

(No Model.)

3 Sheets—Sheet 1.

S. M. CUTTER.
MACHINE AND DIE FOR FORMING NAIL STRIPS.

No. 561,206.

Patented June 2, 1896.

Fig. 1.

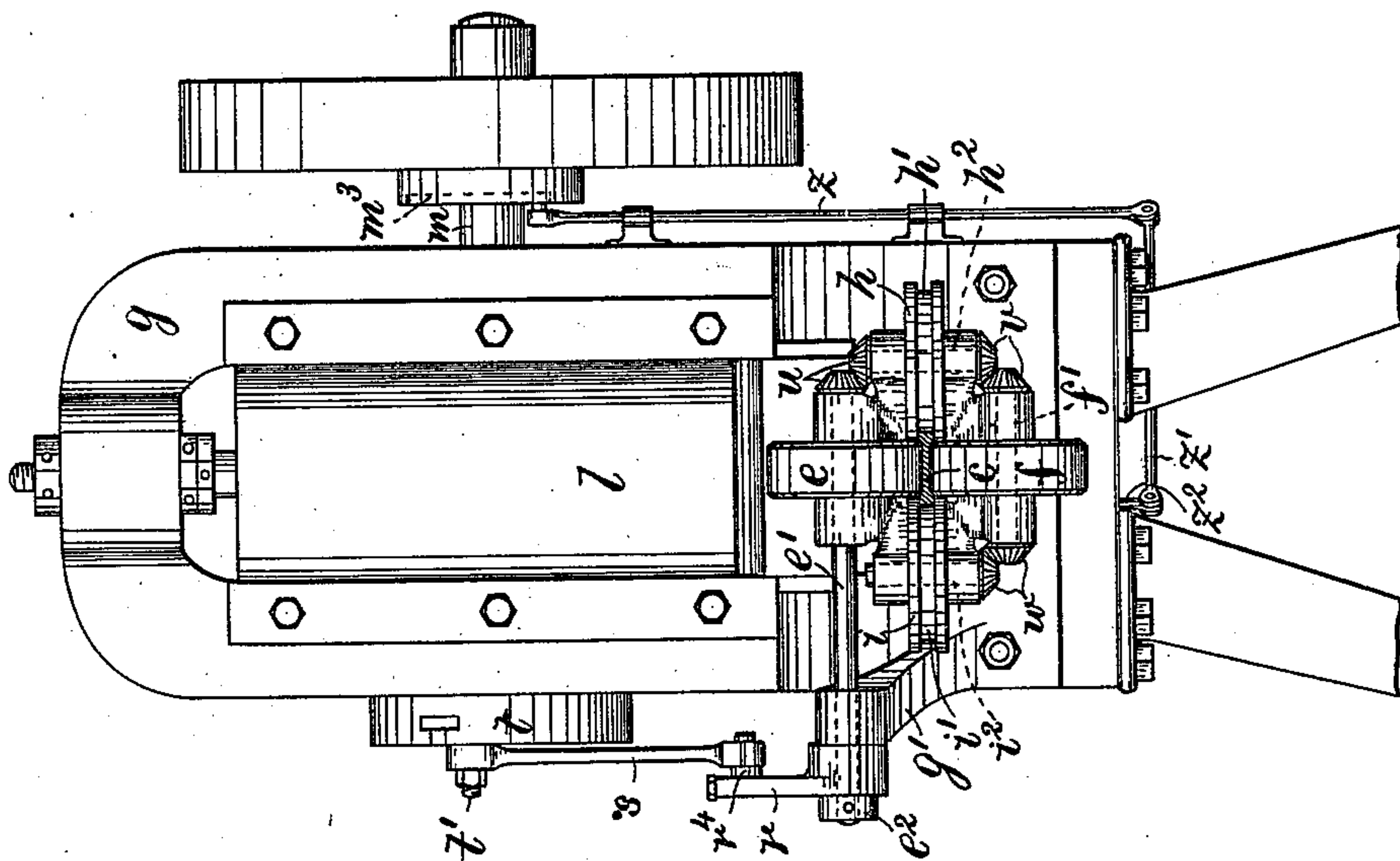
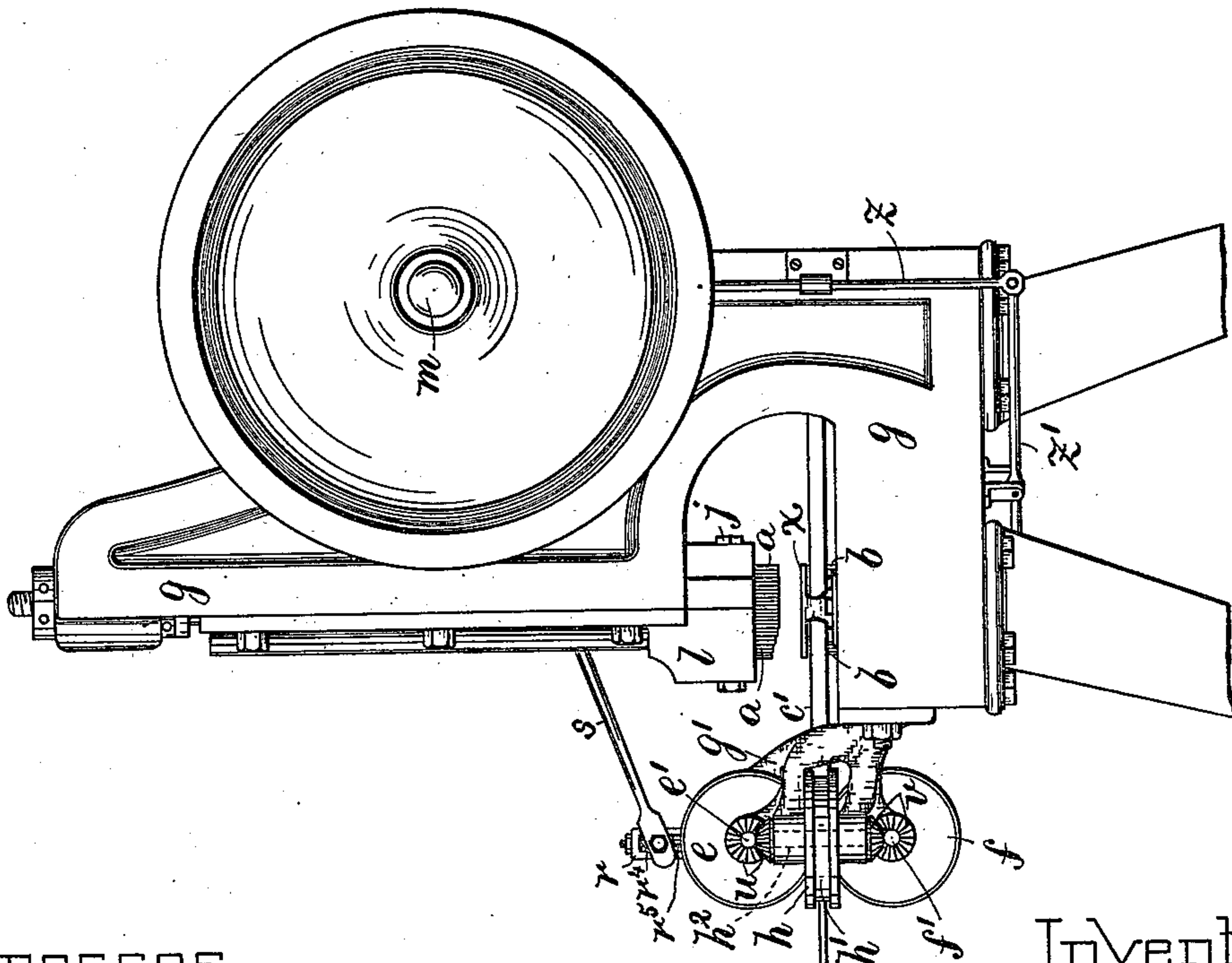


