

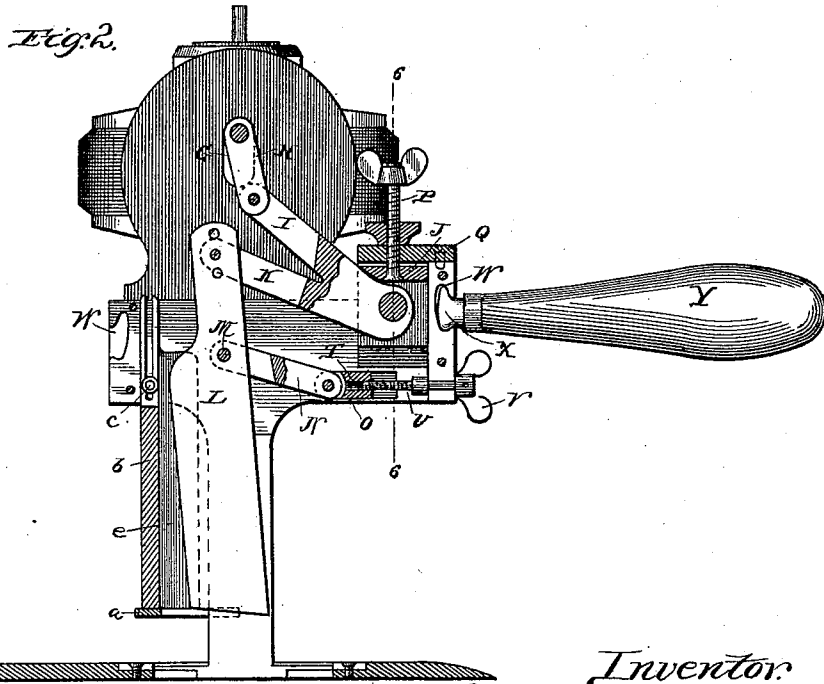
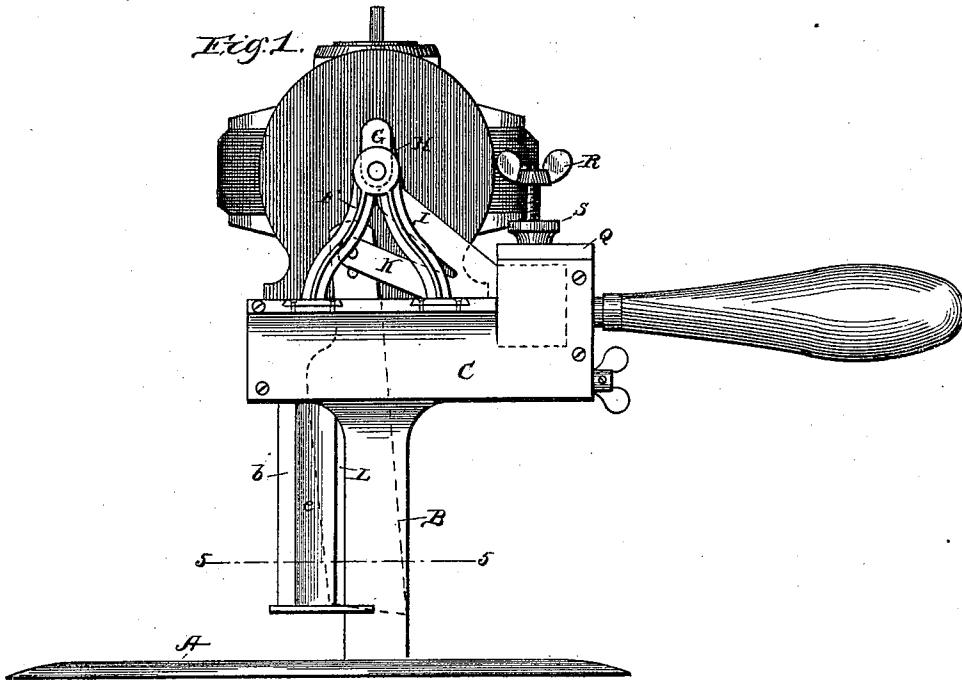
(No Model.)

3 Sheets—Sheet 1.

H. A. CALDWELL.
CLOTH CUTTING MACHINE.

No. 470,233.

