J. R. ENGELMAN.

FILM PERFORATING MACHINE.

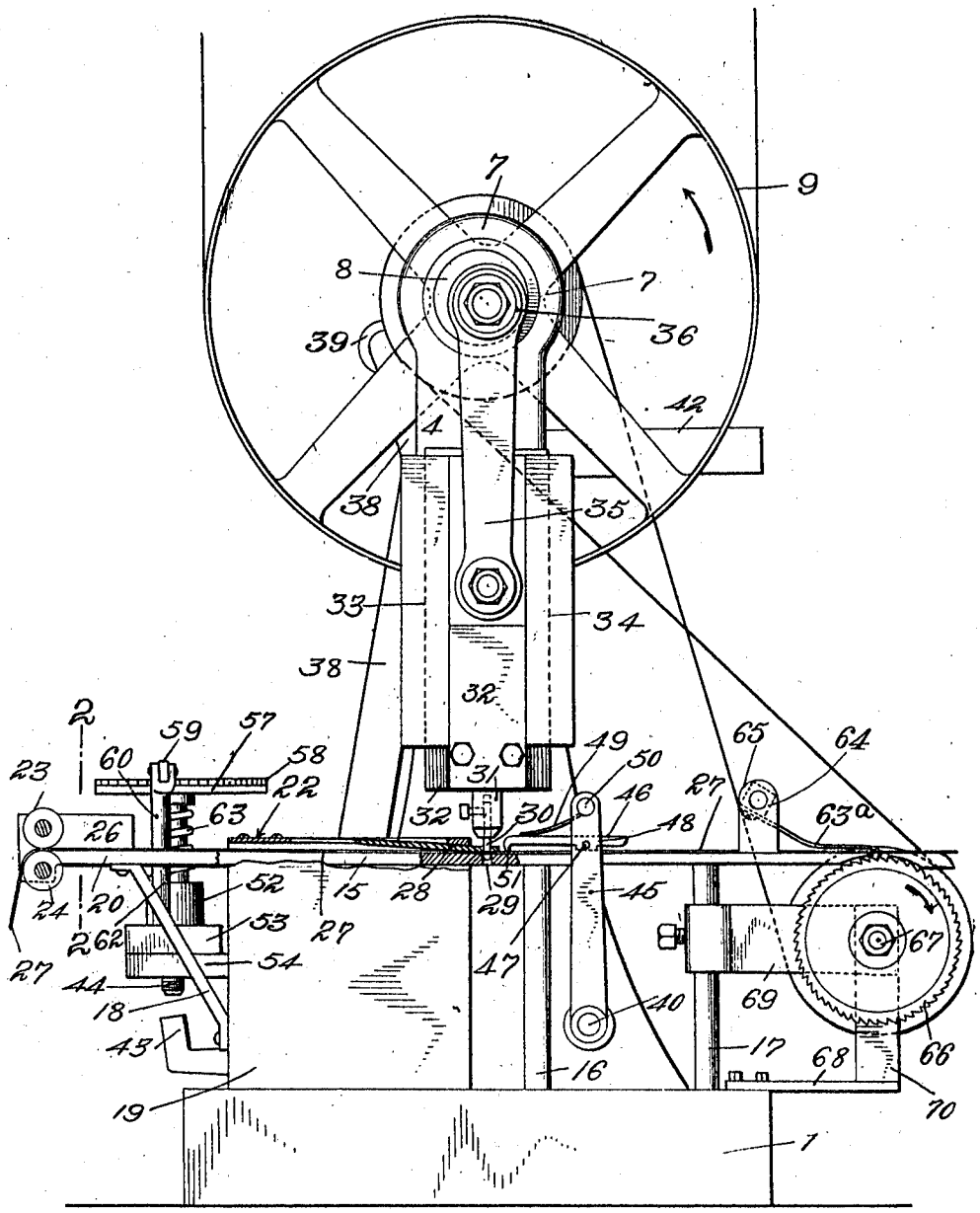
APPLICATION FILED JULY 28, 1909.

978,121.

