(No Model.)

G. SWOPE.

CLOTH CUTTING MACHINE.

No. 595,084. Patented Dec. 7, 1897.

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CLOTH-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 595,084, dated December 7, 1897.

Application filed February 27, 1897. Serial No. 625,304. (No model.)

To all whom it may concern:

Be it known that I, GERARD SWOPE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Cloth-Cutting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an improved electric cloth-cutting machine of that class having a reciprocating cutter and an electric motor which actuates the same and which is moved or shifted by the operator upon the table or surface supporting the layers of cloth to be cut, so that the cutter will sever said layers along the desired outlines.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a view in central vertical section of an apparatus embodying my invention. Fig. 2 is a similar section taken on a plane at right angles to that on which Fig. 1 is taken. Fig. 3 is a sectional view taken on line 3 3 of Fig. 2. Fig. 4 is a plan section taken on line 4 4 of Fig. 1. Fig. 5 is a plan section taken on line 5 5 of Fig. 1. Fig. 6 is a detail section taken on line 6 6 of Fig. 2. Fig. 7 is a detail section taken on line 7 7 of Fig. 2. Fig. 8 is a detail view of a socket on the top of the machine for connecting the electric conductors therewith.

As shown in said drawings, A indicates a horizontal base-plate, which rests upon the cloth-supporting surface and runs under the cloth as the machine is moved in cutting.

B is a standard attached to the base-plate A and forming a guide for a vertically-reciprocating cutter C.

D and E are motor-coils arranged one above the other with their central axes in vertical alinement with each other, said coils being rigidly attached to the top of the standard B, and F is a vertically-reciprocating plunger or armature-core which is movable vertically within the central openings of the motor-coils. Said core has attached to its lower end a stem or shank G, which slides in a guide-aperture in the upper part of the standard B and to the lower end of which the cutting-knife C is attached. Said armature-core has attached at its upper end a guide rod or stem H, which slides in a centrally-arranged guide-aperture, herein shown as formed of a tube I, which is secured in a top plate M, attached to the upper coil E. The reciprocating core F is moved vertically by the force of magnetic attraction exerted by the coils D and E in alternation when an electric current is sent through first one and then the other of said coils, in the manner heretofore usual in reciprocating motors, a suitable switch mechanism operated by the said core being employed to control the current which excites the two coils, as will hereinafter more fully appear.

Referring now more in detail to the several features of construction of the machine illustrated, the same are constructed as follows:

The standard B is provided at its upper end with a horizontal flange or supporting-plate B′, on which the portions of the machine above the standard rest and to which they are attached. To the rear edge of said standard is attached an arm B^2, terminating in a handle B^3, by which the cutter is moved and guided. Said standard is formed of two similar pieces or halves divided on a vertical plane, passing centrally through the same front to rear, the parts being connected by screws or otherwise. In its lower part the standard is tapered toward its front edge and contains a deep groove in which the cutter moves or slides, the cutting edge of the knife extending outside of the groove, as seen in Fig. 5. In the upper part of the standard is formed a recess to receive the lower end of the stem G, to which the cutter is secured conveniently by means of a stud C, passing through a vertical slot in the upper part of the knife and made integral with the said stem. An opening *b*, Fig. 2, is formed in one side of the standard, through which the fastening-bolt may be reached when it is desired to detach or adjust the cutter.

At the opposite ends of the coil D are iron disks or heads J and J′, which are preferably joined by a tube J^2, of brass or other non-magnetic material, which extends through the coil and forms with the heads a spool on

which the coils are wound. The coil E is similarly provided with two disks or heads K K′, connected by means of a tube K^2, similarly forming a spool for the coil. The bottom head J′ of the lower coil rests on the top of the standard, while the upper head J is rigidly connected with the bottom head of the upper coil by means of a transverse supporting-plate L and a distance-post L′, which are interposed between said heads. On the top of the uppermost head K rests the top plate M, which has a central opening, in which is screwed the guide-tube I, hereinbefore mentioned. A plurality of vertical tie-rods N are arranged around the coils and pass through the outer parts of the several heads, the supporting-plate B′, and the top plate M, and said tie-rods are provided with heads or nuts outside of the said plates B′ and M by which the several parts are rigidly secured together. An exterior tubular casing O, of sheet-iron or other magnetic metal, extends around both of the coils and the space between the same, said tubular covering being arranged in contact with the heads J J′ K K′ of the coils D and E. The tubular casing thus arranged serves to form a magnetic connecting piece or yoke between the upper and lower heads of the spools, thereby forming with the central core or plunger, which is also made of iron, a magnetic circuit acting to concentrate the magnetic field and to thereby increase the energy of the magnetic action or "pull" on the core. Between the coils D and E and the spools are placed layers J^3 K^3, of insulating material, by which the wires forming the coils are insulated from the metal heads and tubes in a familiar manner.

