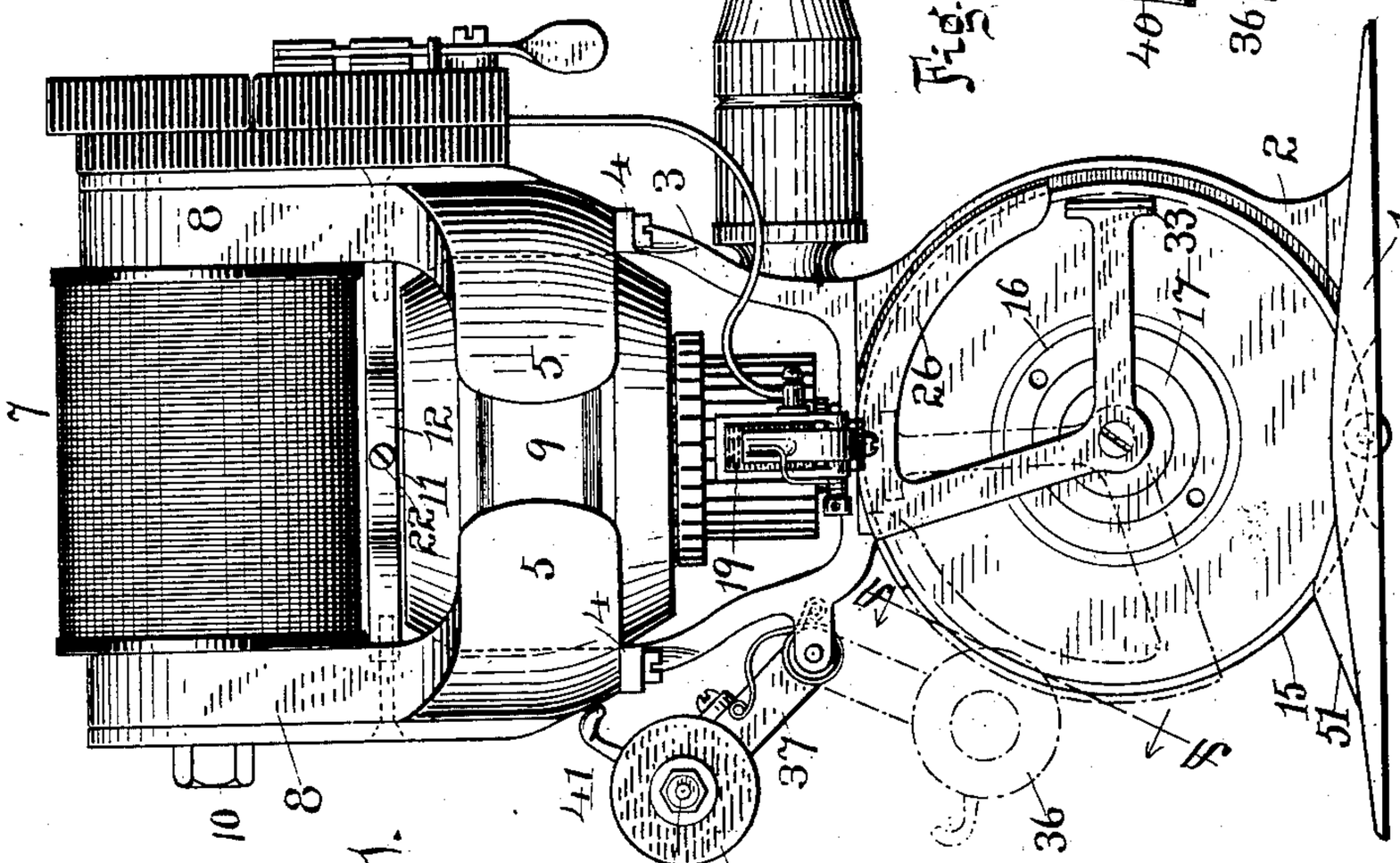


Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

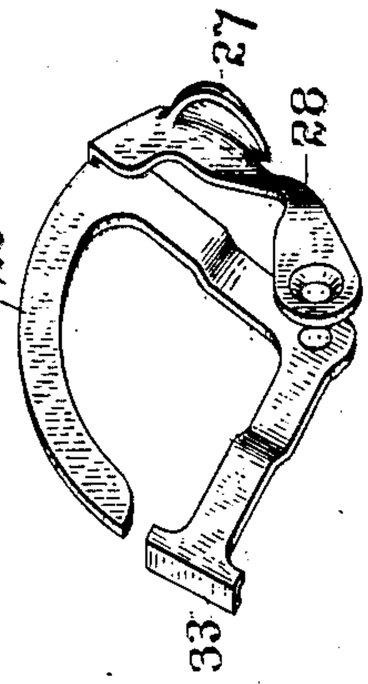


Fig. 5.