Patented Mar. 8, 1892.



Witnesses.

Wm. N. Rhems.

R. B. Crookenden

Inventor.

Henry A. Caldwell

By Elliott G. Quohundo.

Atty's.

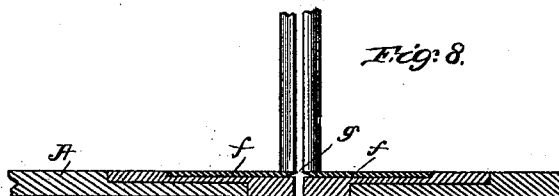
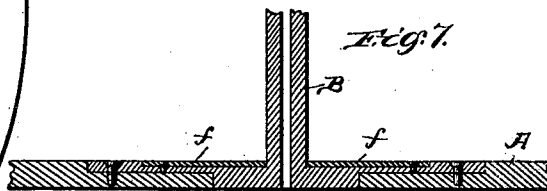
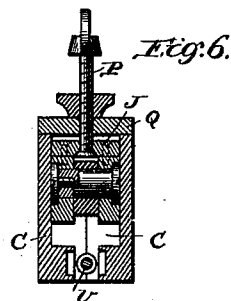
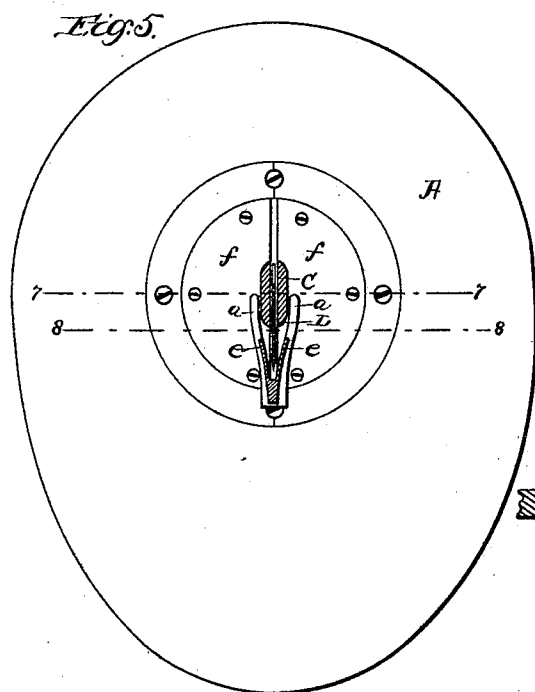
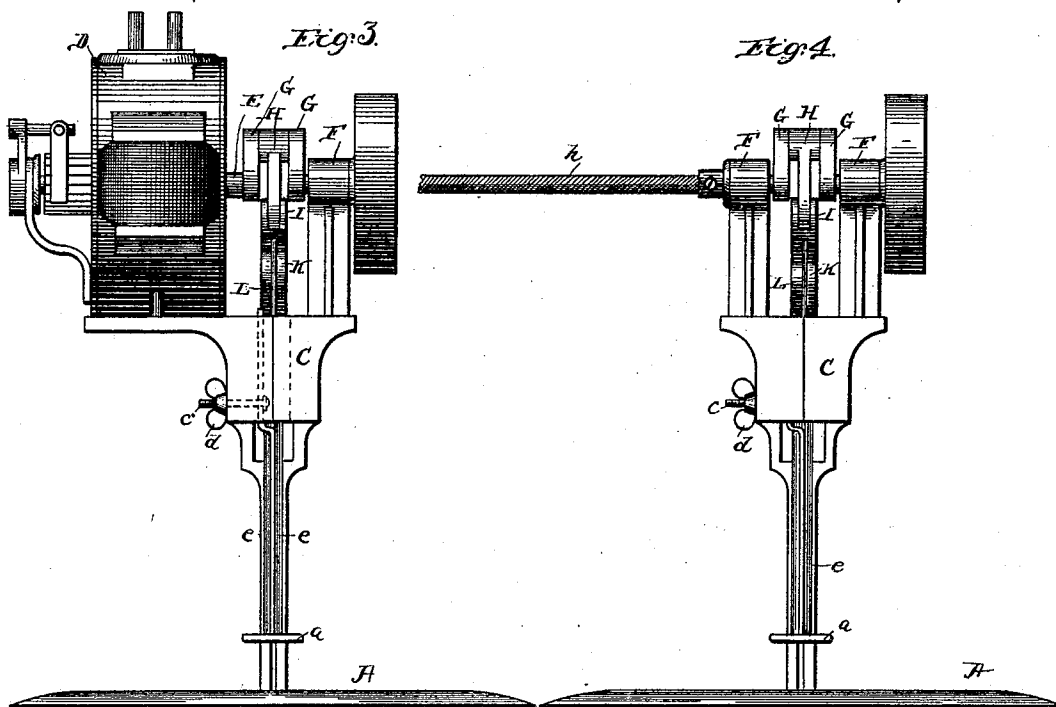
(No Model.)