Fig. 2.



Witnesses
Anna Pike.
Harry N. Squires

Inventor
Solomon M. Cutter
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Henry Chadbourne
his Atty.

(No Model.)

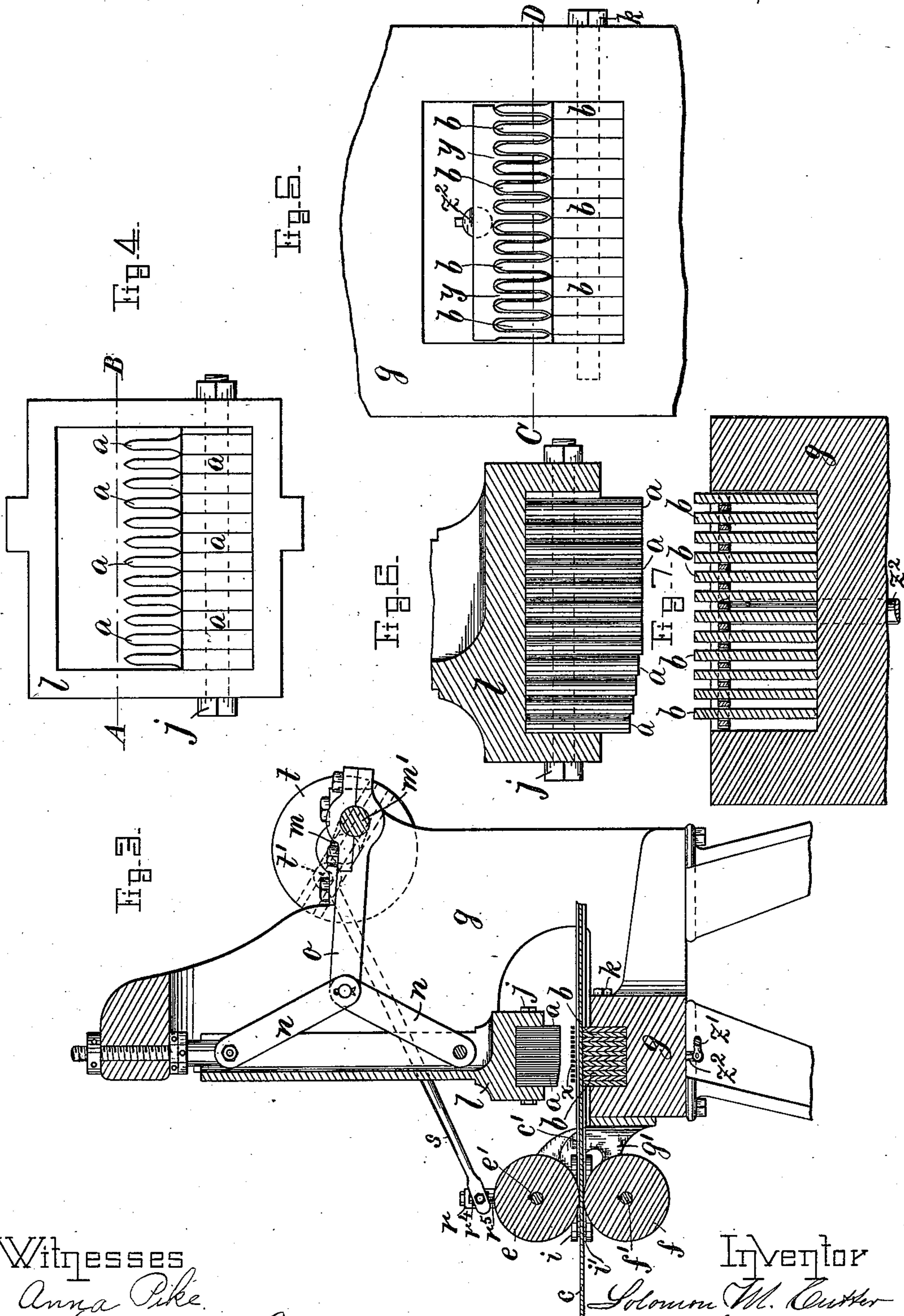
3 Sheets—Sheet 2.

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Fig. 9.