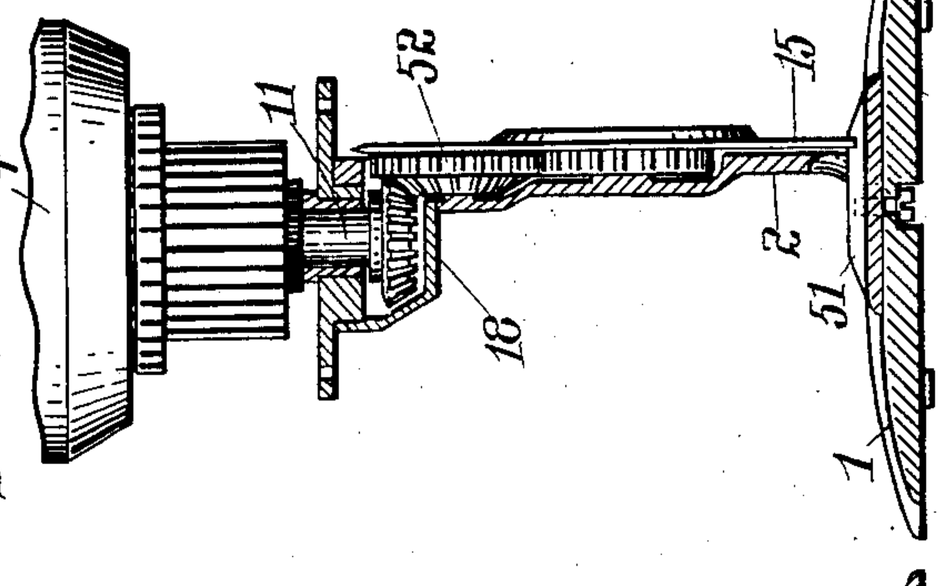
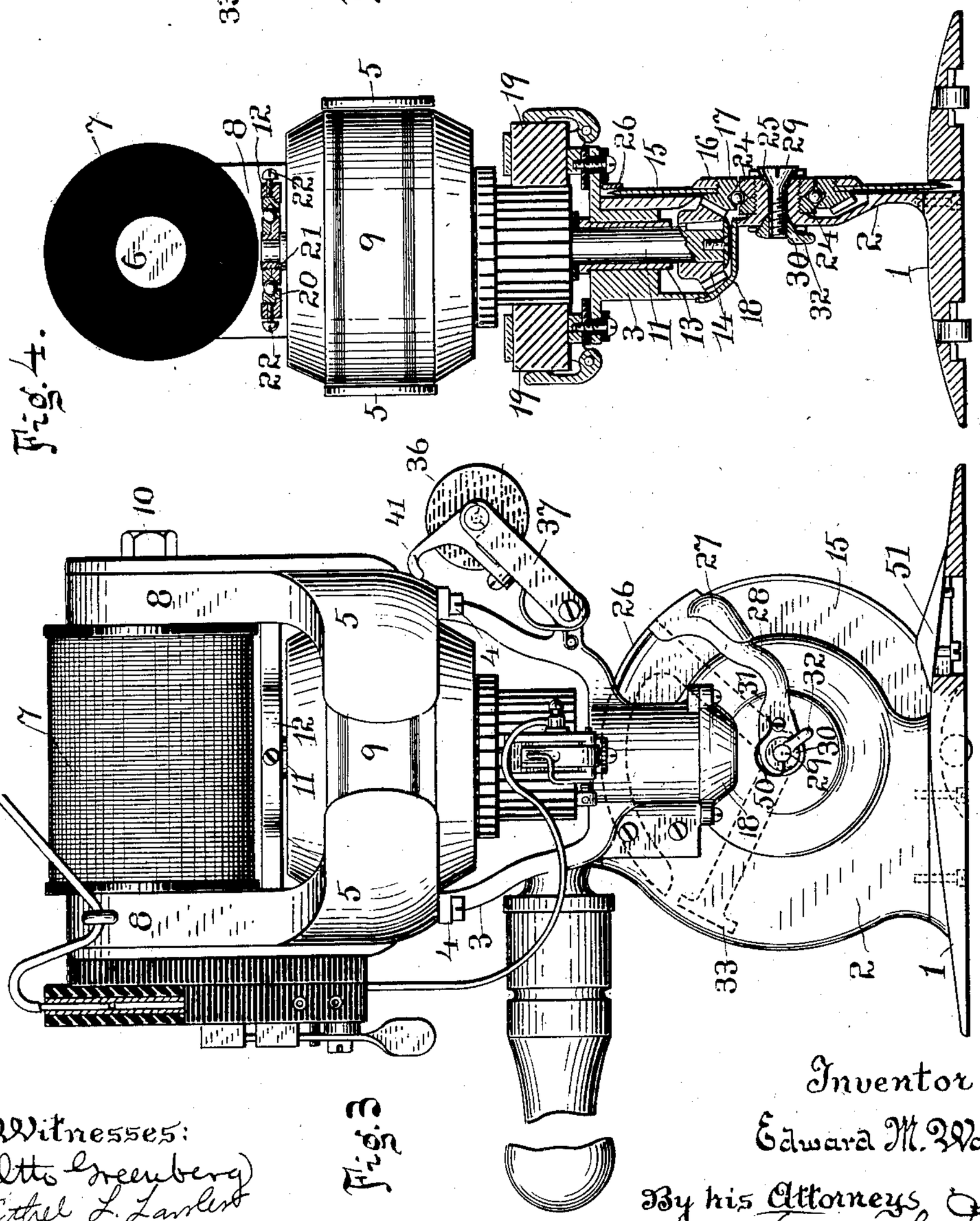