3 Sheets—Sheet 2.

H. A. CALDWELL.
CLOTH CUTTING MACHINE.

No. 470,233.

Patented Mar. 8, 1892.



Witnesses.

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(No Model.)

3 Sheets—Sheet 3.

H. A. CALDWELL.
CLOTH CUTTING MACHINE.

No. 470,233.

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Fig. 9.

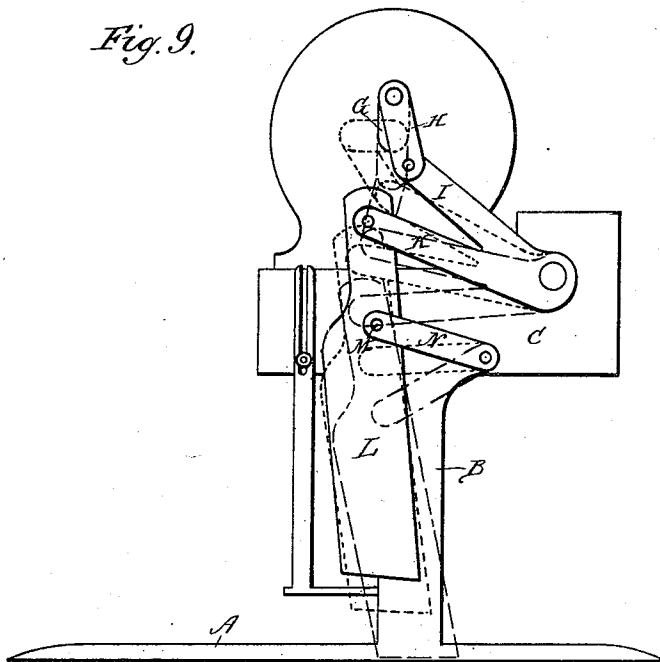
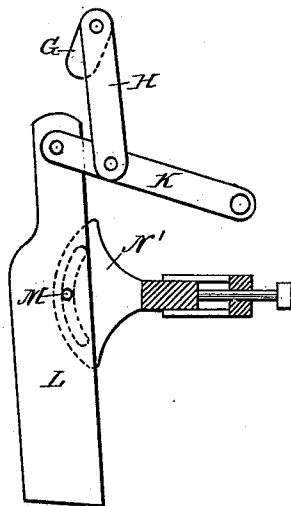


Fig. 10.



Witnesses

Wm. M. Rhems.

R. B. Quokhades

Inventor:

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UNITED STATES PATENT OFFICE.

HENRY A. CALDWELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE ELECTRIC CUTTING MACHINE COMPANY, OF SAME PLACE.

CLOTH-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 470,233, dated March 8, 1892.

Application filed December 29, 1890. Serial No. 376,060. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. CALDWELL, a citizen of the United States, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Cloth-Cutting Machines, of which the following is a specification.

This invention relates to improvements in cutting-machines, but more particularly to that class of cutting-machines designed for cutting cloths or fabrics in which an electric motor is mounted upon and carried by the machine for operating a reciprocating cutting-knife.

Prior to this invention, so far as I am aware, in all machines of this class the cutting-knife has been reciprocated in a straight line, in some cases vertically or perpendicular to the surface of the working table, and in others at an oblique angle thereto, but without producing the "draw cut" so essential to the practical operation of a machine designed for cutting fabrics; nor have any of the prior machines been capable of adjusting the line of cut stroke or line of action of the knife or the plane of its cutting-edge during its stroke to vary its cutting effect upon different fabrics, and in fact no such variation can take place where the cutting-knife reciprocates in a straight line, no matter what be its direction of reciprocation.