Patented Dec. 6, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

Julius R. Engelman Inventor

By his Attorneys

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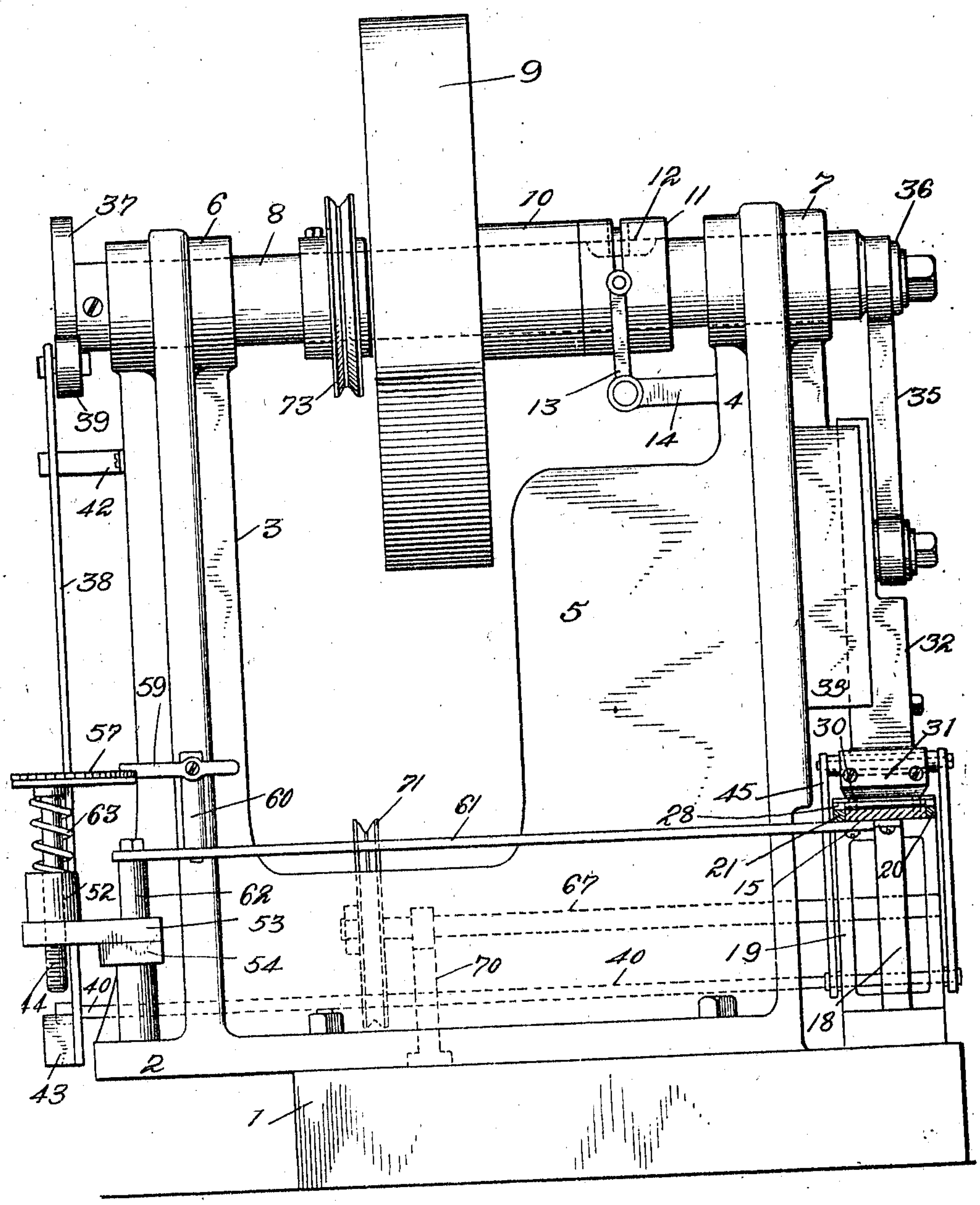
4 SHEETS—SHEET 2.