Fig. 4.



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No. 735,848. Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

EDWARD M. WARING, OF BROOKLYN, NEW YORK.

CLOTH-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 735,848, dated August 11, 1903.

Application filed February 5, 1902. Serial No. 92,616. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. WARING, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Cloth-Cutting Machines, of which the following is a specification.

My invention relates to that class of cloth-cutting machines designed for use in cutting a pile of cloth upon a table and operated by means of a motor supported with a knife upon a suitable standard rising from a foot-plate adapted to slide over the surface of the table beneath the cloth.

The first part of my invention relates to that particular class of cloth-cutting machines in which the knife is driven by an electric motor; and the main object of this part of my invention is to secure increased stability by reducing the horizontal dimensions of the parts above the base and by securing a more uniform distribution of the weights.

A further object of this part of the invention is to bring the bearing for the armature-shaft close to the pole-pieces or point where the torque is applied, thereby strengthening the machine and securing increased durability.

My invention consists in the novel combination of field-magnet pole-pieces, armature-axis, and cross-bar affording a bearing for the upper end of said armature-axis, as hereinafter more fully described, and specified in the claims.

My invention relates also to the details of construction of a rotary-knife guard, as hereinafter set forth.

The object of my invention is also to provide suitable ball-bearings for the rotary parts—as, for instance, for the armature-shaft and rotary knife; to which end the invention consists in the particular details of construction, as hereinafter described in connection with the accompanying drawings.

My invention relates also to the construction and manner of supporting the sharpening device and to other details and features of construction, as will be hereinafter more fully described and then specified in the claims.

In the accompanying drawings, Figure 1 is a side elevation of an apparatus embodying my invention. Fig. 2 is an end elevation of the machine. Fig. 3 is a side elevation looking from the reverse side and with a part shown in vertical section. Fig. 4 is a vertical central section through the machine on a line transverse to the knife and core of the field-magnet, the armature being, however, shown in side elevation. Fig. 5 shows in vertical section a modification in the manner of gearing the armature-shaft and the knife together. Fig. 6 is a perspective view of the knife-guard in its preferred form detached from the machine. Fig. 7 is a cross-section through the knife and the sharpening device on the line A A, Fig. 1, looking in the direction of the arrows.

1 indicates the base of the machine, which rests directly upon the table upon which the cloth is supported and may be provided with suitable casters or rollers to enable it to be readily moved over said surface.