The prime object of this invention is to impart to the knife a curvilinear line of travel or action and simultaneously therewith a rocking or oscillation upon a shifting axis between the ends thereof, whereby the action of the knife will simulate that of the hand-knife and give the fabrics what is technically known as a "draw cut," well known to be the most effective cut in working upon fabrics because of their yielding nature.

Another object is to have the machine of such character that the curvilinear reciprocation or line of action of the knife may be varied at the will of the operator, according to the class of goods upon which the machine is working, and that the plane of its cutting-edge will change throughout its stroke, thereby enabling a deeper cut into the soft fabrics

at each stroke than in the harder or more compact fabrics, and also a change in the angle or position in which the knife enters the fabric, whereby the machine is adapted for cutting all kinds of fabrics, and the action of the knife upon each kind of fabric is rendered effective in the maximum degree.

These objects are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of a cloth-cutting machine embodying my invention; Fig. 2, a central vertical section thereof; Fig. 3, a front elevation of the same; Fig. 4, a view similar to Fig. 3, but showing a different kind of power for operating the machine; Fig. 5, a horizontal section on the line 5 5 of Fig. 1; Fig. 6, a vertical section on the line 6 6 of Fig. 2; Figs. 7 and 8, detail vertical sections on the lines 7 7 and 8 8, respectively, of Fig. 5; Fig. 9, a diagrammatical view more particularly intended to illustrate the curvilinear reciprocation of the knife, and Fig. 10 a similar view of a modified construction for producing substantially the same stroke of the knife.

Similar letters of reference indicate the same parts in the several figures of the drawings.

My invention is applicable to cutting-machines of all characters, but is more especially adapted for and is herein illustrated in connection with a type of "overboard" cloth-cutting machine, so called because of its being moved around by hand over the work-table when in operation, the power for operating the machine being derived from some suitable source—such as an electric motor, mounted upon and carried by the machine, or flexible shafting or some similar device.

Referring by letter to the accompanying drawings, A indicates a base having a flat elliptical shape by preference because of the ease with which it may be inserted beneath the pile of goods, and, if desired, mounted upon anti-friction rollers, (not shown,) and B a slotted standard secured to the base near the center thereof and supporting upon its upper end a bed or table C, carrying the working parts of the machine, it being preferable

in practice to have the standard and bed or table cast integrally in two parts for convenience in putting together.

When the machine is electrically operated, an electrical motor D is mounted upon the table, the armature-shaft E of which bears at one end in a bearing F, projecting up from the top of the table, and is cranked at G, immediately over the standard, to receive one end of a link H, the opposite end of which is pivotally connected with one arm I of a bell-crank lever pivoted in an adjustable bearing J, the other arm K of which has a pivot connection with the knife L, working in the slot in the standard. This knife is provided on its extreme lower end, as well as throughout its length, with a cutting-edge, so that this end in descending a second time will cut any threads that may have been left uncut by the said other cutting-edge at the previous down-stroke, the cutting-edge on the end of course extending transversely of the knife. The knife is restrained and guided in its reciprocations by a traveling pivot M between the ends thereof, conveniently furnished by a link N, which has a pivot connection with an adjustable bearing O. As shown in the drawings, this pivot M shifts or travels with the knife, so as to form a fulcrum for the knife, upon which it oscillates throughout its movement, and the link N being shorter than the lever K it will thus be seen that the points of pivotal connection between the knife and the lever K and the link N are caused to travel through arcs of unequal radii and which radii are unchanging—that is, their respective lengths do not vary throughout the travel of the said pivots. The purpose of these link-and-lever connections between the motor-shaft, table, and knife is to not only convert the rotary motion of the crank-shaft into a reciprocating action of the knife, but to also cause the knife to reciprocate in a curved line, or, in other words, to impart to the knife a curvilinear line of action, besides which by changing the relative lengths of the arms I and K of the bell-crank lever the length of stroke of the knife, as well as the leverage, may be changed, according to the circumstances involved in the use of the machine. It will also be seen by an inspection of Fig. 9 that the knife has a compound action, for besides having the curvilinear line of travel or action above referred to induced by its traveling pivot it has at the same time a rocking or oscillating motion upon this pivot under the influence of the lever which causes its reciprocation. Thus the position of the knife, or rather the plane of its cutting-edge, is constantly changing throughout the stroke both up and down, imparting to the knife a draw cut, which cannot be produced by a knife reciprocating in a straight line.

