(Model.) 2 Sheets—Sheet 1.

F. P. SHELDON.

MACHINE FOR FEEDING CLOTH DISKS TO BUTTON MAKING MACHINERY.

No. 245,407. Patented Aug. 9, 1881.

Fig. 1.

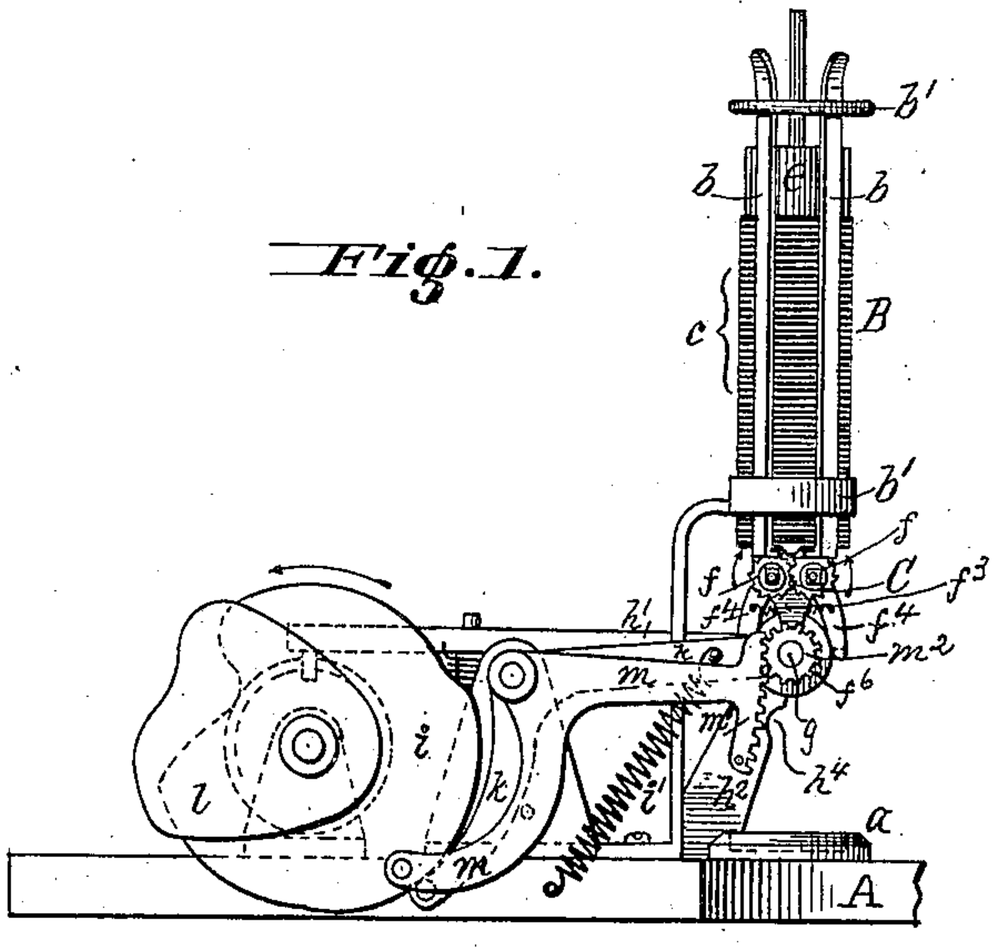


Fig. 2.

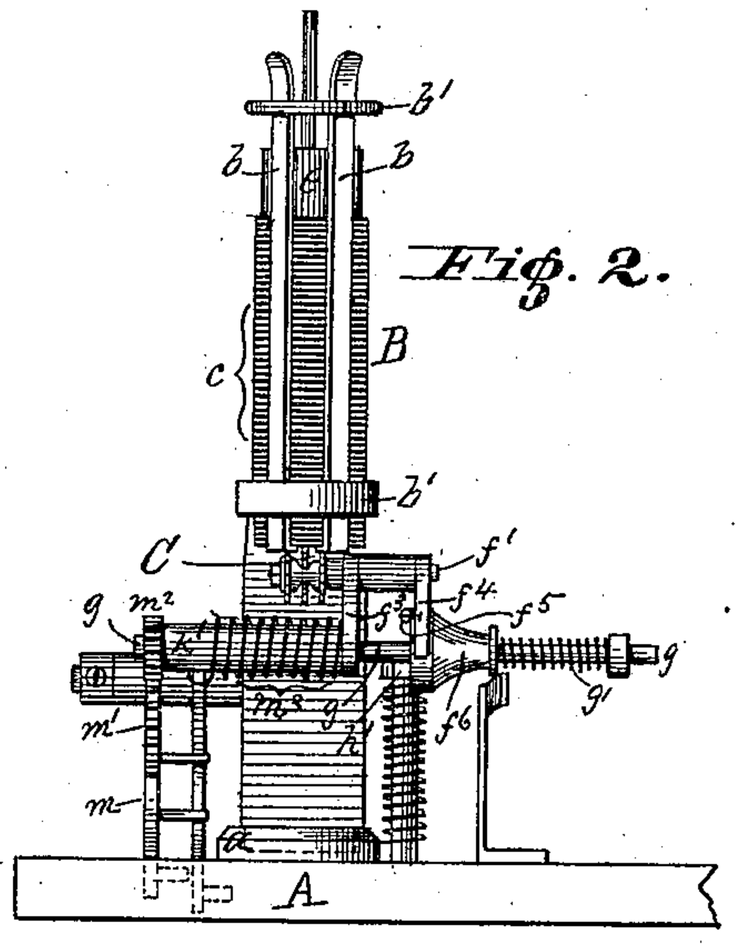


Fig. 3.