Fig. 2



Witnesses:
Harry C. Hebig
Adolph C. Dinse

Inventor
Julius R. Engelman
By his Attorneys
Dunn & Fish

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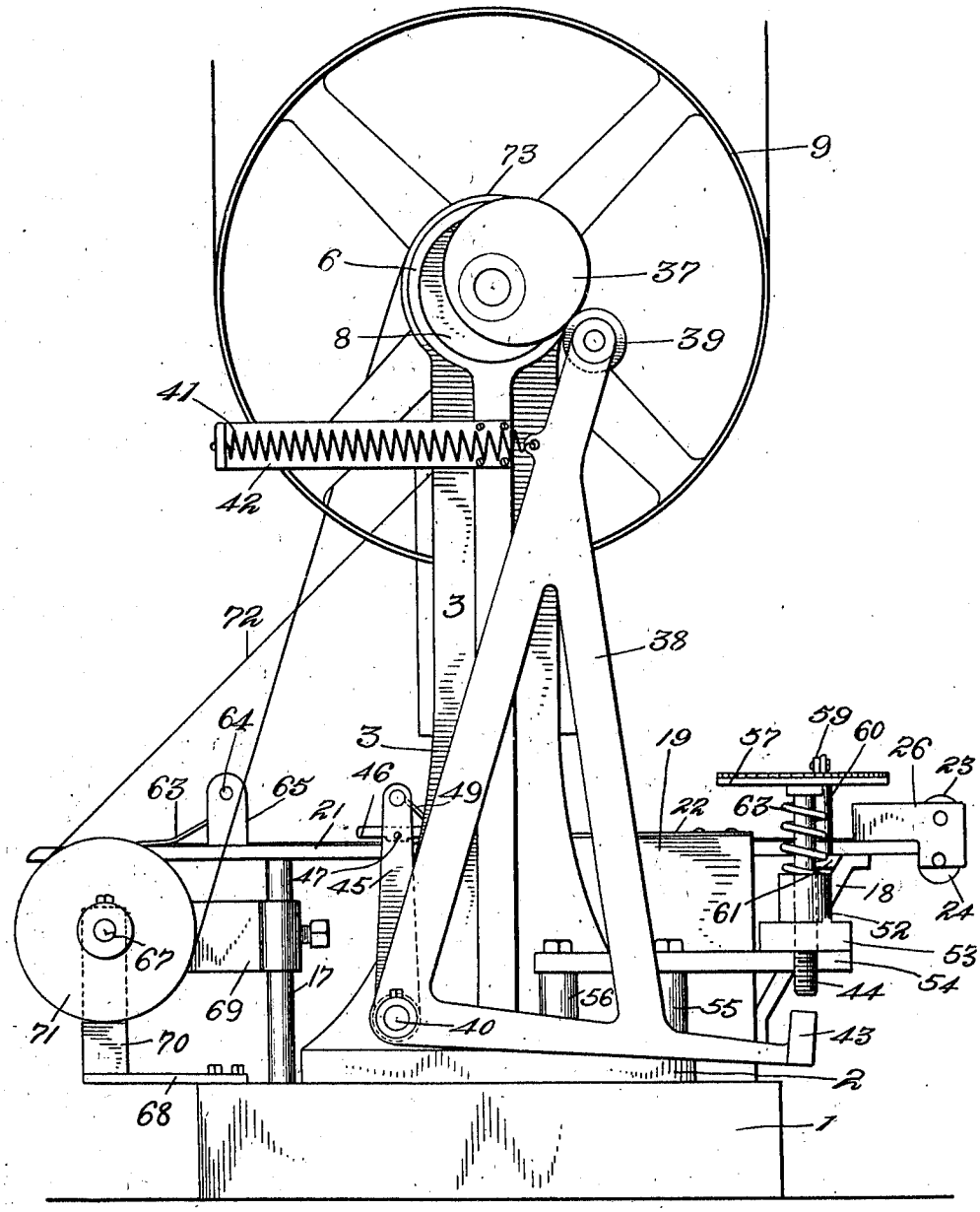
4 SHEETS—SHEET 3.

Fig. 3.



Witnesses:

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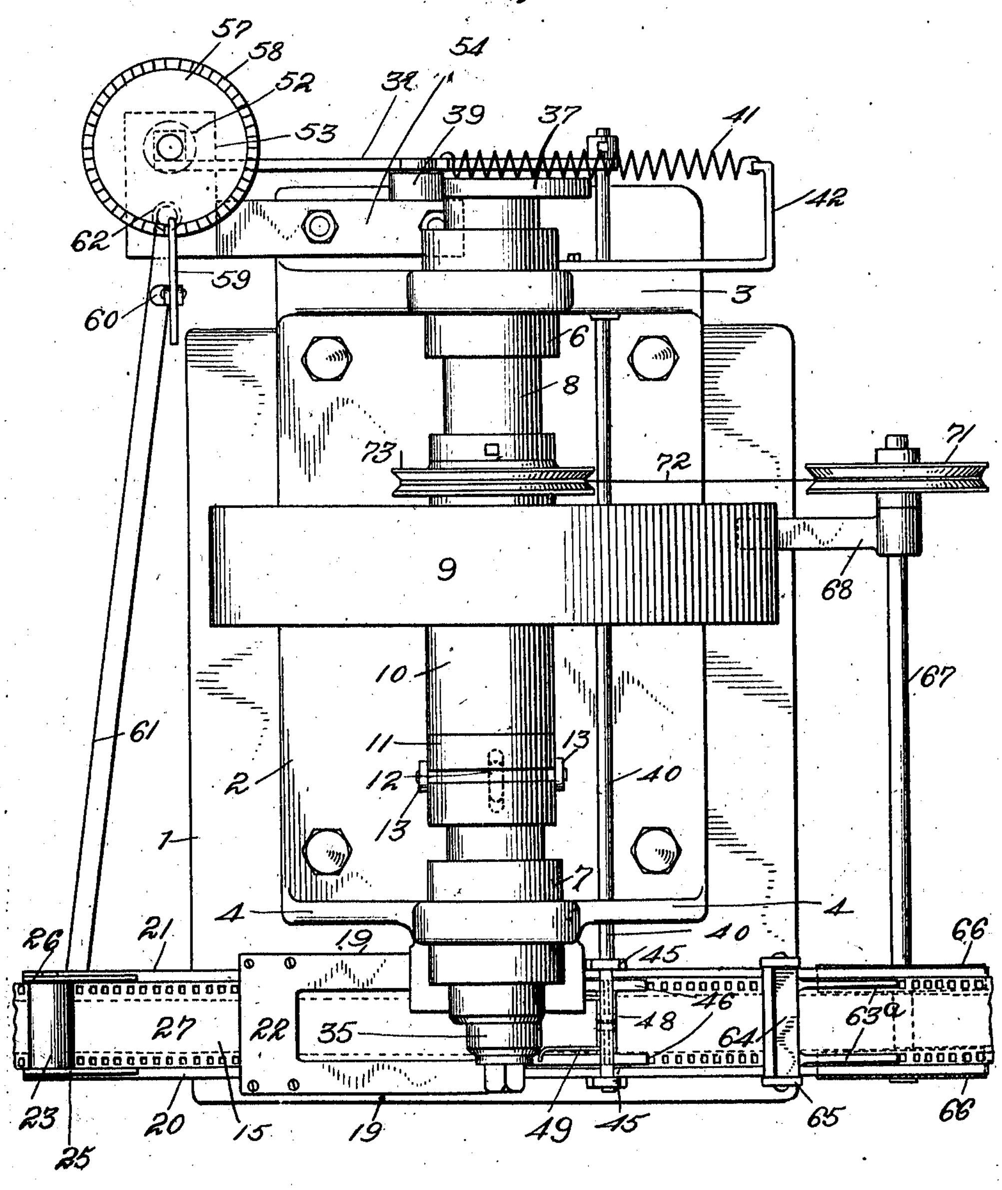
4 SHEETS—SHEET 4.

Fig. 4



Witnesses:

Harry C. Herbig

Adolph G. Deine

Inventor

Julius R. Engelman

By his Attorneys

Dunn & Fisk

UNITED STATES PATENT OFFICE.

JULIUS R. ENGELMAN, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO HERMAN A. METZ, OF BROOKLYN, NEW YORK.

FILM-PERFORATING MACHINE.

978,121. Specification of Letters Patent. Patented Dec. 6, 1910.

Application filed July 28, 1909. Serial No. 510,093.

To all whom it may concern:

Be it known that I, JULIUS R. ENGELMAN, a subject of the Emperor of Germany, having declared my intention to become a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Film-Perforating Machines, of which the following is a full, clear, and exact specification.

My invention relates to machines for perforating sheets, and while it may be used for a variety of purposes where such operations are required, it is designed with a view to use in perforating reinforcing strips secured to photographic films such as are used in moving-picture machines.