By having the pivot of the bell-crank lever adjustable vertically and the traveling pivot of the knife adjustable horizontally, or either one or both of these pivots adjustable in any

manner, according to the construction of the machine, an infinite variety of changes in the curvilinear reciprocation or line of action of the cutting-knife, as well as the plane of its cutting-edge during action, may be effected, for every change in the position of either one of these pivots will effect a corresponding change in the line of action of the knife and also the plane of its cutting-edge at different parts of the stroke.

I may here state that my invention broadly consists in means for imparting to the knife two simultaneous movements—to wit, a curvilinear reciprocation and a rocking or oscillation upon a shifting axis between the ends of the knife—thus causing a constant change in the plane of the cutting-edge of the knife during its reciprocations, and any means for accomplishing this result is within the scope of my invention, for many such means will readily suggest themselves to one skilled in the art to which my invention appertains—such, for instance, as dispensing with the bell-crank lever and link and connecting the crank itself directly to the knife or changing the form of the lever connecting the crank-link with the knife into a straight lever, as illustrated in diagram in Fig. 10. So, also, may the cam N', as shown in Fig. 10, be substituted for the link N, with the pivot M, rigidly secured to the knife and working in the groove in the cam, and likewise for the lever K might be substituted a cam similar to the cam N', either alone or in addition to the cam N', substituted for the lower link, which changes are so obvious as not to require further illustration than that furnished in the diagrammatic illustration in Fig. 10.

For adjusting the pivot bearing the bell-crank lever any suitable means may be employed, a simple form of which is shown in the drawings, consisting of a screw P, having a swivel connection with the bearing J and working through a screw-threaded cap Q, connecting the two sections of the table, which screw is provided with a head or thumb piece R for convenience of manipulation, and a lock-nut S for securing the screw in any adjusted position. So, also, with the adjustment of the bearing O of the link N, which may be readily accomplished by providing the latter with a screw-threaded socket T, in which works a screw-bolt U, bearing in but having no endwise movement in the bed or table C and being provided with a head or thumb piece V for convenience of manipulation; or any other means may be employed for effecting the same end. The bed or table may be also provided at the front and rear end thereof with irregular-shaped sockets W to receive a corresponding-shaped foot X of a handle Y for detachably securing the handle to either end of the bed in order that the machine may be either pushed or pulled in operation. A vertically-adjustable presser-foot *a* is also provided, carried at the lower end of a slotted bar *b*, working in an opening in or be-

tween the sections of the bed or table, through the slot in which projects a set-screw *c*, having a head at one end and a thumb-nut *d* at the opposite end, by means of which the
 5 presser-foot may be secured in any adjusted position. This bar, which extends parallel with the knife, opposing the cutting-edge thereof, is also provided with obliquely-arranged wings *e*, lying at each side of the
 10 knife and encompassing the cutting-edge thereof and extending up between and overlapping the sections of the bed or table, as shown in Fig. 2, so that the operator is relieved of the danger of being cut by the knife, the
 15 wings being of such length as to always oppose the cutting-edge of the knife, notwithstanding the adjustment of the presser-foot. I also propose to have the lower end of the knife a cutting-edge to render the operation
 20 of the knife more effective, to which end also is provided opposing cutting-blades formed by plates *f*, (see Figs. 5, 7, and 8,) countersunk in the foot of the standard B, which latter is countersunk in the base A, these plates
 25 being separated in the line of action of the knife, so as to permit the passage of the knife between them, and thus sever any shreds which may be carried down by the knife and also prevent the accumulation of lint, which
 30 might otherwise affect the operation of the knife, the plates *f* for this purpose being reversely beveled on the under side of the opposing edges, as shown in Fig. 8, forward of the standard, to form the cutting-edges. In most
 35 of the work done by a cutting-machine, however, the top of the pile of cloth operated upon is much above the range of action of the lower edge of the knife, and I have found by practice that in cutting such piles the lower
 40 edge of the knife may be blunt or unsharpened, for the pile is almost invariably first engaged by the side cutting-edge of the knife near the upper end thereof and while the knife is in the oblique position illustrated in
 45 Fig. 9, and hence in all such work the lower edge of the knife would have no function whatever to perform, except to sever the shreds which may not be cleanly cut at the bottom of the pile by the cutting-edge proper of the
 50 knife. It is therefore advantageous to have the lower edge of the knife sharpened, not alone for the purpose just mentioned, but also to extend the range of usefulness of the knife to the lowest piles which it may be found desirable to cut, which piles are sometimes so
 55 low that the lower edge of the knife will rise above the top of the pile at each stroke, and in such cases only is it necessary that the lower edge of the knife should be sharpened, for
 60 obviously so long as the lower edge of the knife does not impinge directly upon the top of the goods it cannot take part in or perform any of the cutting operation, and therefore need not be sharpened or formed into a cutting-edge except to give a better finish to the