Now, referring to the electric connections and the switch mechanism by which the electric current is controlled, these parts are constructed as follows:

Mounted on the plate L, in the space between the two motor-coils, is an insulating-block P, of porcelain, slate, or the like, on which is mounted a swinging or insulating switch-lever Q, arranged to move in a vertical plane and adapted for engagement when at the upper and lower limit of its movement with two insulated terminals or contact-plates Q′ Q^2, which are attached to an insulating-block P′, also secured to said plate L at the side of the core opposite that at which the block P is located. Preferably the contact-plates Q′ Q^2 are mounted in recesses in the insulating-block P′ and held therein by bolts, as shown in Fig. 7. Said switch-lever is engaged by contact-shoulders on the core F, which shoulders are so located as to move the switch-lever from one contact-plate to the other as the core approaches the extremity of its stroke in either direction. As a simple and preferable construction the core is provided with a vertical slot *f*, through which the switch-lever passes, the ends of said slot forming shoulders or contact-surfaces *f′* f^2 above and below the switch-lever, adapted to strike and move the same in the manner described. Pivotal connection of said switch-lever is afforded by means of a metal plate Q^3, attached to the insulating-block P, Fig. 3, and provided with a pivot-pin *q*, which passes through the said switch-lever.

Upon the block P′ is mounted a guide-bar P^2, which is adapted to engage and hold from outward movement the free end of the switch-lever, which is thereby held in position for close or intimate contact with the contact-plates. On the block P, to which the lever is pivoted, are secured two spring-clips *p′* p^2, which are adapted to embrace and engage the lever at both limits of its movement, said spring-clips being arranged to act on or clasp the lever with such force as to hold the lever when forced into the same until released therefrom by the positive action of the core in its reverse movement. Said clips are shown as formed by means of integral prongs on a plate P^3, which is inserted beneath the pivot-plate Q^3, which is secured to the insulating-block P by means of bolts *q′* *q′*, said prongs being bent to form the said clips, which are of U shape and adapted for spring or resilient engagement with the said lever.

R R′ indicate two binding-posts on the top plate M, to which the terminals of supply-wires S S′ are attached. The terminal R is electrically connected with a switch-lever by means of a wire *r*, leading from the binding-post R to the plate Q^3. A positive connection between the said plate Q^3 and the lever is afforded by means of a wire q^2, which is bent at its ends to form two spiral springs q^3 q^4, the extremities of which are attached to the block Q^3 and to the said lever near the pivot of the latter. Wires *r′* and r^2 lead from the contact-plates Q′ Q^2 to the terminals of the motor-coils, while the other terminals of the said coils are connected with the binding-post R′ by conductors r^3 and r^4.

It will be obvious from the above that when the armature-core is at the lower limit of its movement and the switch-lever is in contact with the contact-plate Q^2 a circuit will be completed from the binding-post R through the wire *r*, the switch-lever, the said contact-plate, the wire *r′*, the motor-coil E, and the conductor r^4 to the binding-post R′. At this time the current will be passing through the said coil E, thereby developing a magnetic field which will attract the armature core and produce the upward stroke thereof. At the termination of such upward stroke the switch-lever will be lifted until brought into contact with the contact-plate Q′, at which time the circuit will be closed through the wire *r*, the switch-lever, the said contact-plate Q′, the wire r^2, the lower field-magnet coil, the wire r^3, to the binding-post R′. A bearing for the upper guide-stem H may obviously be formed in the top plate M, but preferably I employ the separate tube I, which is detachably secured in the top plate and is provided at its lower end with a guide-aperture for said stem,

said tube being made long enough to cover the stem when at the upward limit of its movement, thus protecting the same from contact with external objects. The hole in the top plate M, in which the tube is inserted, is preferably made somewhat larger than the core F, so that the latter may be easily removed by disconnecting the knife or the lower end of the same and then, after removal of the said tube I, lifting the core outwardly through the hole in the top plate.

In order to cushion the blow in case the upper end of the core should strike the face or shoulder formed by the lower end of the tube I, a cushioning-ring H′, of rubber or other suitable elastic material, is placed around the stem in contact with the upper surface of the core. As a convenient construction the stem H is provided at its lower end with a screw-threaded shank and with a flange which rests against the top surface of the core and forms a bearing-shoulder for the cushioning-ring H′. The stem G at the lower end of the core is shown as similarly attached to the said core, the same being provided with a threaded stem and flange. A cushioning-ring G′ is shown as placed around the upper end of the stem G and adapted to strike an abutment or shoulder B^4, formed at the upper end of the standard, to cushion the blow of the core should it strike said shoulder on its downward stroke.

A presser-foot T is arranged above the top surface of the base-plate A in such manner as to pass above the top surface of the pile of cloth being cut and to thereby hold the same from rising on the upstroke of the cutter. This presser-foot is shown as made of the form as seen in plan view, Fig. 5, with its side portions extending around or embracing the opposite sides of the standard. As a convenient means of adjustably supporting the said presser-foot it is provided with an upwardly-extending shank T′, which extends into a socket B^5, formed in the front part of the standard above the cutter, a clamp-screw *t* being employed to hold the shank in any desired position in said socket.

As an improved construction in the base-plate of the cutting-machine the same is provided on its under surface with a plurality of antifriction balls or rollers U, which rest in sockets *a a*, formed in the under surface of said plate A, the balls being held within said sockets by means of confining-plates *u*, having central openings through which the balls project, which openings are somewhat smaller than the diameter of the balls, so as to prevent the escape of the same from the sockets.