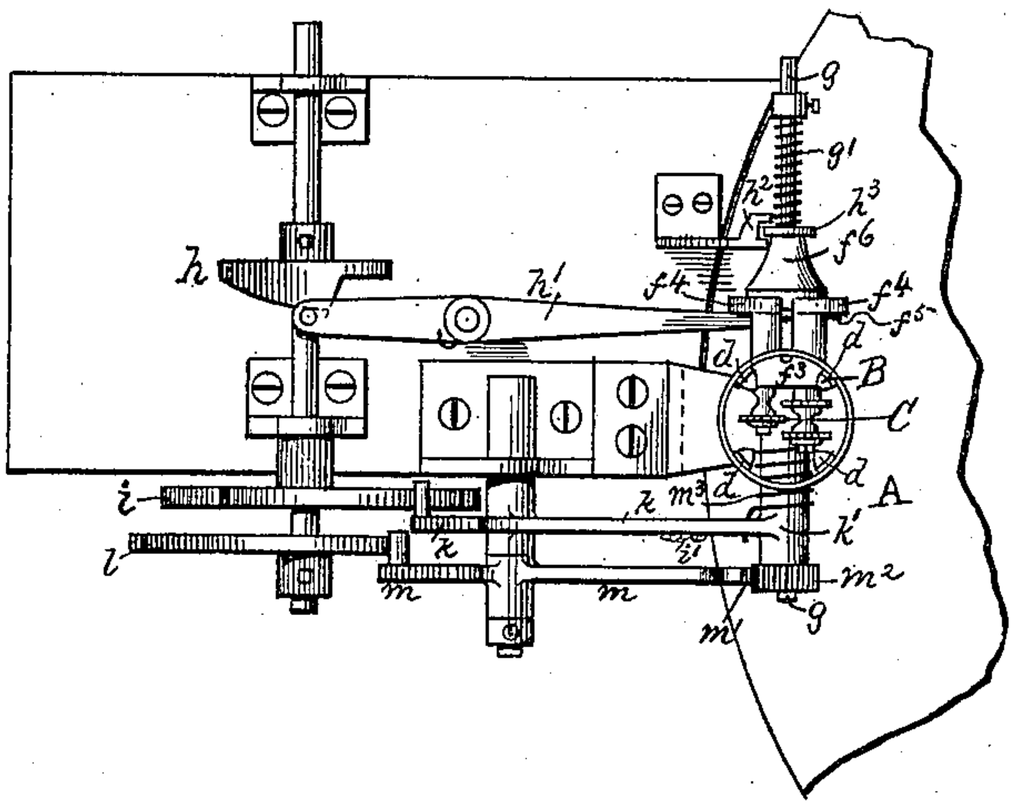


Fig. 4.

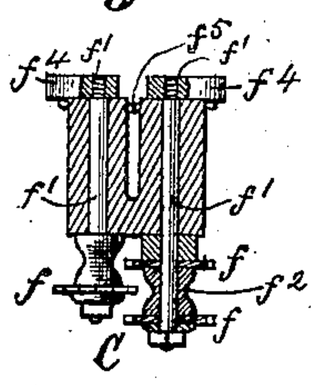
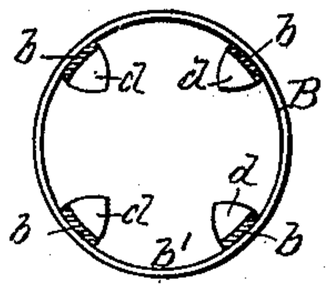


Fig. 5.



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Philip F. Larner.

Inventor:
Frank P. Sheldon.

By. Wm. C. Wood Atty.

(Model.) 2 Sheets—Sheet 2.

F. P. SHELDON.

MACHINE FOR FEEDING CLOTH DISKS TO BUTTON MAKING MACHINERY.

No. 245,407. Patented Aug. 9, 1881.

Fig. 6.