2 is a standard rising from said base and supporting the knife, driving-gear, motor, and other parts of the machine. Said standard is preferably fastened to the base-piece by bolts or screws, as shown, the parts meeting on a horizontal line to permit the interposition or removal of liners which will change the distance of the knife center from the base and compensate for wear and diminution of the circumference of the knife. Attached to said standard is a suitable frame or casting 3, to which the field-magnet of the motor is secured by means of bolts or screws 4 passing into the poles 5 for the field-magnet. The field-magnet is itself composed of a horizontally-disposed core 6, wound with suitable coils 7 and provided with polar projections 8, extending vertically downward from said core and terminating in the pole-pieces 5, which are formed, as shown, to embrace the armature 9 of the electric motor. These polar projections 8 terminate in the pole-pieces 5, which are formed, as shown, to embrace the armature 9 of the electric motor. These polar projections and pole-pieces are each preferably in the general form of an inverted letter T and are fastened to the end of the core 6 by proper bolts or screws 10, as usual in the art.

The armature-shaft 11 has a bearing at its upper end in a cross-bar 12, fastened between

the polar projections 8, and at its lower end rotates in a bearing or bushing 13, set in an opening in the casting 3, as clearly shown in Fig. 4. The bearing at the upper end of the shaft is designed to receive the end thrust of the shaft imparted to it from the beveled gear at the lower end when the machine is doing work. At the extreme lower end of the shaft 11 is a beveled gear 14, secured to said shaft in any suitable way and serving to impart motion to the knife 15, which rotates in a vertical plane and which is fastened by a nut 16 to the hub 17 of a beveled gear gearing with the beveled pinion 14. The gear is cased in the recess formed in the face of the standard 2 and in the lower end of the casing 3. A hood 18 closes the space intervening between the gears to thoroughly protect the parts.

The brushes 19 for the motor are carried by suitable brush-holders mounted on projections from the casting or frame 3.

At its upper end the armature-shaft is provided with a ball-bearing in the cross-piece of frame 12, which latter may be of non-magnetic material, so that it shall not magnetically short-circuit the lines of force of the field-magnet. Said ball-bearing is constructed, preferably, as follows: At or about the center of the cross-bar 12 an enlarged circular opening is formed, adapted to receive a hardened-steel bearing 20, having a conical raceway disposed, as shown, for the balls. The other member of the ball-bearing consists of two cones 21, one of which has a threaded projection, upon which the other screws to fasten the cones together. The threads are of such direction that the two cones will tend to tighten upon one another by any resistance to rotation. The shaft has a reduced end adapted to rotate in an opening in the center of the internal member of the ball-bearing, and has a shoulder, as shown, by which the ball-bearing is made to receive the end thrust on the shaft. The cone 20 is fastened in the circular opening in the cross-bar 12 by means of screws 22 and rests upon an internal offset or shoulder of said circular opening, as clearly shown in the vertical section. By this construction and arrangement of the parts I not only secure compactness, but also afford a bearing for the armature-shaft near to the field-pole 5, and therefore near to the point where the torque is applied and where the greatest strain comes. It will also be seen by the disposition of the magnet, the armature, and its bearings that all the parts are brought within a small compass and over the center of the base, so that the machine will be much less top-heavy than is the case with previous constructions of electromagnetic cloth-cutters.

The ball-bearing for the knife 15 consists of an internal conical or otherwise shaped ball-race formed on the interior of the hub 17, to which it is secured, coöperating with an opposite ball-race composed of the two cones 24, separately attached to the horizontally-projecting stud or boss projecting from the standard 2, as clearly shown in cross-section. The exterior of said stud or boss is threaded to permit the threaded cones to be fastened thereon in proper position. The threads are cut in such direction that in the rotation of the parts the cones will tend to tighten in position against the shoulder upon the casting 2 and so that the outer cone will tend to tighten against the inner one. By unscrewing the outer cone the gear and balls may be readily removed.