The object of the invention is to provide means for manually controlling the spacing between perforations, thereby insuring uniformity in the position of the perforations and the registry of the perforations in such reinforcing strips with the perforations in the film; also permitting an uneven spacing in the original perforation to be corrected and to enable such adjustment to be effected while the machine is in operation. These and other objects which will appear as the description proceeds, I accomplish by the improved construction of machine hereinafter described and illustrated in the accompanying drawings wherein—

Figure 1 is a front elevation of my improved machine. Fig. 2 is an elevation taken from the left, and partly in section, on the line 2—2 of Fig. 1. Fig. 3 is a rear elevation; and Fig. 4 is a plan view.

The long films as usually supplied for moving-picture machines are perforated when manufactured. It is desirable to reinforce the films so that they will be durable in use, and such reinforcements when applied cover the perforations in the film. It is necessary, therefore, to perforate such reinforcing strips. These perforations must register exactly with the perforations existing in the film in cases where the latter was correctly perforated, and should correct any uneven perforation in the film. My invention is designed to form such perforations in the reinforcing strips in exact register with the previous perforations where they are right, or to perforate the film evenly where the original perforations were uneven.

The main shaft of my machine runs from front to rear and the punches are situated at what I designate as the front of the machine.

Upon a bed-plate 1 is mounted the frame of the machine, comprising a base-plate 2, and standards 3, 4. The front standard 4 may, if desired, be formed with a stiffening web 5. The upper ends of the standards are provided with bearings 6, 7, for the main shaft 8. Upon this shaft is loosely mounted the driving pulley 9, which is operatively connected to the shaft through clutch wheels 10, 11, the first of which is fixed to the pulley and the second keyed upon the shaft by key 12, so as to slide, and is controlled by clutch-operating lever 13, fixed to the frame at 14.

A film-carrying table 15 is supported at the front of the machine upon posts, of which 16, 17, only are seen, but of which there may be any suitable number. The table is also supported by a brace 18, which is bolted to its receiving end on the inner side and is also attached to a box-like frame 19, which has rails 20, 21, situated upon each side of the table, and a stripper-plate 22 passing over the table and film and holding the latter in place when the punches rise. At the left of the table a pair of revolving guide-rollers 23, 24, are supported upon side-brackets 25, 26, attached to the rails 20, 21, sufficiently near together to guide the film 27 between them. As the film emerges from the guide-rollers, it passes along the table under the stripper-plate and is held in close proximity to the table adjacent the punch by a flat-spring 28 (seen in section in Fig. 1) formed out of the stripper-plate by slitting the same, and which has a spring-pressure upon the upper surface of the film.

A hardened die, inserted in the table, is perforated at 29 (Fig. 1), to permit the passage of the punches 30, of which there are two, one on each side of the film, as seen in Fig. 2. The punches are adjustably mounted in a head 31, which is attached to a sliding-block 32, having beveled sides and sliding in ways 33, 34, which have undercut edges and are attached to standard 4. A pitman 35 connects the block with a crank-

pin 36, mounted eccentrically upon the end of the main-shaft 8, and turning in the upper bearing of the pitman, whereby the rotation of the main shaft is converted into a reciprocation of the punch.

The feeding device is actuated by an eccentric cam 37 (Fig. 3), fixed upon the main shaft at the rear of the machine and which rocks the rocking-arm 38 of a rocking lever through roller 39. This rocking-arm is fixed upon a rock-shaft 40, extending from front to rear of the machine, and is retracted and operated by a coiled-spring 41, attached at one end to the said arm and at the other end to a bracket 42, projecting to the right of the machine from the rear standard 3. The motion of the rocking-lever is limited in one direction by the cam 37, and in the other direction by a stop 43, which is upon a lower extended branch of the rocking-arm and encounters the lower end of an adjusting stop-screw 44, which is adjustable for a purpose presently to be described.

Upon the forward end of rock-shaft 40 are fixed rocking-arms 45, which give a reciprocating motion to film-feeding fingers 46, which are loosely hinged upon an axle 47, which has bearings on the rocking-arms 45. Attached to each finger is a short bracket 48 extending inward and which provides an auxiliary bearing upon the axle 47 for the finger. The fingers 46 are maintained in position to engage the film by springs 49, mounted upon a rod 50, connecting the outer ends of the rocking-levers (Fig. 4), and these fingers at their free ends terminate in downwardly-extending hooks 51, which are adapted to enter the perforations in the film formed by the punch and have their outer ends beveled to ride freely out of the perforations in their forward movements.