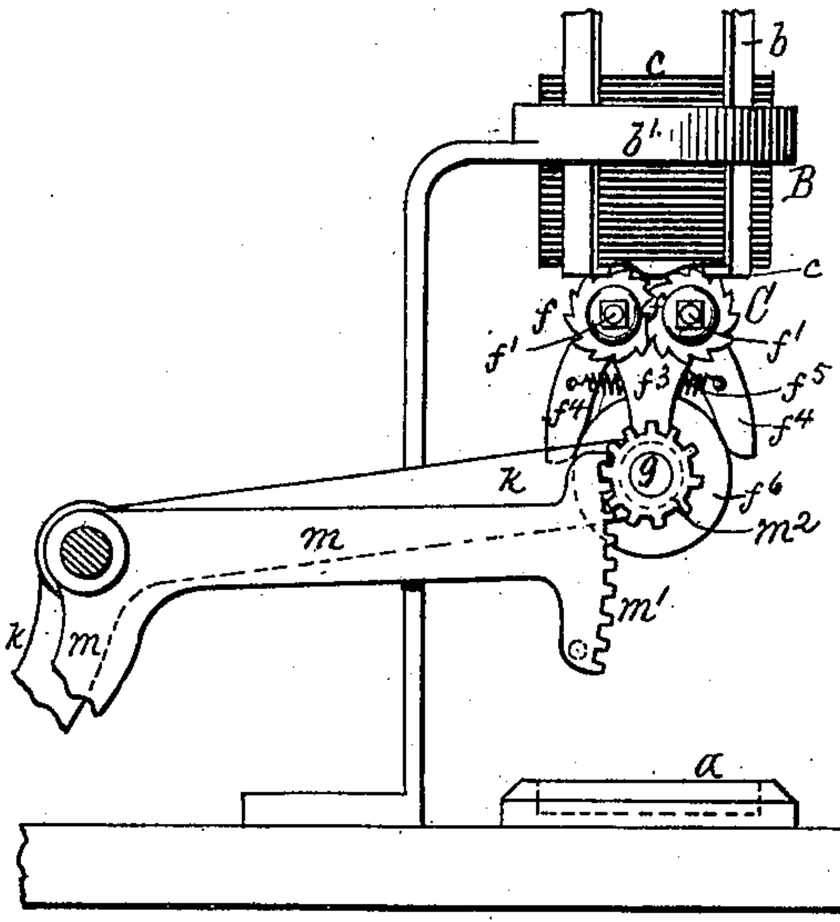


Fig. 7.

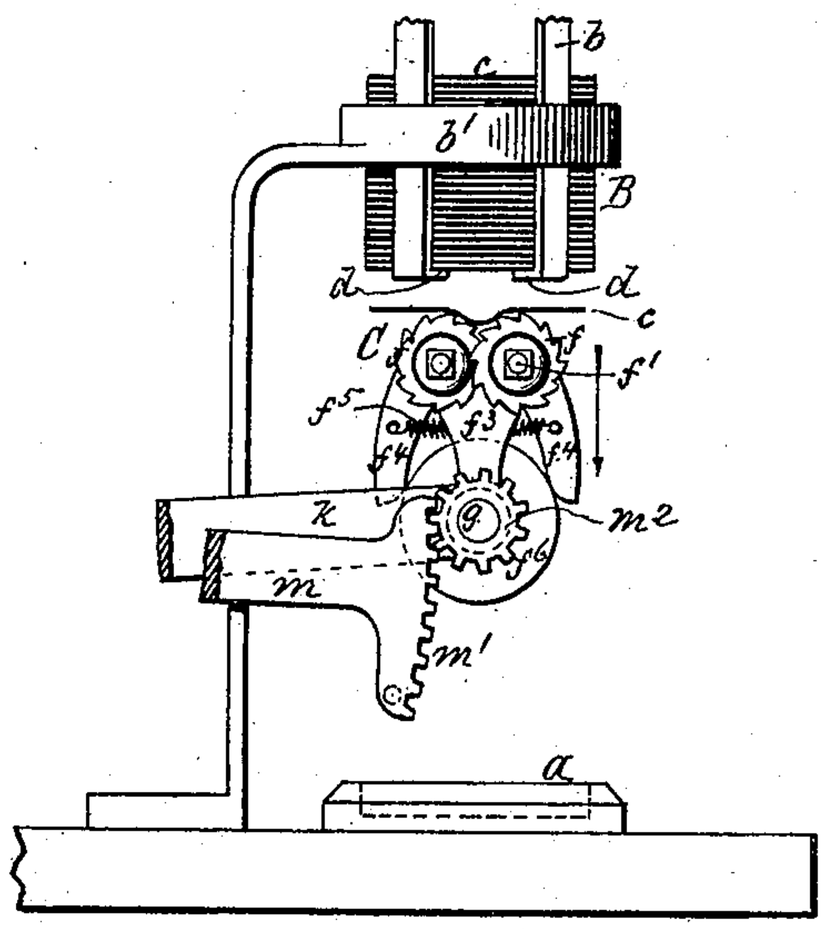


Fig. 9.