The guard shown in detail in Fig. 6 is for a rotary cutter and is mounted to be capable of turning a limited distance concentrically with said knife. The edge 26 of the guard is curved to conform to the circumference of the circular knife-edge and is arranged to project slightly beyond or to be just flush with said edge, but in close proximity thereto, so as to prevent the knife-edge from striking any object in front thereof. The forward edge 26 of the knife-guard might be extended around over the edge of the knife; but it is sufficient that it project slightly beyond the knife-edge at one side of the knife, as shown. The guard is properly formed with a shoe 27 on its forward portion adapted to rest upon the pile of cloth, and said shoe is preferably curved or upturned at its forward end, so that it will ride up over the edge of the pile as the knife moves forward. This shoe is located, as shown, slightly back of the edge of the knife, so as not to obscure the edge from the view of the operator. The shoe may be formed upon an arm 28, which is attached to the guard and extends over the edge of the knife and down to the center about which the knife turns, so as to afford a double bearing for the guard, one bearing on each side of the standard 2. The preferred manner of supporting the guard is as follows: 29 is a pin or stud passing centrally through the boss 25 and preferably formed as a screw, the enlarged head of which forms a rotary bearing-surface for the center of the guard on one side, while a similarly-formed nut 30 upon the opposite end of the screw forms a rotary bearing or support for the arm 28. The guard turns freely upon these bearings or supports and is preferably held down upon the cloth by gravity, so as to guard the exposed portion of the knife above the upper layer of cloth. If it is desired to limit the extent to which the guard may be dropped downward toward the base 1, it may be provided with a pin or projection 31, adapted to engage with a stop 32, carried by the nut 30. By loosening the screw 29 and turning the nut 30 to different positions, so as to set the stop 32 to the desired position, the extent to which the guard may be dropped may be limited to any desired degree. When the screw and nut are tightened together, the stop will be held immovably in the proper position. The threads are cut in such a way that when

the guard engages the stop it will tend to tighten up the nut.

It is preferred to make the head of the screw and the nut with conical bearing-surfaces where they engage with the standard 2 and boss 25, as clearly shown in the sectional view, Fig. 4.

The guard may be provided with an arm or projection 33 in such position as to permit the operator to lift the guard away from the cloth by taking hold of the arm with his thumb or finger when he begins the operation of cutting a pile of fabric. Upon releasing the arm the guard falls down with the shoe 27 in contact with the upper layer of cloth, and the whole exposed forward edge of the knife is then guarded.

If desired, a spring may be employed, as indicated at 50, to press the guard down upon the cloth, or the guard may have slight frictional engagement with the side of the knife, so that as the knife rotates it will tend to draw the guard down and keep it in proper position.

The sharpening device consists of two disks 36, of emery or other suitable abrasive substance, fastened on a horizontal pin or shaft which is secured to the end of arm 37. The latter is pivotally mounted upon some portion of the frame 3 or other part of the apparatus and is provided with a spring which tends to keep the disks or sharpeners 36 raised in the position shown in full lines. The sharpeners 36 are separated by a slight space, as shown in Fig. 2, and when they are depressed into the position shown in dotted lines in Fig. 1 the edges of the disks receive the edge of the knife between them. The sharpeners are, however, mounted so as to engage the edge of the knife in an inclined position, as indicated in Fig. 7. This manner of engagement may be secured by mounting the stud which carries said disks so that it shall project from the arm 37 out of parallelism with the axis of rotation of the knife. As will be obvious, the same result might be obtained by so mounting the arm 37 upon its pivotal support that it will swing on an axis out of parallelism with the axis of the knife. By thus mounting the sharpening device I am enabled to impart a bevel to both edges of the knife and dispense with the use of special devices for forcing the disk 36 toward the knife in a direction transverse to the plane thereof. The disks are kept apart the necessary distance by replaceable and removable washers 40, mounted upon the stud or pin which carries them.

41 is a suitable handle carried by the arm 37 or the pin upon which the disks 36 are mounted for the purpose of depressing the sharpening device into engagement with the knife. 42 is a suitable clamping-nut by which the disks are held upon said stud or pin against rotation.

51 is an adjustable knife-plate which receives the pressure of the lower layer of cloth produced by the rotation of the knife when passing through the pile of fabric. This knife-plate is so constructed as to provide a vertical adjustment to compensate for the wear in the knife and reduction of diameter of the same, for which purpose it is provided with an inclined upper surface, upon which the cloth rests, and is fastened to the base by a screw which permits a longitudinal adjustment of the knife-plate rearwardly as the edge of the knife wears away. Preferably the plate 51 has a bearing upon the base, which rises at an angle rearwardly, so that by the horizontal rearward adjustment the shoe will be raised toward the center or horizontal line to the axis of the knife, thus more effectually preserving the position of the angle or point at which the edge of the rotating knife and the upper surface of the knife-plate intersect.

