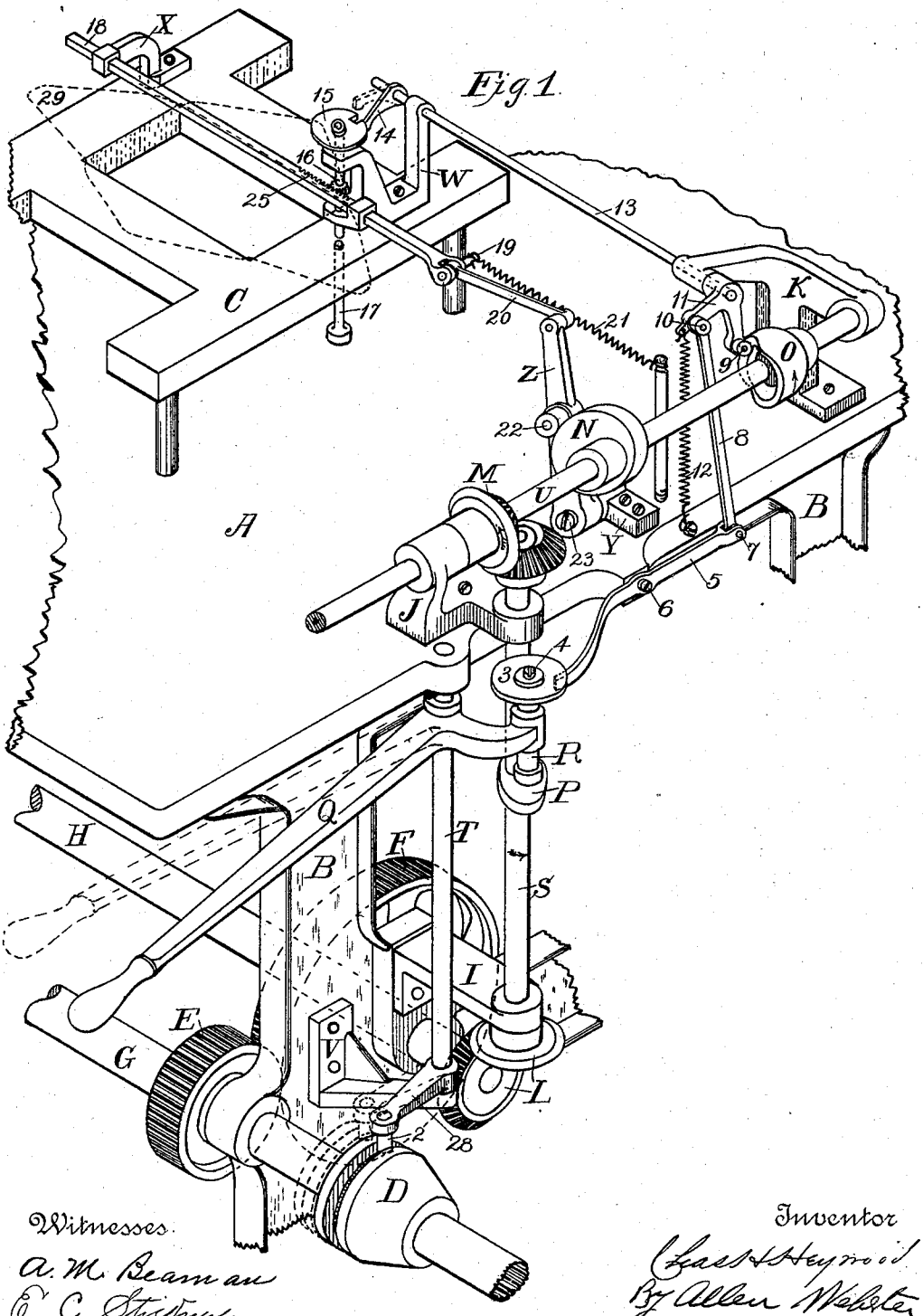
(No Model.) 2 Sheets—Sheet 1.

C. H. HEYWOOD.

STOP MOTION MECHANISM.

No. 590,984. Patented Oct. 5, 1897.

Fig. 1.



Witnesses.
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Inventor
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Attorney

(No Model.) 2 Sheets—Sheet 2.

C. H. HEYWOOD.

STOP MOTION MECHANISM.

No. 590,984. Patented Oct. 5, 1897.

Fig. 2.