The operation of the machine is so timed that the feeding fingers move forward toward the punch to engage a fresh part of the film when the punch is down, thereby avoiding any liability that the fingers will move the film the wrong way. When the punch rises the fingers are in position over a perforation and are forced down by the springs and the rocking-lever is retracted, feeding a fresh part of the film under the punch.

It occasionally happens that films are improperly perforated, when made, and this must be corrected. It also happens that films, from various causes, may require to be perforated, or that perforations of different spacings may be required. To enable this to be successfully accomplished, I have provided my machine with finely-adjustable feeding mechanism, which I regard as the most important feature of my invention. By means of this adjustment the feeding fingers may be made to feed more or less film under the punch at each feeding movement, and thereby the space between perforations may be varied as desired. This device is capable of fine and exact adjustment and the adjustment is maintained as long as desired when set. These results I accomplish by the threaded stop-screw 44, which limits the feeding movement of the feeding-fingers (Fig. 3). This stop-screw takes into a threaded bearing 52, carried upon a rectangular bracket 53, 54, which is supported upon posts 55, 56, fixed to the base-plate 2. The stop-screw 44 carries a locking-wheel 57, formed with a series of locking, serrated teeth 58 upon its upper face near the perimeter, and these teeth are engaged by a locking arm 59, which is pivoted upon a post 60, carried by a brace-bar 61, which at its front end is attached to the under side of the table and at its rear end is attached to a post 62 upon arm 53, situated under locking-wheel 57.

A spring 63 is coiled about a stop-screw 44, and presses at one end against bearing 52 and at the other end against the wheel 57 and serves to take up any lost motion in the thread of the stop-screw. It will be perceived that the rocking-arm 38, shaft 40, and rocking arm 45 constitute a rocking-lever, by which, in connection with the cam 37, the rotary motion of the shaft is converted into a horizontally-reciprocating motion of the feeding-hooks and that the length of this motion in the feeding direction is varied as the stop-screw is raised or lowered.

The pitch of the screw 44, and also the serrated locking-teeth 58 may be made as fine as desired, and the finer these parts are, the greater the extent of adjustment for the feeding device.

Means are also provided for clearing the perforations by removing any bur or punchings from the perforations that have not been entiely removed from the film. A bur-removing device is shown at the right of the machine and in the illustration comprises a pair of spring-fingers 63^a, one for each row of perforations, upon a bar 64, extending across the top of two brackets 65, which are attached to the table. These fingers have their ends bent down for entering the perforations, and tend to push out any adhering punchings. The fingers in their clearing action are shown cooperating with moving members. A serrated roller 66 is shown below each finger 63^a. The rollers 66 are fixed upon a revolving shaft 67, having bearings in an arm 68, mounted upon a post 70 and an arm 69 adjustably mounted on post 17, for adjusting the wheels 66 toward and from the fingers 63^a. Shaft 67 also has fixed thereto a pulley 71, which is run by crossed belt 72, from pulley 73 on the main shaft. As the main shaft revolves in the direction of the arrow (Fig. 1), the toothed wheels 66 will turn, as indicated by arrows, and will

brush away, as it were, any adhering punchings, the coöperating devices 63 serving to force the adhering punched out portions into engagement with the wheels 66.

The usual spool may be employed to receive the perforated film, but this is omitted for clearness and as it forms no part of my invention.

What is claimed is:

1. In a perforating machine, a perforating device, a feeding finger, means for reciprocating said finger in a path parallel with the path of stock feed movement and manually adjustable means for varying the amplitude of reciprocation of said finger, substantially as described.

2. In a perforating machine, a perforating device, reciprocating feeding fingers, a rocking lever for reciprocating same, a manually-adjustable stop for limiting the movement of said rocking lever in the feeding direction, and means for rocking said lever, substantially as described.

3. In a perforating machine, a perforating device, reciprocating feeding fingers, a rocking-lever having one arm connected to said feeding-fingers for reciprocating same, and having another arm adjacent to the main shaft, a cam on said shaft for rocking said lever, and relatively-adjustable stops on said rocking-lever and the frame for limiting the movement of said rocking-lever in the feeding direction, substantially as described.

4. In a perforating machine, a perforating device, horizontally-reciprocating, hooked feeding fingers, a rocking-lever having one arm connected to said feeding fingers for reciprocating same, and having another arm adjacent to the main shaft, a cam on said shaft for rocking said lever, a retracting-spring for moving said lever in the feeding direction, and relatively-adjustable stops on said rocking-lever and the frame for limiting the movement of said rocking lever in the feeding direction.