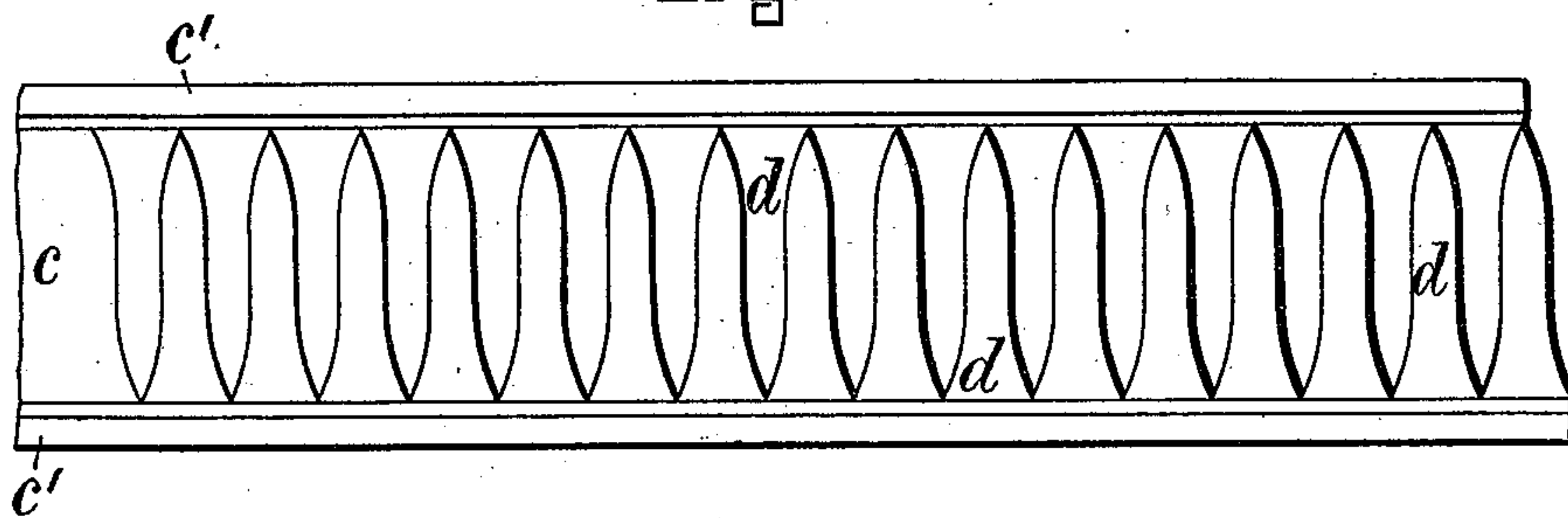


Fig. 10.

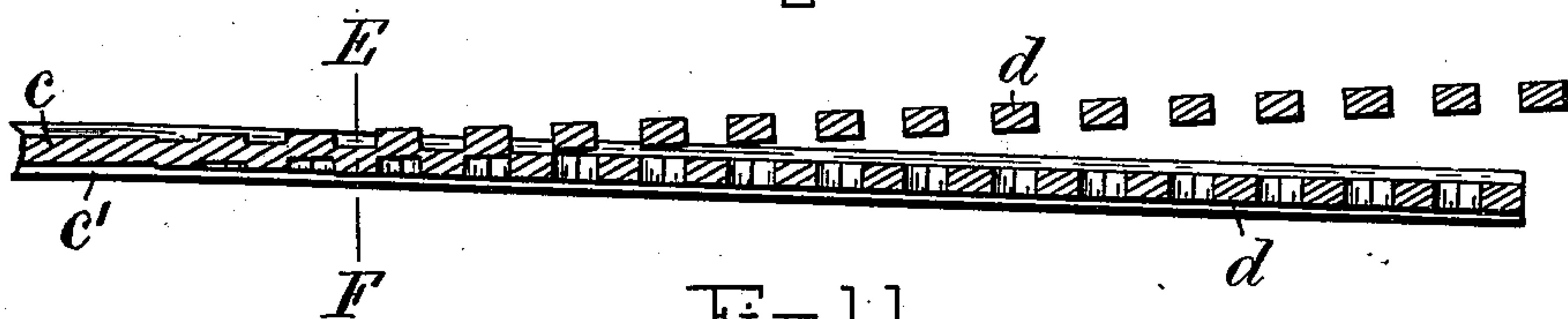


Fig. 11.