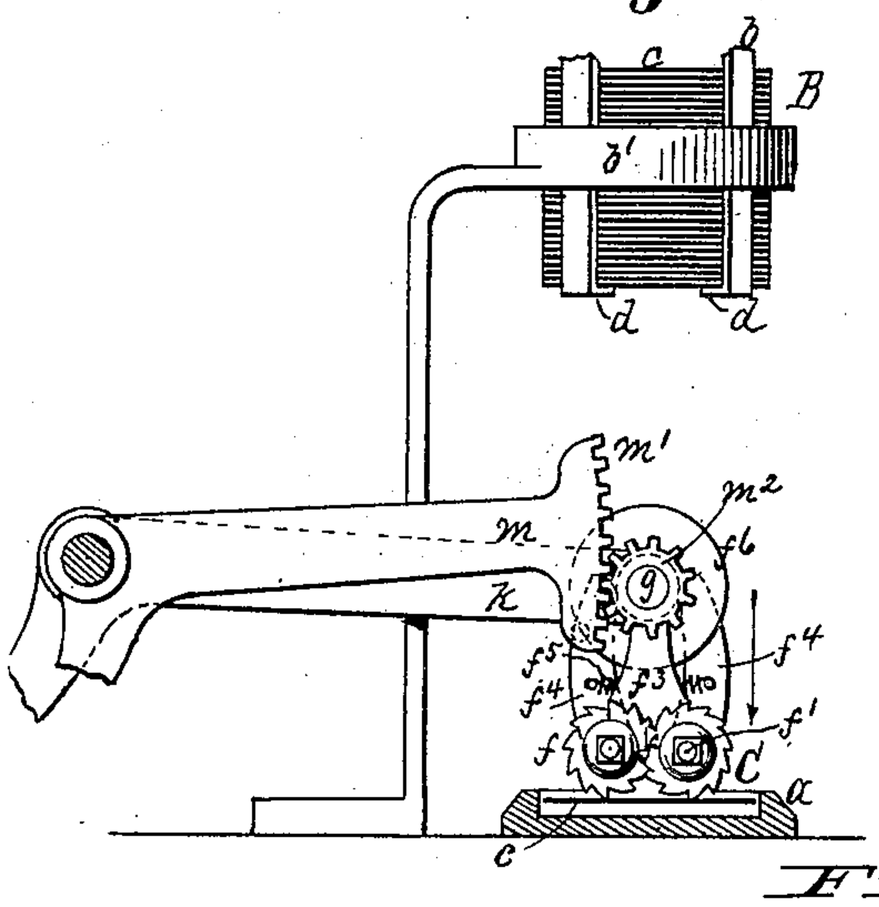


Fig. 8.

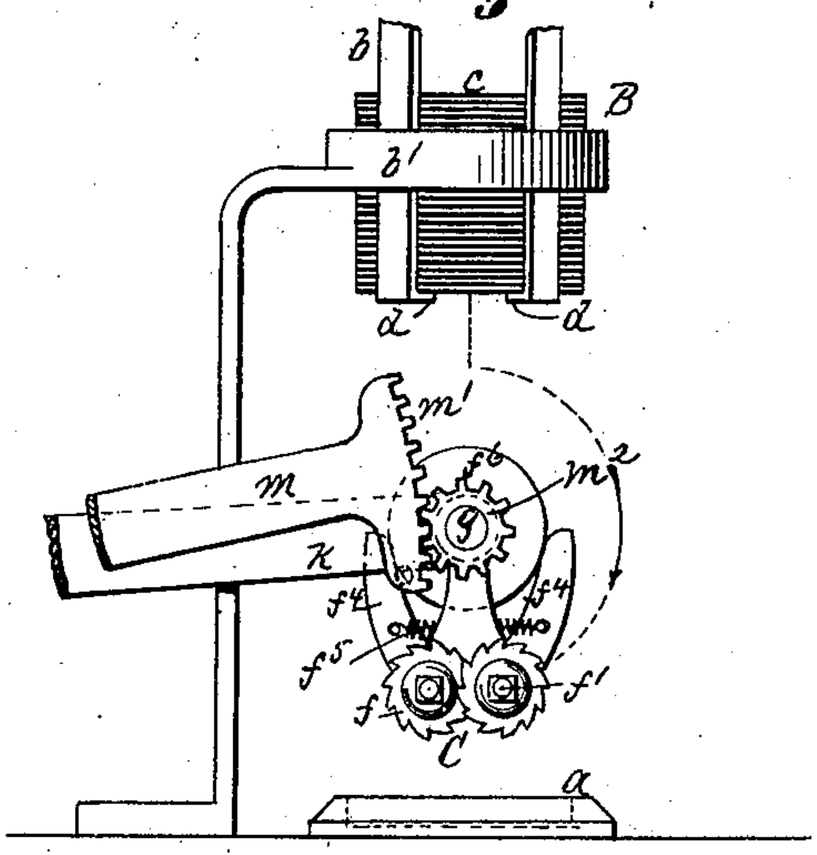
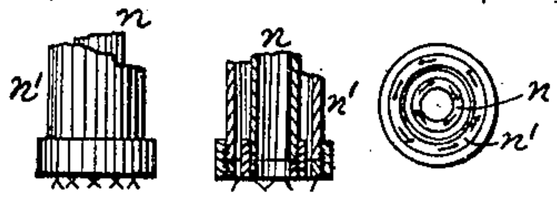


Fig. 10.



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Philip F. Larner

By

Inventor.
Frank P. Sheldon.
Wm. B. Wood Atty.

UNITED STATES PATENT OFFICE.

FRANK P. SHELDON, OF PROVIDENCE, ASSIGNOR TO HENRY B. METCALF, OF PAWTUCKET, R. I., AND WILLIAM McCLEERY, OF BOSTON, MASS.

MACHINE FOR FEEDING CLOTH DISKS TO BUTTON-MAKING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 245,407, dated August 9, 1881.

Application filed November 17, 1880. (Model.)