As a means for conveniently making electrical connection with a house-supply system I apply to the upper end of the tube I a switch-socket V, having a key *v*. Conductors *s s′* extend to said socket and are attached to the opposite terminals thereof in a familiar manner. In connection with such socket is of course employed a duplex flexible conductor leading from the electric-lighting wires of the house and having a plug at its end, which may be screwed into the socket in a familiar manner. The switch-socket thus arranged not only enables the machine to be conveniently connected with and disconnected from supply-conductors, but it affords a means located at the machine by which the current may be turned on or off as desired.

As a preferable construction I intend to so arrange the contact-faces by which the switch-lever is operated that the switch will be moved somewhat before the termination of the upward and downward stroke of the plunger, so that the exciting-currents will be thrown into the opposite coil as the plunger approaches the limit of its stroke, and the counteracting or cushioning action will thus take place, with the effect of absorbing the momentum of the core and avoidance of shock or jar, such as would be produced by contact with the core with a mechanical arresting device. Ordinarily the switch will be so adjusted that the core will strike with little, if any, force against the shoulders or surfaces at its upper and lower end, the cushion described being employed merely to take care of such variations in the force with which the core strikes said shoulders as may be due to variations in the strength of the current, character of the work, and other conditions affecting the operation of the apparatus.

Obviously a machine organized generally in the manner described may be employed with alternating currents as well as with continuous currents, it being of course understood that in the case of alternating currents the switch mechanism will not be required and that the stroke of the plunger will be synchronous with the phase differences of the generating-dynamo.

Obviously, more than two motor-coils arranged in the same manner as above described may be employed where a greater amplitude of stroke is required in the actuating-core of the plunger.

I claim as my invention—

1. A cloth-cutting machine comprising a flat, vertically-reciprocating cutter, two motor-coils, arranged one above the other, a reciprocating core or plunger to the lower end of which the cutter is rigidly attached, a flat, horizontal base-plate, and a thin, vertical standard which rises from the base-plate and supports the parts of the machine above the same, said standard being provided with a vertical groove which extends inwardly from its front edge and in which the cutter slides or moves.

2. A cloth-cutting machine comprising a reciprocating cutter and an electric motor consisting of two motor-coils arranged with their central axes in alinement with each other and with a space between them, a core to which the cutter is rigidly attached, and a switch located in said space between the coils, said switch embracing a pivoted vibrating lever, which passes through a longitudinal slot in

the core, the ends of which slot form contact-surfaces which engage and move the lever as the core approaches each end of its throw.

3. A cloth-cutting machine comprising a reciprocating cutter, two motor-coils, a core to which the cutter is attached, and a switch comprising a pivoted switch-lever which is actuated by the said core, two insulated contact-plates and spring-clips adapted to engage the said lever at opposite limits of its throw.

4. A cloth-cutting machine comprising a reciprocating cutter, two motor-coils, a core to which the cutter is attached, and a switch comprising a pivoted switch-lever, which is actuated by the said core, two insulated contact-plates, and a guide for the lever constructed to hold the same in position for contact with said plates.

5. A cloth-cutting machine comprising a reciprocating cutter, two motor-coils, a core to which the cutter is attached and a switch comprising a pivoted switch-lever which is actuated by the said core, two insulated contact-plates, a guide for the lever, holding the same in position to engage said plates, and two spring-clips, adapted to engage the lever when the same is at opposite limits of its throw.

6. A cloth-cutting machine comprising a reciprocating cutter, two motor-coils, a core to which the cutter is attached and a switch comprising a pivoted switch-lever, two insulated contact-plates, and spring-clips located in position to engage the lever at opposite limits of its movement, said core being provided with contact-shoulders which engage and move the switch-lever.

7. A cloth-cutting machine comprising a flat, vertically-reciprocating cutter, two motor-coils located one above the other, spools for said coils attached to each other, a flat, horizontally-arranged base-plate, a standard which rises from the base-plate and is attached at its upper end to the lowermost spool, said standard being made flat or thin, with a groove which extends inwardly from the front edge of the standard and in which the cutter slides or moves, a reciprocating core or plunger provided at its lower end with a depending stem, to the lower end of which the cutter is rigidly attached, said plunger having at its upper end an upwardly-extending guide-stem and a guide for said guide-stem attached to the upper spool.

8. A cloth-cutting machine, comprising a base-plate, a standard thereon having a horizontal flange at its top, a reciprocating cutter moving vertically in the standard, two motor-coils located one above the other and separated by a space, iron spools for the coils rigidly attached to each other and to the top of the standard, a switch located in the space between the spools, a guide-plate attached to the top of the uppermost spool, and an endwise-reciprocating armature-core which has operative connection with and operates the switch, said core having on its lower end a stem which slides in the standard to which the reciprocating cutter is rigidly attached and having at its upper ends a stem which slides in said guide-plate.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 23d day of February, A. D. 1897.

GERARD SWOPE.

Witnesses:
C. CLARENCE POOLE,
TAYLOR E. BROWN.