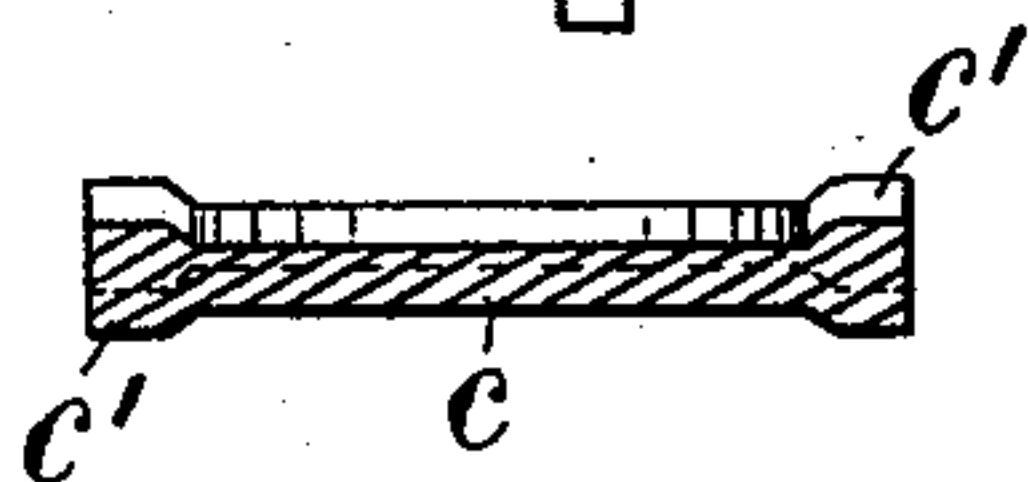
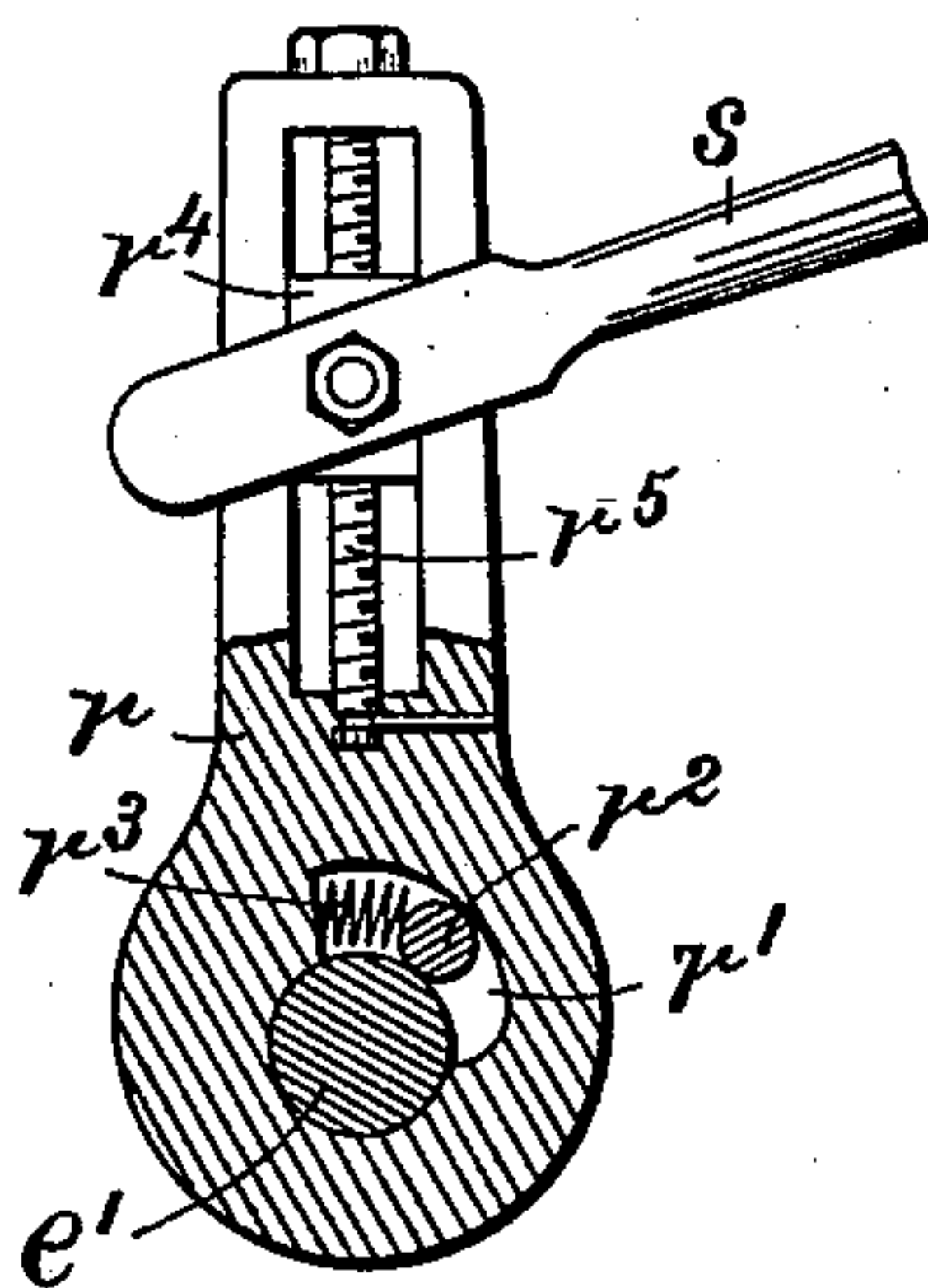


Fig. 8.



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UNITED STATES PATENT OFFICE.

SOLOMON M. CUTTER, OF NASHUA, NEW HAMPSHIRE.