To all whom it may concern:

Be it known that I, FRANK P. SHELDON, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Machines for Feeding Cloth Disks to Button-Making Machinery; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of my invention.

My said improvements relate to the manufacture of that class of buttons which are composed, in part, of disks of woven textile fabric of various kinds, whether the cloth be relied upon in forming a flexible shank, as when placed in the rear of a "collet," or used as an ornamental finish or cover for the front portion of the button, or in both connections in the same button, as is common in the art. As is well known, these buttons are composed of various parts which are regularly assembled, and by the aid of mechanically-operated dies of proper construction these parts are firmly united to form the finished button.

Heretofore, so far as my knowledge extends, the delivery of cloth disks to the dies of button-machines has always involved the manipulation of each disk—*i. e.*, either by placing it by hand directly into the die or into the aperture of a revolving feed-wheel, (in a plane parallel with the die,) from which said cloth disk is forced by a plunger into the die.

The object of my invention is to automatically deliver said cloth disks to the dies for attaining economy in the cost of attendance of each machine, coupled with an increased capacity for production, as compared with hand-fed machines.

The initial essential element in the attainment of the ends sought by me is a suitable receptacle for receiving and containing the cloth disks in a properly-arranged mass, stack, or pile, and into which the disks may be placed, singly or in groups of many disks prearranged by the fingers into uniform circumferential relations with each other, and also preferably so constructed that it may be placed beneath the disk-cutting dies for permitting the cloth disks to fall into position as they are forced from the dies.

The cloth-disk holder used by me is generally similar to receptacles for paper tickets or labels, and for nail-head parts heretofore used in machines for ticketing ball-yarn, and for making trunk-nails, wherein the pneumatic principle was applied to automatic-feeding devices.

The cloth-disk receptacle should be located upon a button-making machine sufficiently adjacent to the path of the dies thereof (which receive the disks) to admit of the interposition of suitable transferring mechanism.

The initial essential capacity in the transferring mechanism is that of automatically taking a single cloth disk from the pile with a firm hold thereon, but without undue interference with the next-succeeding disk in the stack or pile. In this connection I have had to carefully consider the variable character of the fabrics employed in the button manufacture, some of them being thick, heavy, and quite stiff, others thin, openly woven, and very flexible, while some cloth disks are large and others quite small; and having pursued a wide range of experiment and investigation with reference to the development of the most desirable principles on which to rely in the furtherance of the ends sought by me, I have adopted what I will term the "nipper" principle, and that principle may, as I well know from experience, be made available in various refinements of construction, both with and without more or less puncturing of the disks during the nipping operation, and either with a loose nip or a tight one. I prefer, however, a loose puncturing nip, for by the puncturing, partial or wholly, I attain a secure hold upon the disk, and by the loose nip I attain the holding of the disk by crimping or curling it into a partially concavo-convex form, well adapted for accurate and easy delivery into a die, or into a metallic shell therein, as the case may be.

I am well aware that automatic feeding mechanism has heretofore been employed in great variety in screw-machines, cartridge-capping machines, &c., and, as before herein indicated, I am aware that the automatic feeding of labels to

ball-yarn and of parts of nail-heads in trunk-nail machines has heretofore been effected by means of devices operating upon pneumatic principles; but I know of no organization of mechanism, prior to my invention, whereby the cloth parts of a button were automatically fed to button-machines, nor any prior mechanism involving devices operating pneumatically, nor any prior grasping or nipping devices operating mechanically, which were adapted for use in this connection.

The details of mechanism for operating the nipper or its equivalent may be almost indefinitely varied according to the conditions present, involving, for instance, the distance of the disk-receptacle from the dies, the horizontal or vertical position of said receptacle, whether the disks be taken from the top or the bottom of a vertical, or from one end of a horizontal, receptacle; but none of these variations are of substantial consequence, although they have been fully considered by me, resulting, for the purposes of illustration, in the adoption of certain details in construction and arrangement, as hereinafter described and illustrated.

The various specific features, devices, and combinations of devices believed to be novel are set forth in the claims at the close of this specification, and while I prefer to embody all of the several subjects claimed in one organization of mechanism, I am well aware that more or less of them may be used with mechanism of a somewhat different character.

Referring to the two sheets of drawings, Figure 1, Sheet 1, is a side elevation of so much of a button-making machine with my improvements mounted thereon as is deemed necessary to illustrate my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view thereof. Fig. 4 is an enlarged partial plan and sectional view of the nippers and details in mounting the same. Fig. 5 is an enlarged plan of the disk-receptacle. Fig. 6, 7, 8, and 9, Sheet 2, are enlarged side views, illustrating the nippers in various working positions. Fig. 10 is a side view, section, and plan of a modification of the loose nipper.

A denotes a portion of the usual rotating die-table of a button-making machine, and the die *a* is one which receives a cloth disk. It is immaterial, for the purposes of this specification, whether said die be one which receives a cloth disk to serve as a cover, or a cloth disk which is relied upon to form the shank through which sewing is applied for attaching the buttons to garments.