cut, and I therefore do not desire to limit my invention to sharpening the lower end of the cutting-knife.

While I have shown and described my invention in connection with an electrically-
 70 operated machine it is obvious that the knife may as well be driven by a flexible shaft *h*—such as that illustrated in Fig. 4, or by any other suitable or desirable power—for the means for driving the knife form no part of
 75 the present invention, nor in fact is the use of a knife operated as before described limited to a cloth-cutting machine as the knife or some other cutting-tool when so operated may obviously be employed in other ma-
 80 chines for the purpose and for operating upon other materials than cloth or fabrics.

Among the advantages of reciprocating the knife in a curved line, as before mentioned, is that of securing a draw cut, which is the
 85 most efficient cut in operating upon fabrics whether hard or soft being in close simulation of the action of the hand-knife used for this purpose, and an equally if not more important advantage is that the power re-
 90 quired for operating such a knife has been practically demonstrated by me to be far less than that required for operating cutting-knives reciprocating in a straight line, in fact not one-fourth of the power heretofore re-
 95 quired, while the machine effectually accomplishes the work upon all kinds of fabrics, thus effecting great economy in the working of the machine and when electrically operated greatly reducing the weight and cost of
 100 the motor.

My invention relates more particularly to overboard cloth-cutting machines, and hence the shifting pivot or fulcrum of the cutting-knife between the ends thereof is of espe-
 105 cial importance in that in this class of machines it is essential that the lower end of the knife be free and unhampered by any link or driving connection at its lower end which would interfere with the introduction
 110 and passage of the knife through the cut, would shift and disarrange the layers of cloth, and besides would prevent the traveling or swinging of the lower ends of the knife in making the cut, an action essential to an
 115 effectual draw cut.

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

1. A cloth-cutting machine comprising a
 120 movable frame or support, a reciprocating knife mounted therein, means for reciprocating the same in a curved line, and a shifting pivot or fulcrum for said knife between the ends thereof, substantially as described. 125

2. A cloth-cutting machine comprising a
 125 movable base or support, a slotted standard mounted thereon, a frame or table supported on said standard, a reciprocating knife working in said standard, means for reciprocating
 130

the same in a curved line, and a shifting pivot or fulcrum for said knife between the ends thereof, substantially as described.

3. In a cloth-cutting machine, the combination, with the power-shaft, a cutting-knife, and a connection between said shaft and knife, whereby the latter will be reciprocated in a curved line by the rotation of the former, of a shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

4. In a cloth-cutting machine, the combination, with the power-shaft, the knife, and a connection between the said shaft and the knife, whereby the latter will be reciprocated in a curved line by the rotation of the former, of an adjustable shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

5. In a cloth-cutting machine, the combination, with the power-shaft, the knife, and the connection between said shaft and knife, whereby the latter will be reciprocated in a curved line by the rotation of the former, of a link pivotally secured at its ends, respectively, to the machine-frame and to the knife between the ends thereof, substantially as set forth.

6. In a cloth-cutting machine, the combination, with the power-shaft, the knife, and a connection between said shaft and knife, whereby the latter will be reciprocated by the rotation of the former, of a link, pivots connecting the ends of said links, respectively, with the knife between the ends thereof and with an adjustable bearing, substantially as set forth.