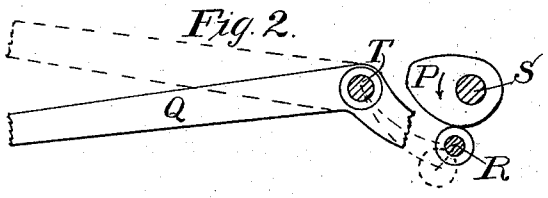
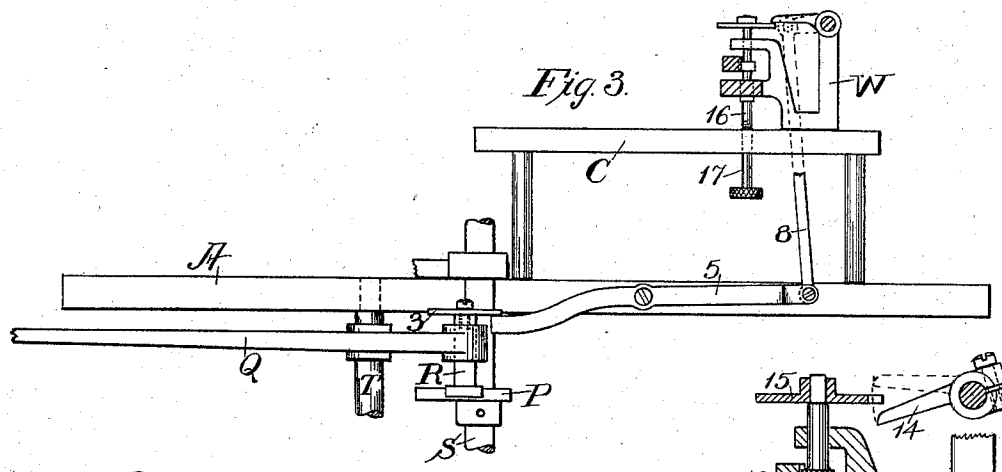


Fig. 3.



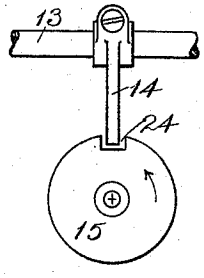


Fig. 4.

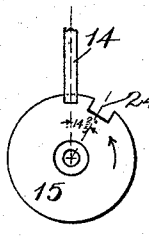


Fig. 5.

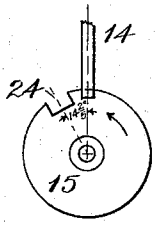


Fig. 6.

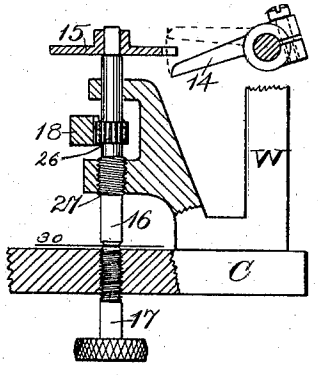


Fig 7.

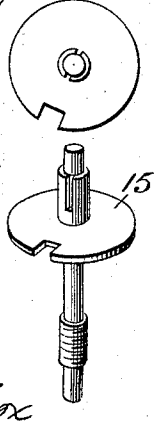


Fig. 8.

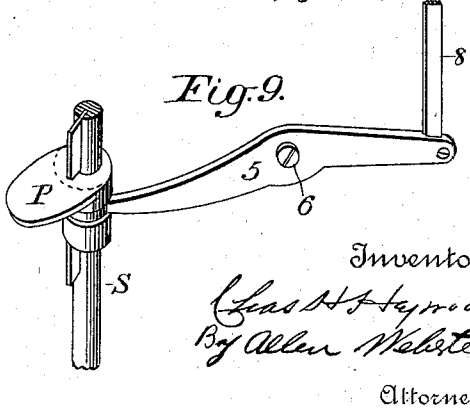


Fig. 9.

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UNITED STATES PATENT OFFICE.

CHARLES H. HEYWOOD, OF HARTFORD, CONNECTICUT.

STOP-MOTION MECHANISM.

SPECIFICATION forming part of Letters Patent No. 590,984, dated October 5, 1897.

Application filed February 23, 1895. Serial No. 539,340. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. HEYWOOD, a citizen of the United States of America, residing in Hartford, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Stop-Motion Mechanism, of which the following is a specification, reference being had to the accompanying drawings and letters and figures of reference marked thereon.