B denotes the tubular cloth-disk receptacle. It is skeletonized, as shown, and composed of parallel bars *b*, (of which three or more may be used,) and binding-hoops *b'*, for securing said bars in position to provide for a cylindrical interior corresponding in diameter to the cloth disks to be used therein. The upper ends of these bars are curved outward to serve, after the manner of a funnel, in the introduction of the disks *c*. At the lower end of the receptacle are three or more retaining-studs, *d*, preferably one to each bar *b*, and they may be formed integral with said bars by bending their ends inward at right angles. Within the receptacle, and on top of the pile of cloth disks, I employ a weight, *e*, for maintaining the stack of disks in a compact condition, but a spring may obviously be employed in lieu thereof. As arranged with the transferring mechanism devised by me, said disk-receptacle is in a vertical position, and so as to deliver the disks from its lower end. It is also arranged to overhang the die-table, with its lower end coincident with the die *a*, whenever, in the intermitting rotation of the table, said die occupies the proper position for receiving a cloth disk, so that the transferring motions may be of a comparatively simple character, involving only movements in a line coincident with the axis of the die and cloth-disk receptacle, and a simple swinging movement, as hereinafter described; but whether the delivery be from the bottom or top, or the receptacle arranged in a horizontal position, it, with the weight, or equivalent, a spring, will not only properly contain the disks, permitting them to pass through with a minimum of friction against its walls, but also retain the mass of disks, while permitting the lower one to be removed. As shown, the cloth-receptacle is detachable, with its standard, from the platform on which it is mounted, so that when two or more of such receptacles are employed for each machine one can be placed below the usual cutting-dies and be filled with disks directly therefrom, while another filled receptacle is meantime properly mounted upon the platform of the machine.

Instead of thus mounting the disk-receptacle on the machine, said receptacle may be provided with a tenon-foot, and the standard be provided with a mortise to receive said foot, and a set-screw, whereby it may be firmly fixed in its proper position with relation to the transferring mechanism.

Although I show the cloth-receptacle adapted only to receive disks of about one size, it will, in practice, be preferably constructed so as to be adjustable for accommodating disks of various sizes—as, for instance, either by having the several bars provided with screw-studs and nuts on their backs for attaching them to properly-perforated rings of various sizes, or by constructing the rings in sliding sections, which will admit of their adjustment to various diameters.

For removing the cloth disks separately from the receptacle I employ the nippers C, which may be variously constructed, according to the character of the fabric employed. In some cases a plush or a napped fabric is desirable, and if so a close tight nip, centrally, will afford a firm hold thereof; but as a rule it will be preferable that the nippers possess such a puncturing capacity that they will partially enter a disk without disturbing the one next-adjacent thereto. This partial puncturing ca-

pacity may be attained by shouldered points, or by non-shouldered points, if limited in their movement toward each other to a plane quite closely corresponding to that occupied by the cloth disk. I prefer the latter arrangement. Two oppositely-located puncturing-points in the nippers will serve a good purpose; but I have preference for three, two on one side and one on the other located centrally between the two.

The nippers shown are composed of three toothed disks, *f*. These disks resemble circular saws of the "splitting" variety; but the angular teeth are sharp-pointed. In operation but one tooth (or two at the most) of each disk is in use at any one time; but the disk form is desirable, in order that many disks may be made at once and many teeth sharpened at once, and also, in order that dull ones may be replaced by others on the same disk, by rotating it and readjusting it on its axis. It is also important that the nippers be arranged so that they may be readily removed for the insertion of other nippers specially adapted to operate upon cloth disks composed of some particular variety of fabric. However the disks *f* may be mounted or rotated, if placed oppositely to each other, so that their teeth will move toward each other when in contact with a cloth disk, they can be relied upon for separating a single cloth disk from the receptacle, and if properly controlled they will securely hold the cloth disk and release it with facility, when desired. These nipper-teeth are mounted on parallel rock-shafts *f'*, which are provided with threaded outer ends, nuts, and an inner shoulder, between which, on one shaft, two of said disks are clamped with an intervening collar, f^2; but on the other shaft, *f'*, but one toothed disk is mounted and located centrally with relation to the other two. The rock-shafts *f'* have a partial rotation in opposite directions, so that the teeth of the disks on their upper sides move toward each other in grasping a disk, and from each other in releasing it. This movement may be variously attained; but I have devised means whereby the nipping motion is positively effected, and the releasing motion is attained by the action of a spring. The nippers are axially mounted with their rock-shafts *f'* in boxes upon an arm, f^3, which has a hub keyed to a rock-shaft, *g*. The rock-shafts *f'* have at their ends opposite the nippers pendent levers f^4, which are connected at their lower ends by a retractile spring, (rubber band,) f^5. A sliding conical cam-block, f^6, mounted on the rock-shaft *g*, occupies the space between the levers f^4, and against its surface the levers are snugly held by their band-spring. The movement of said conical cam-block in the direction of its small end spreads the levers f^4 apart, thus rotating the toothed disks toward each other for nipping, and the opposite movement of the conical cam-block permits the band-spring to promptly draw the arms toward each other, thus backwardly rotating said disks for releasing.