MACHINE AND DIE FOR FORMING NAIL-STRIPS.

SPECIFICATION forming part of Letters Patent No. 561,206, dated June 2, 1896.

Application filed June 5, 1895. Serial No. 551,708. (No model.)

To all whom it may concern:

Be it known that I, SOLOMON M. CUTTER, a citizen of the United States, residing at Nashua, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Dies for Forming Nail-Strips and in Machines in which they are Used; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in dies for forming nail-strips and in the machines in which they are used.

The object of the invention is to prevent the bending of the metal as much as possible while it is being punched into nail-strips, and thereby obviate the liability of breaking, kinking, or crippling the strip formed; also, to allow the formation of two continuous nail-strips from a metal tape without waste of stock by overlapping or interlocking the shank-forming portion of the dies, and to produce an automatic action of the machine used.

The essential part of the invention consists in the employment of an upper and a lower series of punches, one or both of which series are wholly or in part graduated in length, so that the longest of the punches will sever the strip and the remaining punches will enter the strip graduated distances, as fully described hereinafter.

The invention further consists in novel combinations of elements and device and minor details of construction which operate to produce a machine in which said series of punches are used, which machine is automatic in its operation.

On the accompanying drawings, which illustrate my invention and form an essential part of this specification, Figure 1 represents a front elevation of one form of machine embodying my invention. Fig. 2 represents a side elevation of the same. Fig. 3 represents a central longitudinal section of the machine shown in Fig. 1. Fig. 4 represents a bottom view of the upper series of punches. Fig. 5 represents a plan view of the lower series of punches and the device to clear the strip from said punches after it has been punched. Fig. 6 represents an enlarged longitudinal

section, on the line A B in Fig. 4, of the block to hold the upper punches, showing the upper punches in side elevation. Fig. 7 represents an enlarged longitudinal section, on the line C D in Fig. 5, of the block to hold the lower punches, showing the lower punches and their clearer in section. Fig. 8 represents a detail view of a portion of the mechanism to produce the intermitting feeding of the strip to the punches. Fig. 9 represents an enlarged plan of a small portion of the metal tape after it has been acted upon by the punches and a portion thereof has been formed into a nail, tack, or slug strip. Fig. 10 represents a central longitudinal section of the metal strip shown in Fig. 9. Fig. 11 represents a cross-section on the line E F in Fig. 10.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

In progressively punching the nail-strips from the metal tape by punching a short piece at once and then feeding the strip and punching another short piece it has been found that if the entire series of the punches are of even length and entirely sever the metal strip there will be a kink or bend formed in the continuous portion of the strip at the place where the end punch of the series severed the strip. For this reason it has been impossible heretofore to punch two continuous comb-shaped nail-strips from a metal tape without great loss or waste of stock, as it has been impossible to have the shank-forming portions of one strip overlap or interlock to any great extent the shank-forming portions of the other strip, and therefore it has been found necessary to have the metal tape nearly if not quite double the width of the length of the shanks of the nails to be made from the nail-strip if it is desired to form two nail-strips from the metal tape. By submitting the metal tape to the action of graduated punches I am enabled to punch two continuous comb-shaped nail, tack, or slug strips, with no waste or loss of metal, from a metal tape having its width equal to the length of the nail to be made therefrom plus the thickness of the head-forming portion of the nail-strip, as clearly shown in Fig. 9. Thus the nail-strip can be produced at less cost of material than it has hitherto been made.

In carrying out my invention I may use any suitable and well-known press now in common use; but I prefer to use the press substantially as shown in the drawings, which will be hereinafter fully described.

A series of upper punches *a a a* of the desired shape are used, which, in connection with the series of lower punches *b b b*, sever the metal strip or tape *c* into two comb-shaped nail or tack or slug strips *d d* without loss or waste of stock, as shown in Fig. 9. A part or the whole of either or both of these series of punches may be made graduated in length, as shown in Fig. 6, so that when the metal strip is acted upon by these punches the longest punches will entirely sever the metal strip and the remaining graduated punches will enter the strip more or less according to their length, and thereby partially sever the strip, as fully illustrated in Fig. 10. This partial severing of the strip prevents the formation of a kink or bend between the place where the last punch acted upon the strip and the remainder of the strip, which kink or bend if formed would tend to cripple the strip.