The object of my invention is to provide a means of controlling the movements of machines for various purposes, and which can be applied in such manner as to cause the stopping of the machine or a portion of the machine or change the operation of a part in case the article or substance handled by the machine fails to be at the proper place at the proper time, or in case more than one article or substance arrives at the place together, or if because of any difference of thickness of a part it is not desired to operate upon the same.

Various stop-motions have been invented that operate to stop the machine when the paper or substance fed is out of position or gone entirely from its proper place. Such machines, for illustration, are shown in patents for printing-machines, Patent No. 303,550, issued August 12, 1884, and envelop-machines, No. 420,792, issued February 4, 1890, and No. 468,925, issued February 16, 1892; but not to my knowledge has there ever before been produced a device that will so control the machine as to stop the same or a portion thereof without puncturing or marring the sheet if there be more than one sheet or substance fed together at one time, in addition to also stopping the machine or a portion thereof if the sheet or substance is inadvertently omitted.

In the accompanying drawings, in which like letters and figures of reference indicate like parts, Figure 1 is a perspective of a portion of an envelop-machine embodying my invention. Fig. 2 is a plan of the vertical shafts S and T, taken in section beneath the main table A and showing the shipper-lever in the position occupied by it when the machine is running, the end supporting stud R being broken away to show the end of the stud in the path of the cam P. Fig. 3 is an elevation of part of Fig. 1, taken from the right-hand side of the machine. Fig. 4 is a plan view of the stop disk and finger at the time of the screw abutting on the paper beneath. Fig. 5 is a plan view of the same at the time when the screw abuts on two sheets of paper. Fig. 6 is a plan view of the same at the time when the screw abuts on the adjusting-screw in consequence of the lack of paper in its path. Fig. 7 is an enlarged view of a portion of Fig. 3, partly in section and showing the screw abutting on a sheet of paper and the stop-finger having just passed down through the slot in the disk and thereby removing, through intermediate connections, the stud R out of the path of the cam P; and Figs. 8 and 9 illustrate modifications in the construction of two of the parts.

In detail, A indicates the table; B, supporting-frame; C, creasing-plate; D, clutch or cone for same; E and F, spur-gears; G, clutch-shaft; H, large gear-shaft; I, J, and K, brackets; L and M, bevel-gears; N O P, cams; Q, shipper; R, stud; S, vertical shaft; T, rock-shaft; U, horizontal shaft; V, rock-shaft bracket; W and X, brackets mounted on the creasing-plate; Y, a stand or bracket for cam-lever, and Z cam-lever.

2 indicates a clutch-operating pin; 3, a disk on the shipping-lever stud; 4, a screw; 5, trip-lever; 6, a stud; 7, a pin; 8, connecting-rod; 9, antifriction-roll; 10, pivot; 11, bell-crank lever; 12, spiral spring; 13, rock-shaft; 14, finger; 15, disk; 16, threaded shaft; 17, adjusting-screw; 18, sliding rod; 19 pivot or stud on the latter; 20, connecting-rod; 21, spiral spring; 22, antifriction-roll on cam-lever; 23, stud on which cam-lever is mounted; 24, opening in disk 15; 25, teeth on sliding rod 18; 26, spur-gear on threaded rod 16; 27, thread on threaded rod 16; 28, clutch-arm on rock-shaft T, and 30 a sheet of paper.

A general description of the construction and operation of my invention is as follows:

The blanks are brought to creasing-plate C in any well-known manner and removed therefrom by a plunger or other well-known manner. I have not shown any means of

bringing the blanks to this plate or removing them, for such mechanism forms no part of this invention.

G is the main driving-shaft, and on this shaft I represent a common friction-cone D. I have omitted the friction-pulley, it being unnecessary to show to illustrate my invention. The friction can be of any well-known make, operated in any well-known manner by moving this cone D forward and back upon the shaft. Therefore I only show the cone, and show in dotted lines the position this cone assumes when thrown out of engagement with the friction.

E is a spur-gear fastened upon shaft G, meshing with gear F, fastened upon shaft H. The power being applied to shaft G is transmitted through gears E and F to shaft H. At the end of shaft H is a pair of bevel-gears L, one of which is fastened on the lower end of vertical shaft S. This shaft extends through bracket I upward through bracket J, fastened upon table A, and terminates with another pair of bevel-gears, (marked M.) The motion is then transmitted through horizontal shaft U, running at right angles to shaft H. On shaft U are located two cams N and O.