It is essential that the toothed disks of the nippers, while grasping the cloth disk, and during their movements toward the die *a*, should be immovably held with relation to each other and to the cloth disk held by them, and this, together with the movement of the cam-block, is effected as follows: Upon any suitable revolving shaft a cam, *h*, is located for vibrating laterally a lever, *h'*, the front end of which engages with the head of the cam-cone for forcing it along the rock-shaft *g*. A spiral spring coiled around the standard-fulcrum of lever *h'* forces the latter into contact with cam *h*. A thin vertical standard, h^2, is located at the rear of the rock-shaft and stands edgewise thereto, with its upper end at the front edge so located with reference to the path of the conical cam-block during the swinging movement of the nippers, (hereinafter to be described,) and during the sliding movement of the cam-block on the rock-shaft *g*, that a shoulder, h^3, on the cam-block, at its small end, engages with the edge of the standard h^2, (during a portion of its swinging movement,) and is controlled or held thereby until it reaches a recess in the standard at h^4, whereat the holding or locking effect ceases, the cam-block being then free to be promptly moved back to its normal position by the force of the expansive spiral spring *g'* on rock-shaft *g*. This return movement of the cam-block permits the releasing movement of the nippers, due to the succeeding action of their band-spring f^5. The recessed standard h^2 and the shoulder h^3 on the cam-block constitute a lock for securely maintaining the nippers in their closed or grasping position.

The grasping motion of the nippers is slow and positive, thus insuring a good hold upon the cloth disk, whereas the releasing motion is quickly effected, and with a shock incident to the operation of the spring on the nipper-arms supplemented by the spiral spring, which throws the cam-cone endwise on the rock-bar, and also by the action of a spring, *i'*, hereinafter described, which is relied upon to lower the nippers, when permitted to do so by the cam, which raises them independently of their hereinafter-described swinging movement, and therefore the cloth disk is readily disengaged from the nippers at the proper moment. As before indicated, the standard h^2 operates as a lock or locking device for securely maintaining the nippers in their closed or grasping position until the proper moment arrives for releasing the disk from the nippers.

It will be seen that the form of the nippers may be largely varied without materially affecting the results. Instead of the toothed disks, one pointed curved finger on each shaft would seize and withdraw a cloth disk from the receptacle; and, also, that said fingers would crimp or bend the cloth disk more or less, according to the proximity of the points in their closed position; and, also, that if the points

should be quite close to each other at the moment of their contact with the cloth disk, the latter would be pinched more tightly and nearer its center than by the toothed disks; and therefore, while I prefer the toothed disk-nippers, I do not confine myself thereto, except in such special limitation as is expressed in certain of the claims hereunto annexed.

The nipper-operating mechanism thus described may be employed in connection with cloth-disk receptacles, regardless of whether they occupy a vertical or a horizontal position, or whether the cloth disks are taken from the bottom or the top of a vertical receptacle, these changes in the position and arrangement of the receptacle involving merely corresponding changes in the arrangement of the nippers and their operative mechanism.

As shown, the cloth-disk receptacle is immediately above the revolving die-table A, and with its axis practically coincident with the center of the die when in position to receive the cloth disk. The receptacle therefore delivers the disks from its lower end, and the nippers require a vertical motion in attaining a position for grasping the cloth disk, a downward movement, and then an outward and downward swinging or rotating motion for moving the grasped disk from its upper to a lower position, and then a downward movement for projecting the disk into the die simultaneously with or preparatory to its release. The mechanism employed by me for the attainment of these motions is as follows: Upon any suitable revolving shaft a cam, *i*, is mounted for engaging with the rear end of the lever *k*, which at its front end has a sleeve or box, *k'*, within which the rock-shaft *g* is mounted, and by which said shaft and the nippers are supported. The cam *i* is so shaped on its edge that as it revolves it depresses the rear end of lever *k* and elevates the front end, (with the nippers,) and then, after a proper "dwell," it permits the retractile spiral spring *i'* to depress the front end of said lever and the nippers. This provides for the direct upward and downward movement of the nippers. Alongside of cam *i* is a second cam, *l*, which engages with the rear end of a lever, *m*, which has a fulcrum on the same line as that of lever *k*, in fact, a prolongation thereof, and the front end of said lever *m* has a segmental gear, *m'*, which meshes with a pinion, m^2, on the rock-shaft *g*, on which the nippers are mounted. The cam *l* is so shaped at its edge and so set with relation to cam *i* as not to operate upon lever *m* until the nippers have been lowered through their first directly-downward movement; but immediately thereafter said cam depresses the rear end of the lever *m*, elevating the segmental gear (limited in its upward movement by a stop-pin thereon) and rotating the pinion *m'*, the rock-shaft, and the nippers for executing the swinging downward and outward movement, and after that is completed, both cams *i* and *l*, corresponding in their outline, permit both levers to be moved together by the spring *i'* until the nippers have been depressed to their lowest point, whereupon the nippers release the cloth disk, as before described.

Although I have shown a segmental-gear lever for rotating the nippers, it is obvious that a vertically-reciprocated rack may be employed in lieu of the segment, and that in such case a lever may be relied upon as a means of communication between the cam and rack, or the cam may be placed in line with and in direct contact with the rack.