When it is desired to form a nail-strip with projecting head-forming portions from a flat metal tape, I use, in connection with the series of graduated punches and the intermittingly-operating feed-rolls *e* and *f*, having bearing in the frame *g* of the press or in the bracket *g'* attached to the frame, a pair of upsetting-rolls *h* and *i*, which press against the side edges of the metal tape and, in connection with the feed-rolls, compress and upset the edges of the tape, forming a projecting ridge *c'* on each edge of the tape from which the heads of the nails to be cut are made. These upsetting-rolls are preferably provided with circumferential grooves *h'* and *i'*, within which the edges of the metal tape are upset, and the form of said grooves determines the shape of the ridge formed on the tape.

The lower punches are stationary and secured in any suitable manner to the frame of the press. On the drawings the lower punches have been shown as being secured by means of the bolt *k*, which passes through a perforation in each punch of the series of punches and is screwed into the frame. The upper punches are secured in a similar manner, by means of the bolt *j*, to the reciprocating head *l* of the press. The head *l* is reciprocated within guides in the frame by means of a crank *m'* on the driving-shaft *m*, the toggles *n n*, and the connecting-link *o*, between the toggles and the crank, in a manner similar to presses of this kind now in common use; but it may be reciprocated in any other and well-known manner.

The feed-rolls *e* and *f*, which are keyed or otherwise firmly mounted on their respective shaft *e'* and *f'*, are intermittingly rotated in bearings in the bracket *g'* on the frame of the press by the following mechanism:

Upon the shaft *e'* is loosely mounted the arm *r*, which is held upon the shaft by means

of the collar *e²*. The arm *r* is provided with the cam-recess *r'*, within which the clamp-roll *r²* and the spring *r³* are placed. The action of this clamp-roll is such that the arm is free to be rotated on the shaft in one direction, but will clamp the arm and the shaft firmly together when the arm is moved in the other direction. The arm *r* is oscillated on the shaft *e'* by means of the connecting-rod *s*, attached to the arm and to a crank-pin *t'* on the crank-disk *t*, which disk is firmly attached to the driving-shaft *m*. Thus it will be seen that by the oscillation of the arm *r* an intermitting rotation is imparted to the feed-roll *e*, which causes the metal tape to be intermittingly fed to the punches. The crank-disk is placed upon the driving-shaft *m* in such a relation to the crank *m'* that the punches are out of the tape and the tape remaining stationary while being severed by the punches.

The upsetting-rolls *h* and *i* are firmly attached to the respective shafts *h²* and *i²*, (shown in dotted lines in Fig. 1,) and a rotary movement corresponding to the movement of the feed-rolls is imparted to said upsetting-rolls through the pairs of bevel-gears *u v w*. It will be seen that the upsetting-rolls *h* and *i* not only upset the metal tape, but also assist the feeding-rolls in feeding the tape to the punches.

The upsetting-rolls are provided with the circumferential grooves *h'* and *i'*, which may be made in any suitable and required shape, according to the form of the longitudinal ridge to be made on the metal tape for the formation of the head-forming portion of the nail-strip.

The feed-rolls are preferably chamfered at their corners, so as to cause the under side of the heads of the nails made from the nail-strip to be inclined, and, if so desired, the upsetting-rolls may be made plain, so as to simply make a flat head with inclined under side when used with the chamfered feed-rolls.

The amount of the metal tape which is fed to the punches at each operation of the feed-rolls is preferably equal to the number of the full-length punches in the series of punches containing the graduated punches—that is to say, if the series of the upper punches *a a* contain twenty punches and five of said series are graduated in length the feed-rolls will preferably feed the metal tape a distance equal to the length of the fifteen remaining punches of said series.

In order to adjust the amount of metal tape fed by the feed-rolls, I make the connection between the arm *r* and the connecting-rod *s* in the form of a nut *r⁴*, which is adjustable toward and from the center of the shaft *e'* on a screw *r⁵* in a slot in said arm, as shown in Fig. 8.

A suitable comb-shaped clearer *x* is attached stationary to the bed of the frame *g* and the upper punches are cleared from the nail-strip by being drawn upward through said clearer. A second and similar comb-

shaped clearer y is placed within the lower stationary punches in such a manner that it can be moved up and down through said punches to clear them from the nail-strip.

5 The clearer y is caused to move up and down once between each reciprocation of the upper punches by means of a cam m^3 on the driving-shaft, which cam acts upon a pin or roll on the vertical rod z , attached in its lower
10 end to a lever z' , fulcrumed to the frame of the press. The end of the lever z' is attached to a vertical rod z^2 , the upper end of which is itself attached to the clearer y . It will be seen that the action of the cam m^3 causes the
15 clearer y to force the nail-strip out of the lower punches after it has been punched.