5. In a perforating machine, a feeding device comprising spring-pressed, hooked feeding fingers, a rocking lever for reciprocating same, comprising a rock-arm connected to said feeding arms, a second rock-arm adjacent to the driving shaft, a rock-shaft connecting said arms, a cam on the main shaft, a retracting-spring for said rocking-lever, a manually-adjustable stop engaging said rocking-lever for limiting its movement in the feeding direction.

6. In a perforating machine, perforating devices, a feeding device for withdrawing the perforated material from the perforating devices comprising hooked feeding fingers, a manually-adjustable stop for limiting the extent of movement of said feeding fingers, a rocking lever for reciprocating said feeding fingers, automatically-operating means for operating said rocking lever and for permitting its rocking movements to vary in extent according to the adjustment of said stop.

7. In a perforating machine, a feeding device comprising horizontally-reciprocating, spring-pressed, hooked feeding-fingers, a rocking-lever for reciprocating same, means for rocking said lever, a manually-adjustable stop for limiting the extent of movement of said feeding fingers, and a lock for said stop, substantially as described.

8. In a perforating machine, a feeding device comprising feeding-fingers, a rocking-lever for reciprocating said fingers, a stop on said rocking lever, a screw-threaded, co-acting stop-screw on the frame, and a lock for locking said stop-screw in adjusted position, substantially as described.

9. In a perforating machine, a perforating device, a feeding device adapted to enter the perforations for withdrawing material from the perforating device, means for advancing same when the perforating device is down, means for retracting same, manually operated means for adjusting the length of the feed, and automatically-operated mechanical devices engaging the perforated material for clearing the perforations, substantially as described.

10. In a perforating machine, a perforating device, longitudinally-reciprocating, hooked feeding-fingers, manually-operated means for varying the length of stroke of said fingers, spring-clearing fingers, and revolving, toothed clearing-wheels operating in connection therewith, substantially as described.

11. In a perforating machine, a perforating device, reciprocating feeding-fingers, a rocking-lever for reciprocating same, a manually-adjustable stop for limiting the movement of said rocking-lever in the feeding direction, means for rocking said lever, and a clearing device for clearing the perforations.

12. In a perforating machine, a punching mechanism, a feeding device comprising hooked feeding fingers, a rocking-lever for reciprocating same, means for rocking said lever, a manually adjustable stop for limiting the extent of movement of said feeding-fingers, and a clearing device for clearing said perforations comprising clearing-fingers adapted to enter said perforations, and revolving toothed wheels co-acting therewith.

13. In a perforating machine, a punch, a feeding device comprising spring-pressed, hooked feeding fingers, a rocking-lever for reciprocating same, comprising a rock-arm connected to said feeding-arms, a second rock-arm adjacent to the driving-shaft, a rock-shaft connecting said arms, a cam on the main shaft, a retracting-spring for said rocking-lever, a manually-adjustable

stop engaging said rocking-lever for limiting its movement in the feeding direction, and a clearing device for clearing said perforations comprising spring-clearing fingers, adapted to enter said perforations, and adjustable, revolving, toothed wheels co-acting therewith.

14. In a perforating machine comprising guide-rolls, a film-carrying table, guide rails, spring stripper-plate adapted to engage the film adjacent to the punch, a punch, a die, a feeding device, manually-operated means for adjusting the length of feed, and a clearing device for clearing the perforations, substantially as described.

15. In a perforating machine, a punch, feeding devices adapted to enter the perforations and withdraw the perforated material from the punch, a manually-adjustable stop for limiting the extent of movement of the feeding device, a rocking lever for reciprocating said feeding devices, means for rocking said lever adapted to advance the feeding device when the punch is down and to withdraw same, which permit a movement of the rocking lever varying in extent according to adjustment of the stop.

16. In a perforating machine, a punch, a feeding device for withdrawing the perforated material from the punch, a rocking lever for reciprocating the feeding device, an adjustable stop for limiting the extent of rocking movement of said lever, means for rocking said lever which permit a varying movement thereof according to adjustment of the stop.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JULIUS R. ENGELMAN.

Witnesses:
ROSE FEUERLICHT,
HENRY M. TURK.