On the side of the machine is a shipper rock-shaft T. This shaft supports at its upper end the shipper-handle Q and at its lower end the radial arm 28, in which is fastened a pin 2, which extends into the groove in the friction-cone D. At the rear end of shipper Q is a hole through which passes the stud R. This stud R is fitted so as to have a vertical motion through the rocking of the lever 5, pivoted on edge of plate A by the screw 6. The stud R passes upward through its bearing in shipper Q and is capped with a cover 3, fastened by screw 4. The cover 3 overhangs the point of lever 5 and is made large enough to rest upon the point of lever 5 at all times notwithstanding the movements of shipper Q.

Fastened on shaft S is the cam P. This cam I term the "stop-cam."

In Fig. 3 is shown a portion of the shaft S, having thereon the cam P, and a portion of the shaft T, supporting shipper-lever Q. In this view the stud R is shown in its lowest position—that is, with the end in the path of cam P—and in this position if the machine was running shaft S would be revolving, and as stud R is in the path of cam P said cam would move the stud R out of its path, thereby throwing the shipper into the dotted position shown in Figs. 1 or 2. This would move the cone D along the shaft to the dotted position shown and stop the machine.

On the table A is fastened a bracket K. This bracket supports one end of shaft U and also provides support for the rock-shaft 13, extending over the table and through the bearing W, fastened upon the top of creasing-plate C.

On the table A is fastened a stand Y, to which is pivoted the lever Z. This lever carries the stud 22, which is in contact with the periphery of the cam N. At the upper end of lever Z a connection 20 is pivoted and extends to bar 18 and is pivoted thereto by pin 19. Spring 21 causes this bar connection and lever to be retracted and kept in contact on cam N during the operation of the machine. The bar 18 is supported in brackets X and W and is given a reciprocating motion therein by cam N.

On the end of rock-shaft 13 is a bell-crank lever 11. On one member of this lever is the pin 9, which rests in contact with the surface of the cam O. On the other member of this lever is pivoted the connection 8 by pin 10. Connection 8 extends downward and is fastened to lever 5 by pin 7. Spring 12, extending from end of lever 11 to the plate A, keeps the pin 9 in contact with the cam O unless prevented by the operation of parts hereinafter to be described. On the other end of shaft 13 is a finger 14, termed the "stop finger" 14.

In Fig. 7 a portion of the bracket W is broken away, showing the vertical shaft 16. This shaft has on one portion a left-hand screw-thread 27. This thread is tapped into bracket W, so that as shaft 16 is rotated forward or backward it will ascend or descend. Above the thread 27 is the gear-pinion 26, while at the upper end of the shaft is the disk 15.

In Fig. 1 it will be seen that the gear-pinion 26 is meshed into teeth cut into the side of the bar 18. Therefore by reciprocating this bar 18 the screw 16 will be screwed down through the bracket W or unscrewed, according to the direction in which the bar is moved. Directly beneath screw 16 is the adjustable screw 17, and in Fig. 7 I have shown these two screws 16 and 17 with their ends together and the sheet of paper 30 held between them.

The vertical shaft or screw 16 I term the "micrometer-screw." This screw has twenty threads to the inch, and therefore during three hundred and sixty degrees of revolution will ascend or descend one-twentieth or fifty one-thousandths of an inch. Fifty one-thousandths of an inch for three hundred and sixty degrees amounts to seven and one-fifth degrees for every one one-thousandth of an inch. Consequently if we are feeding sheets of paper two one-thousandths of an inch thick the adjusting-screw 17 should be so adjusted that when the micrometer-screw abuts on the sheet 30 the slot 24 in disk 15 will be underneath the stop-finger 14, and the stop-finger may pass through the slot, as shown in Fig. 4; but if no sheet is fed beneath the screw the screw will abut on adjusting-screw 17 instead of on the paper; but to do this it has descended two one-thousandths of an inch lower than before, and this excess of motion will rotate the slot 24 in disk 15 fourteen and two-fifths degrees past the stop-finger, and the finger 14 would fall upon the disk

and stop instead of passing through the slot, as shown in Fig. 6.

If two sheets of paper were fed together, then the screw will descend two one-thousandths of an inch less than in Fig. 4, and the slot 24 in disk 15 will vary fourteen and two-fifths degrees in the opposite direction from the normal position, as shown in Fig. 5. In either case whenever the finger 14 falls on the disk and is retarded thereby stud R fails to be lifted and is left in the path of the stop-cam P, and the shipper of the machine is thrown out, thereby stopping the machine.