I do not wish to confine myself to the use of this particular form of machine in carrying out my invention, as other machines of
20 similar construction might be used to equal advantage without departing from my invention.

No claim has been made in this application to the nail or slug strip shown, as this forms
25 the subject-matter of another pending application, Serial No. 584,366, filed March 23, 1896.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

30 1. In a machine to form two continuous strips from a metal strip or tape, two series of overlapping or interlocking punches graduated in length in part in the line of the feeding of the metal tape to said punches, whereby
35 said tape is separated into two continuous strips section after section without waste of material, for the purpose set forth.

2. In a machine to form two continuous strips from a metal strip or tape, two series
40 of overlapping or interlocking punches graduated in length in part in the line of the feeding of the metal tape to said punches and mechanism to reciprocate said punches, whereby said tape is separated into two continuous strips section after section without
45 waste of material, and said strips are prevented from crippling or breaking, for the purpose set forth.

3. In a machine for forming two continuous strips from a metal strip or tape, a series
50 of stationary punches and a series of reciprocating punches, the latter interlocking or overlapping the former and being graduated in length, in part in the line of the feeding
55 of the tape to said punches, whereby said tape is separated into two continuous strips section after section without waste of material, and said strips are prevented from crippling or breaking for the purpose set forth.

60 4. The combination, with two series of interlocking or overlapping punches to sever a metal strip or tape into two metal strips, of two comb-shaped clearers interlocking or overlapping each other, one for each series
65 of punches and the teeth of the clearers entering the recesses formed by said series of punches, to remove the strips from the

punches after they have been punched, for the purpose set forth.

5. The combination, with two series of in- 70
terlocking or overlapping punches to sever a metal strip or tape in two continuous metal strips, one of said series remaining stationary and the other series reciprocating, of a comb-shaped reciprocating clearer for the series of 75
stationary punches, and a comb-shaped stationary clearer for the reciprocating punches, each clearer interlocking or overlapping the other clearer and the teeth of each clearer entering the recesses formed by its respective 80
series of punches, to remove the metal strip from the punches after it has been punched, for the purpose set forth.

6. A series of stationary punches of even lengths and a series of reciprocating graduated punches each series interlocking or over- 85
lapping the other to sever a metal strip or tape into two continuous strips without waste and preventing, breaking, kinking or crippling said strips combined with a reciprocating clearer for the stationary punches and a stationary clearer for the reciprocating punches, and mechanism to reciprocate said reciprocating punches and clearer, for the purpose set forth. 95

7. In a punching-machine for the formation of continuous nail-strips, the combination with a frame to support the parts of the machine, a driving-shaft, a series of stationary punches mounted in the frame, a reciprocating head, a series of punches mounted in said head, said series of punches being graduated in length in part as described and overlapping or interlocking each other, and connecting mechanism between said reciprocating 100
head and the driving-shaft to reciprocate said head, of an upper and lower feed-roll, side feeding-rolls, gears upon the shaft of the feed-rolls to gear them together, and mechanism between said feed-rolls and the driving-shaft of the machine to intermittingly rotate said rolls to feed a metal strip or tape to the action of said punches section after section, whereby two continuous nail-strips are formed without waste and are prevented from 115
breaking, kinking or crippling, as set forth.

8. In a punching-machine for the formation of continuous nail-strips, the combination with a frame to support the parts of the machine, a driving-shaft, a series of stationary 120
punches mounted in the frame, a reciprocating head, a series of punches mounted in said head, said series of punches being graduated in length in part as described and overlapping or interlocking each other, and connecting mechanism between said reciprocating head and the driving-shaft to reciprocate said head, of an upper and lower feed-roll, side feeding and forming rolls to upset a head-forming portion on a metal strip or tape fed 125
thereby, gears upon the shaft of the feeding and forming rolls to gear them together, and mechanism between said feed-rolls forming-rolls and the driving-shaft of the machine to 130

intermittingly rotate said rolls to feed a metal
strip or tape to the action of said punches and
upset a head-forming portion thereon section
after section, whereby two continuous nail-
5 strips having projecting head-forming por-
tions are formed without waste and are pre-
vented from breaking, kinking or crippling,
as set forth.

In testimony whereof I have affixed my sig-
nature in the presence of two subscribing wit- 10
nesses.

SOLOMON M. CUTTER.

Witnesses:

HENRY CHADBURN,
HARRY A. SQUIRES.