When it is desired to increase the depth of the pile of fabric that may be cut, the shaft 11 may gear indirectly therewith, as indicated in Fig. 5, where 52 indicates an intermediate pinion furnished with a beveled gear to engage with the bevel-gear on the end of the armature-shaft and itself gearing with a gear or pinion upon the hub which carries the knife.

What I claim as my invention is—

1. In a rotary cloth-cutting machine, the combination with a base and standard, of a driving electric motor mounted thereon and having a field-magnet whose core is horizontally disposed and is provided with depending pole-pieces and an armature mounted to rotate on a vertical axis between said pole-pieces, a bearing adapted to receive the thrust of the upper end of said armature-axis, a cross-bar supported between the field-poles immediately beneath the core but above said armature to afford a support for said bearing, a rotary knife mounted to revolve on a horizontal axis on said standard and a gear connecting said knife and armature.

2. In a rotary-knife cloth-cutting machine, the combination of the rotary knife, the field-magnet having a horizontally-disposed field-magnet core and depending pole-pieces attached to opposite ends of the same, an armature mounted upon a vertical axis, a cross bar or piece supported between said pole-pieces parallel to the magnet-core and immediately beneath the same so to lie in the space between the field-coil and the magnetic field in which the armature rotates, a bearing for the upper end of the armature-shaft formed in said cross-bar, and a suitable gear connecting the lower end of the armature with the rotary knife.

3. In a rotary-knife cloth-cutting machine, the combination of an electric motor having a field-magnet consisting of a straight core provided with depending pole-pieces projecting at right angles from said core, a cross-bar of non-magnetic material supported between said pole-pieces in the space immedi-

ately beneath the field-magnet and between the same and the magnetic field in which the armature rotates in a horizontal plane, an armature rotating on vertical axis and having a bearing at its upper end in said cross-bar, a suitable base, a standard rising therefrom and provided with a frame or casting to which the pole-pieces are secured, a bearing for the lower end of the armature formed in said frame or casting, and a rotary knife mounted on the standard and connected with the armature through a suitable gear.

4. In a rotary cloth-cutting machine, the combination substantially as described of a base 1 and standard 2 rising therefrom, a rotary knife mounted in said standard, a frame 3, the inverted-T-shaped pole-pieces 5 fastened thereto, a cross-bar 12 uniting the same, a field-magnet core-piece parallel to the plane of rotation of the knife and to which the pole-pieces are secured above the cross-bar, the armature 9 whose axis has a bearing in the cross-bar 12 and in the frame 3, and a suitable gear between the armature and the knife.

5. In a rotary cloth-cutting machine, the combination substantially as described, of the standard 2, a stud 25, a hub 17 having a beveled gear on its inner face, the knife detachably secured to the opposite face of said hub 17, a ball-bearing for said knife consisting of the cones 24 engaging by a screw-thread with the threaded stud, and an opposite ball-race formed on the inside of the hub.

6. The combination with a knife-guard, of the screw 29, the nut 30, and a projection from said nut adapted to be engaged by a projection from the swinging knife-guard, as and for the purpose described.

7. In a rotary cloth-cutting machine, the combination with the rotary knife, of a pair of sharpening-disks 36 and a support therefor arranged to swing said disks in a plane out of parallel with the plane of rotation of the edge of the knife, as and for the purpose described.

8. The combination in a cloth-cutting machine, of a rotary knife, a knife-guard mounted upon the stud about which the knife turns, a shoe upon the forward side of the guard, and an arm 28 attached to the guard and extending over the edge of the knife and down to the center upon which the knife turns as and for the purpose described.

9. The combination with a rotary-knife cloth-cutting machine, of a swinging knife-guard mounted on pivotal bearings and an arm or projection 33 extending from the guard to afford means whereby the operator may lift the guard when he begins the cutting of a pile of fabric as and for the purpose described.

Signed at New York city, in the county of New York and State of New York, this 3d day of February, A. D. 1902.

EDWARD M. WARING.

Witnesses:
H. C. TOWNSEND,
E. L. LAWLER.