The general operation of the machine is as follows: If the shipper Q is moved over to start the machine and no paper was on the creasing-plate C in position 29, the machine will be stopped at the next revolution. Therefore in starting the machine with no paper passing through at first it will be necessary to raise the stud R by the disk 3 and hold it up by hand until the machine goes into operation. By holding stud R it is prevented from dropping into path of cam P, which would stop the machine. After starting the machine, the paper being fed through in the proper manner, the operation is as follows: Upon shaft U rotating cam N operates to reciprocate bar 18, the reciprocating bar rotating screw 16 forward and back. The travel given to bar 18 by cam N is enough to rotate screw 16 a little more than one revolution, the reason for which will soon appear. In the position shown in Fig. 1 the bar 18 is pushed out to its farthest extent and screw 16 has been unscrewed, thereby raising the end above the adjusting-screw 17 and bringing the slot in disk 15 directly over the point of the stop-finger 14, which is beneath the disk at this time. At this moment, as the disk stops, the finger 14 passes up through the slot by the action of cam O to the dotted position shown in Fig. 1. There is just time for this finger to pass through the slot before the bar 18 commences its return stroke, and during this time a sheet has been removed and a new one substituted beneath the screw 16. As the bar 18 commences its return stroke the screw 16 rotates down upon the paper, and if the adjusting-screw 17 is properly set the slot in disk 15 will stop directly under the point of finger 14. As the screw 16 abuts on the paper the rod 18 is stopped thereby, and pin 22 on lever Z will stop short of making a complete stroke and remain off the bottom of the cam a short distance. This will be better understood by knowing that if no paper was under screw in order to revolve that screw and cause it to descend a thickness of the paper farther and abut on screw 17 it will be necessary to have more stroke on the cam than will be used if the screw stopped on the paper every time and revolved no farther. The moment the screw stops on the paper the slot 24 in disk 15 is brought beneath the finger. The finger passes through by action of the rock-shaft 13, lever 11, and the cam O. This causes the end of lever 5 pivoted on the table to descend through the medium of connection 8 and elevates that end of lever which is beneath cover 3, thereby lifting stud R up out of the path of the cam P. This operation is repeated at every revolution of the machine, the parts being so timed that the cam P barely misses striking the stud R at every revolution; but if a sheet too many or a sheet less is fed to the machine it is obvious that the slot 24 in disk 15 will not stop at the same place, but will occupy positions similar to those shown in Figs. 5 and 6, and in either case the result becomes the same. The stop-finger 14 will strike the disk and be prevented from passing through, thus preventing lever 5 from being lowered, and the stud R will be left in path of cam P, as shown in Fig. 2, and the machine will be stopped. As soon as stud R is raised and the machine started again the parts will resume their relative positions.

I have shown this invention applied to envelop-machines and adapted to operate upon paper blanks as they arrive upon the creasing-plate beneath the plunger. My stop-motion is more particularly adapted to rapid-running paper-handling machines—such as printing-presses and envelop-machines—that have various stations at which the paper stops on its passage through the machine. Such machines would be the envelop-machine No. 444,852, patented January 20, 1891, and the printing-press No. 303,550, patented August 12, 1884; but my stop-motion can be applied to all other machines—such as box-punching and card-setting machines and looms and weaving-machines of all descriptions—where it is desirable to stop an operation if a part breaks or obstructs.

I do not limit myself to the construction herein shown, although I consider this the most practicable and successful for envelop-machines. The adjusting-screw 17 might be omitted, and as a means to adjust for various thicknesses of paper the disk 15 could be adjusted on its screw so as to have slot opposite the stop-finger when screw abutted on paper. The adjusting-screw is much more easy to manipulate and therefore preferable, but could be omitted in the manner just stated.

In the arrangement herein shown I have operated the shipper-lever by the cam P and stud R and I get the result required, but I do not limit myself to this arrangement. This is simply one mechanical construction and may be devised in various ways by any competent mechanic. I show one form adapted to this machine, but for different machines different adaptations would be required. For the construction shown a good equivalent would be to arrange the cam P splined on shaft S in such manner that it could slide up and down, the lever 5 to operate the cam as it

now does the stud, while the stud R could then be made stationary on lever Q. (See Fig. 9.)

My invention consists in arranging a screw to rotate and gage each sheet, piece, thread, or substance passed beneath it and produce at a certain point a marked variation, so that if the sheet, piece, thread, or substance varies the variation will cause, through the mechanism provided, the stopping of the machine or cessation of the operation of any required part.