After a slight rest at their lowest position the nippers are again directly raised by cam *i* for a short distance, the lever *m* moving therewith (but not independently) until after this direct upward movement, whereupon said lever *m*, at its outer end, is permitted to move downward, the nippers being then rotated upward on the rock-shaft by the return action of the spiral spring m^3, which surrounds the box or sleeve *k'*, and is connected at one end to the lever *k* and at the other to the nippers, and is placed under a rotative tension by the segment-gear and pinion during the downward-swinging movement of the nippers. The continued rotation of the cam-shaft causes the nippers to be again directly elevated and placed in grasping contact with the lower cloth disk in the receptacle, the movements already described being then repeated.

The operation of this mechanism will be readily comprehended on reference to Fig. 7, which illustrates not only the position of the nippers after completing their first directly-downward movement with a cloth disk held thereby, but also the point from which the nippers directly rise to grasp a cloth disk, as indicated in Fig. 6; and Fig. 8 illustrates not only the position occupied by the nippers after completing their downward-swinging movement, and just prior to their second directly-downward movement, carrying a cloth disk, but also the position occupied by them after their directly-upward movement (having previously delivered a cloth disk to the die) and before their upward-swinging movement.

In Fig. 9 the nippers are shown in their extreme lowest position, the cloth disk discharged into the die, and ready for the directly-upward movement to the position indicated in Fig. 8, in which figure the straight vertical and the curved dotted lines indicate the line traversed by the nippers.

In Fig. 10 I illustrate a modification of my loose-nipping nippers *f*, consisting of a rod or tube, *n*, within a larger tube, *n'*, one or both arranged to be slightly rotated to and fro in opposite directions, and each provided with a set of more or less teeth slightly inclined or curved respectively, according to their direction of movement in engaging with a disk, whereby they may seize the disk with a loose nip in a manner similar to the nip of the form of nipper previously described—*i. e.*, these two sets of teeth being axially mounted and rotated in

the direction of their curve or inclination while pressing upon a disk, will result in a firm seizure thereof with more or less curling or crimping effect, and a reverse movement of said teeth will effect a prompt release. The rotation of either of these sets of teeth without motion of the other would have a tendency to rotate the disk and cause it to become engaged with the stationary set of teeth with considerable security; but I would generally prefer that both members of the nipper, however otherwise constructed, and whether it clutch a disk by puncturing it or otherwise, should be capable of more or less movement in opposite directions in seizing and releasing a disk.

In some instances leather disks are used instead of cloth, and in feeding such stiff and usually bulky material the nippers described may be relied upon, whether they be or not so constructed and arranged as to curl or crimp the disk.

Having thus described my invention, I claim—

1. The combination, substantially as hereinbefore described, of the die-table in a button-making machine, a cloth-disk receptacle, and the nippers which mechanically engage with and automatically transfer the cloth disks singly from the receptacle to a die in the table.

2. The combination, substantially as hereinbefore described, of a cloth-disk receptacle and nippers provided with oppositely-located puncturing points or teeth, adapted to partially puncture and to crimp or bend a cloth disk in grasping it, substantially as described.

3. The combination, with the cloth-disk receptacle and the cloth-grasping nippers, of the sliding cam-block, the cam, and the lever for moving said block in closing the nippers while in contact with a cloth disk, substantially as described.

4. The combination of a cloth-disk receptacle, nippers mounted on rock-shafts, a sliding cam-block for closing the nippers, and a spring for opening them, substantially as described.

5. The combination, substantially as hereinbefore described, of the automatical cloth-grasping nippers adapted to partially puncture and crimp a cloth disk, and a lock for securely maintaining the nippers in their closed position while grasping a cloth disk, substantially as described.

6. The combination, with a cloth-disk receptacle, of nippers embodying two or more sharp-toothed disks, substantially as described.

7. The nippers composed of two or more sharp-toothed disks, in combination with oppositely-rotated rock-shafts, on which said toothed disks are mounted, substantially as described.

8. The combination, substantially as shown and described, of a die-table, A, a vertical cloth-disk receptacle, open at its lower end for the delivery of disks therefrom, overhanging the die-table and coincident with the die *a*, and the nippers arranged to swing from directly below the cloth-disk receptacle to a point immediately above the die in transferring a cloth disk to a die, as set forth.

9. The combination, with the cloth-disk receptacle and transferring-nippers axially mounted upon a rock shaft, in bearings upon a lever vibrated toward and away from the receptacle by a rotating cam, of a cam, lever, segmental gear, and pinion for partially rotating the nippers, substantially as described.

10. The combination of the swinging nippers axially mounted upon a rock shaft, the pinion on said shaft, the segmental-gear lever, the cam for vibrating said lever in swinging the nippers downward, and the spring for swinging the nippers upward, substantially as described.

11. The combination of the nippers mounted on a vibrating lever, the sliding cam-block, its operating-cam, lever, and spring, the band-spring, the locking-standard, which by controlling the sliding movement of the cam-block locks and maintains the nippers in their closed position, and permits them to release the cloth disk, the gearing which swings the nippers downward, and the spring which swings them upward, substantially as shown and described.

FRANK P. SHELDON.

Witnesses:
LEMUEL H. FOSTER,
DEXTER B. POTTER.