7. In a cloth-cutting machine, the combination, with the power-shaft, the knife, and a lever connection between said shaft and knife, whereby the latter will be reciprocated by the rotation of the former, of a shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

8. In a cloth-cutting machine, the combination, with the power-shaft, a cutting-knife having a cutting-edge on its extreme end extending transversely of or at an angle to the knife, and a connection between said shaft and knife, whereby the latter will be reciprocated in a curved line by the rotation of the former, of a shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

9. In a cloth-cutting machine, the combination, with the power-shaft, the knife having a cutting-edge on its extreme end extending transversely of or at an angle to the knife, and a connection between said shaft and knife, whereby the latter will be reciprocated in a curved line by the rotation of the former, of an adjustable shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

10. In a cloth-cutting machine, the combination,

with the power-shaft, the knife having a cutting-edge on its extreme end extending transversely of or at an angle to the knife, and the connection between said shaft and knife, whereby the latter will be reciprocated in a curved line by the rotation of the former, of a link pivotally secured at its ends, respectively, to the machine-frame and to the knife between the ends thereof, substantially as set forth.

11. In a cloth-cutting machine, the combination, with the power-shaft, the knife having a cutting-edge on its extreme end extending transversely of the knife, and a connection between said shaft and knife, whereby the latter will be reciprocated by the rotation of the former, of a link, pivots connecting the ends of said link, respectively, with the knife between the ends thereof, and with an adjustable bearing, substantially as set forth.

12. In a cloth-cutting machine, the combination, with the power-shaft, the knife having a cutting-edge on its extreme end extending transversely of the knife, and a lever connection between said shaft and knife, whereby the latter will be reciprocated by the rotation of the former, of a shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

13. In a cloth-cutting machine, the combination, with the power-shaft provided with a crank portion, the knife, a lever, a link connection between said lever and the crank of the shaft, and a pivot connection between said lever and the knife, of a shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

14. In a cloth-cutting machine, the combination, with the power-shaft provided with a crank portion, the knife, a lever, an adjustable pivot for said lever, a link connection between said lever and the crank of the shaft, and a pivot connection between said lever and the knife, of a shifting pivot or fulcrum for said knife between the ends thereof, substantially as set forth.

15. In a cloth-cutting machine, the combination, with the power-shaft, the knife having a cutting-edge on its extreme end extending transversely of or at an angle to the knife, and a connection between said knife and shaft, whereby the knife will be reciprocated in a curved line by the rotation of the shaft, of a link pivotally secured at its ends, respectively, to the machine and to the knife between the said cutting-edge on the extremity thereof and the said connection between the shaft and knife, substantially as set forth.

16. In a cloth-cutting machine, the combination, with the power-shaft provided with a crank portion, the knife, a lever, a link connection between said lever and the crank of the shaft, and a pivot connection between said lever and the knife, of a link pivotally connected at its ends, respectively, with the

frame of the machine and to the knife between the ends thereof, substantially as set forth.

5 17. In a cloth-cutting machine, the combination; with the section of the bed or table, the slotted standard, and the base supporting the same, of a reciprocating cutting-knife and a vertically-adjustable presser-foot provided with wings embracing the cutting-edge of said
10 knife between said presser-foot and the upper end of the knife, and said wings extending between and overlapping the sections of the bed or table, substantially as and for the purpose set forth.

15 18. In a cloth-cutting machine, the combination, with the power-shaft provided with a crank portion, the knife, a lever, an adjustable pivot or fulcrum for said lever, a link connection between said lever and the crank of the
20 shaft, and a pivot connection between said lever and the knife, of a link pivotally connected at its ends, respectively, to the frame of the machine and to the knife between the ends thereof, substantially as set forth.

25 19. In a cloth-cutting machine, the combi-

nation, with the power-shaft provided with a crank portion, the knife, a lever, a link connection between said lever and the crank of the shaft, and a pivot connection between said lever and the knife, of link and pivot
30 connections, respectively, between one end of said link and an adjustable bearing and the other end of said link and the knife between the ends of the latter, substantially as described.

35 20. In a cloth-cutting machine, the combination, with the power-shaft provided with a crank portion, the knife, a lever, an adjustable pivot or fulcrum for said lever, a link connection between said lever and the crank
40 of the shaft, and a pivot connection between said lever and the knife, of a link and a pivot connection between one end of said link and an adjustable bearing and between the other end of said link and the knife between the
45 ends thereof, substantially as set forth.

HENRY A. CALDWELL.

Witnesses:

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