The simple mechanism to operate with the screw for detecting this variation and stopping the machine which I have shown and described could readily be modified by ordinary mechanical skill to suit different machines, and in Fig. 8 I illustrate one of such modifications wherein the disk 15 is mounted on the micrometer-screw by a clamp securing the disk to the screw-stem with sufficient firmness for operative purposes and yet permitting it to be moved and adjusted so as to bring the slot in the disk to the proper position.

The principal feature, which I claim broadly, is the employment of the micrometer-screw or its equivalent in a stop mechanism for the purposes shown and specified.

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

1. In a stop-motion mechanism, the combination of a screw, an abutting surface, means for feeding sheets of paper or other material between the screw and abutting surface, means for rotating the screw, to move it toward said abutting surface, said rotary motion being adapted to be stopped by the impact of the screw upon the interposed sheet or sheets of paper, and an operative connection with said feeding mechanism to stop the same, arranged to be started by the stoppage of the screw at any other than a predetermined point, substantially as described.

2. In a stop-motion mechanism, a rod arranged with a screw-thread, an abutting surface, means for rotating the rod intermittently to move it to and from said abutting surface, said forward motion being adapted to be stopped by the impact of the screw upon the interposed sheet or sheets of paper, and an operative connection with said mechanism for rotating the rod, to stop said mechanism, said connection being adapted to be actuated by the stoppage of the rod at any other than a predetermined point, substantially as described.

3. In a stop-motion mechanism, a micrometer-screw and abutting surface combined with a slot-provided disk carried on the screw and a finger adapted to pass through the slot in disk at each revolution of the machine, provided the proper number of sheets or material are fed into the machine, and an operative connection between said finger and the machine for stopping the latter when the finger fails to pass through the slot.

4. In a stop-motion mechanism, a micrometer-screw, a disk rotating with said screw, combined with a finger adapted to pass a certain portion of said disk and all arranged in such manner that if more or less paper or material are fed into the machine at any time, the finger will fail to pass the proper portion of disk, and an operative connection between said finger and the machine for stopping the latter when said finger so fails as aforesaid.

5. The combination of a suitable supporting-frame; a driving-shaft; a clutch mechanism mounted on the latter; a suitable supporting-stand for the blanks or sheets; a threaded stem 16 mounted to move toward said stand and bear against the material thereon when rotated; a suitable slotted head mounted upon said stem; a finger arranged to move through said slot when the stem is in the desired position and mechanism connected with said finger and with said clutch whereby the clutch is thrown out of engagement when the finger fails to pass through said slot, substantially as and for the purposes stated.

6. A suitable supporting-frame; a driving-shaft; clutch mechanism mounted thereon; a suitable supporting-stand or creasing-plate for the reception of blanks or sheets; a threaded stem arranged to move toward and from said blanks or sheets when rotated; a slotted head thereon; a spur mounted upon said stem; a reciprocating rod 18 provided with teeth arranged to engage the teeth upon said spur; a lever Z mounted upon said frame and connected with rod 18; a rock-shaft 13; a finger 14 mounted thereon and arranged to pass through said slot or to strike the head upon stem 16 dependent upon the position of the stem; a bell-crank lever 11 mounted upon said rock-shaft; a shaft U mounted in suitable bearings and provided with cams N and O, the former of which engages the lever Z and the latter the bell-crank lever 11; suitable mechanism to cause the rotation of the shaft U and intermediate mechanism connecting the bell-crank lever 11 with said clutch mechanism whereby the latter is thrown out of engagement when said finger fails to pass through the slot in the head of the stem 16 substantially as and for the purposes stated.

7. The combination of a suitable supporting-frame; a driving-shaft; a clutch mechanism mounted thereon; a frame or plate for receiving the blanks or sheets; a threaded stem 16 mounted to move toward or from said plate or frame and bear with its end against the blanks or sheets; means to cause said stem to rotate back and forth at each complete revolution of the machine, a disk or head mounted upon said stem and provided with a slot; a reciprocating rod 18 having teeth arranged to mesh with the teeth upon a spur, the lat-

ter being mounted upon said stem; a lever mounted upon said frame and connected with said reciprocating rod 18 a rock-shaft 13 mounted in suitable bearings; a finger 14 mounted thereon and arranged to pass through said slot or strike upon said head; mechanism arranged to move said rock-shaft and said lever Z once during each revolution of the machine; suitable springs arranged to take up all slack motion; a suitable driving mechanism and intermediate connections between said rock-shaft and said clutch whereby the clutch is thrown out of engagement whenever the finger fails to pass through said slot, substantially as and for the purposes stated.

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