

No. 628,728.

Patented July 11, 1899.

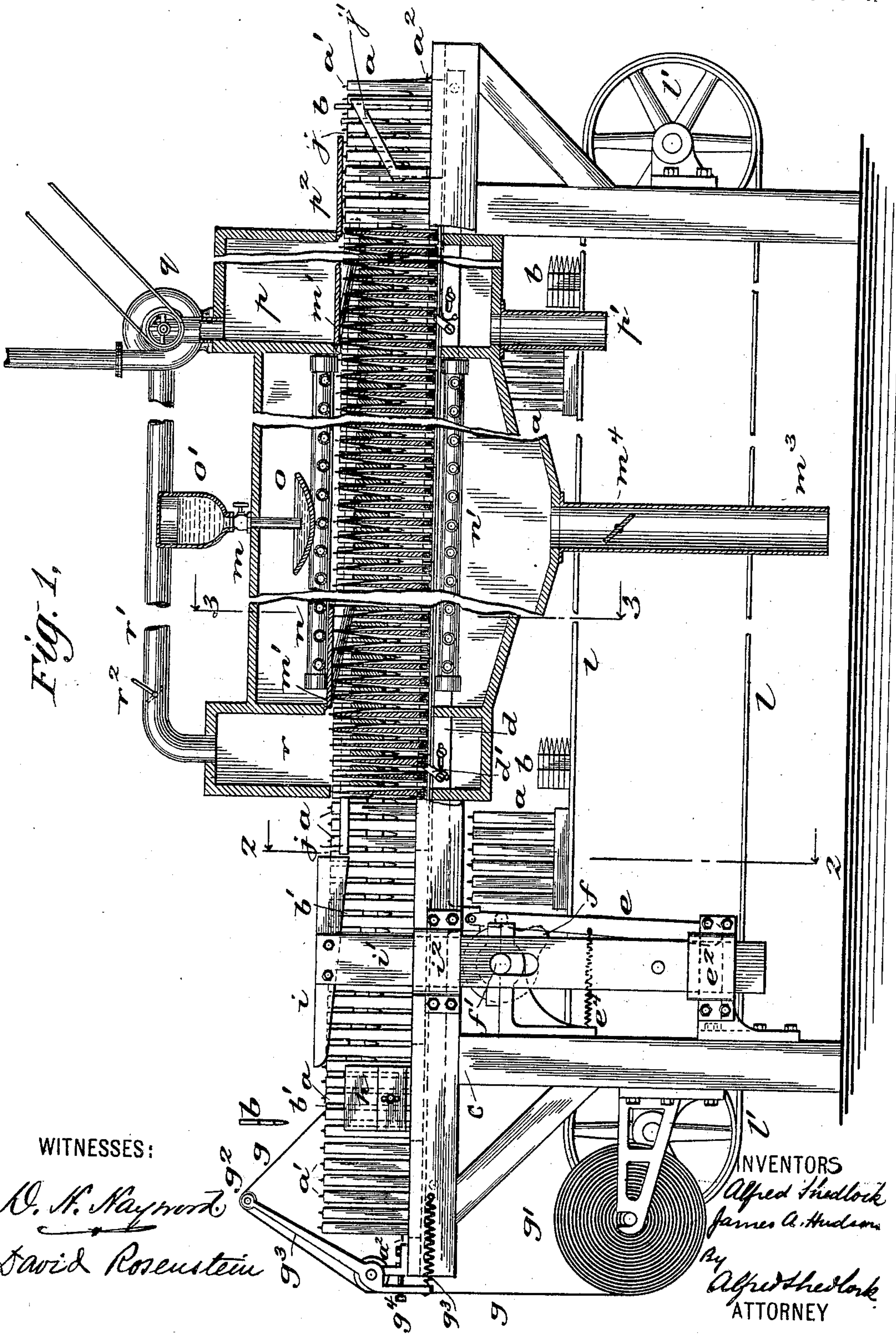
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(Application filed Jan. 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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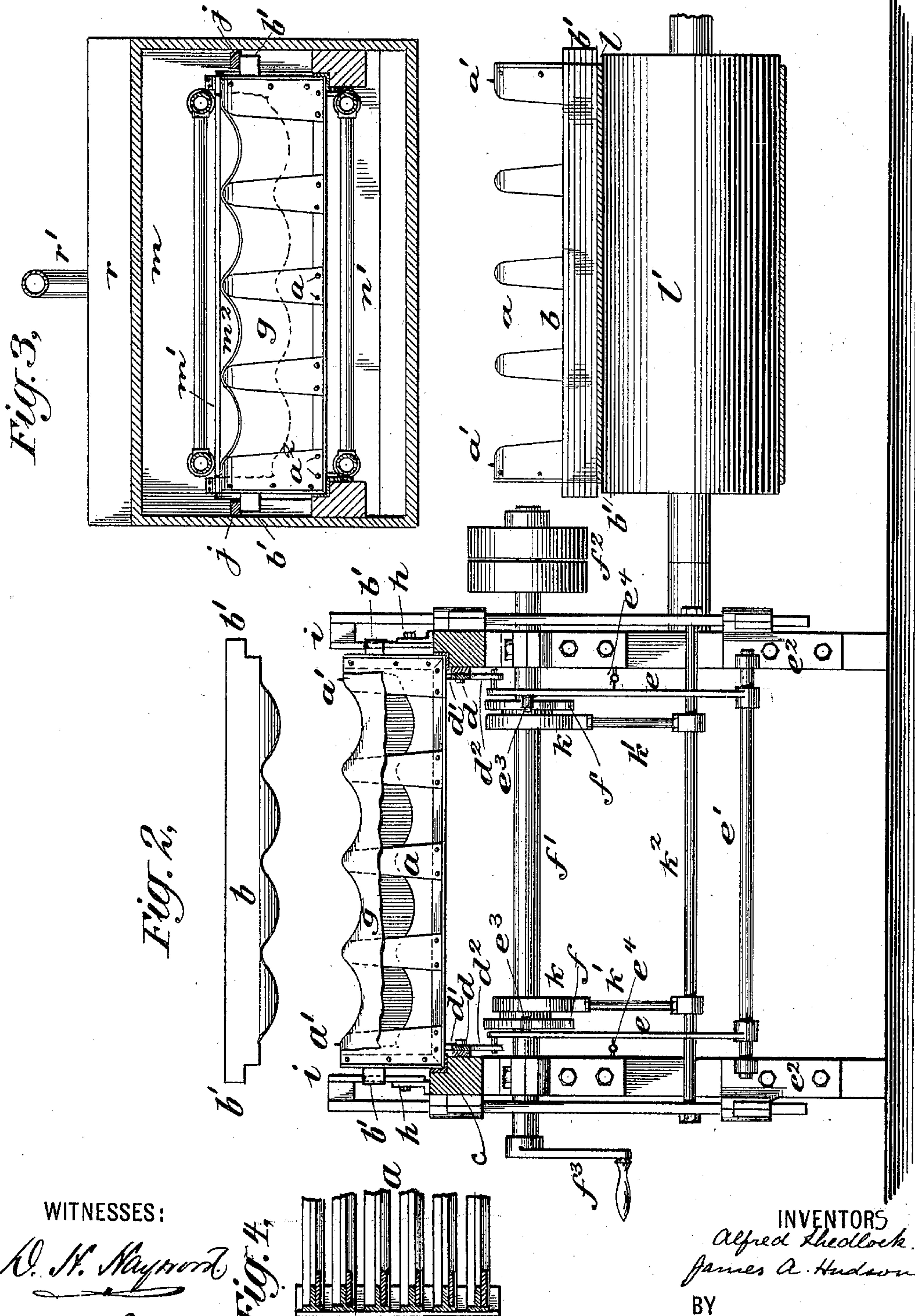
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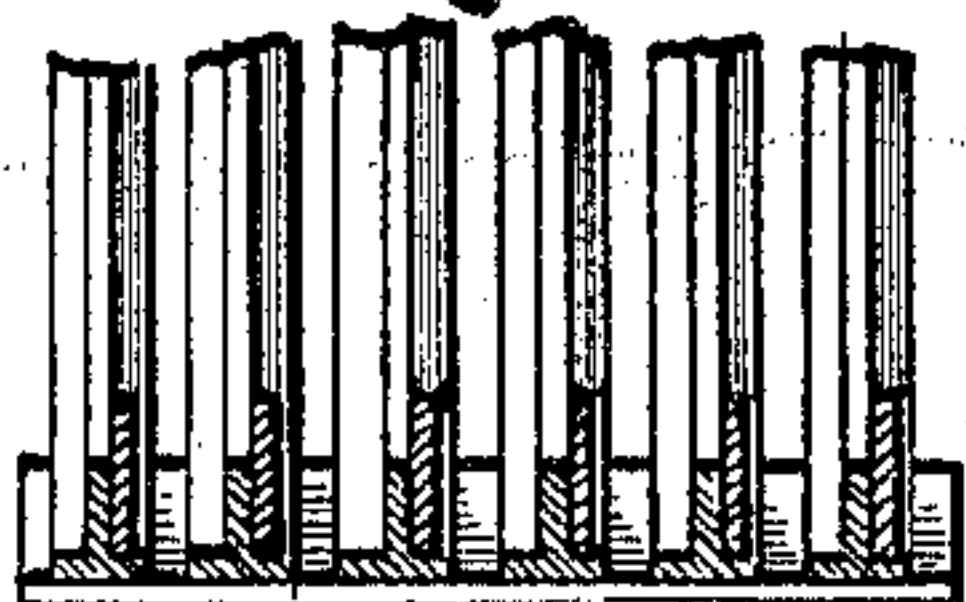


WITNESSES:

*R. H. Maynard*

*David Rosenstein*

*Fig. 4.*



INVENTORS

*Alfred Shedlock.*  
*James A. Hudson.*

BY

*Alfred Shedlock.*  
ATTORNEY



# UNITED STATES PATENT OFFICE.

ALFRED SHEDLOCK, OF JERSEY CITY, NEW JERSEY, AND JAMES A. HUDSON, OF NEW YORK, N. Y., ASSIGNORS TO THE I. B. KLEINERT RUBBER COMPANY, OF NEW YORK, N. Y.

## MACHINE FOR MAKING ARTICLES OF FLEXIBLE MATERIAL.

SPECIFICATION forming part of Letters Patent No. 628,728, dated July 11, 1899.

Application filed January 27, 1899. Serial No. 703,560. (No model.)

*To all whom it may concern:*

Be it known that we, ALFRED SHEDLOCK, a resident of Jersey City, in the county of Hudson and State of New Jersey, and JAMES A. HUDSON, a resident of the city of New York, in the county of New York and State of New York, citizens of the United States, have invented certain new and useful Improvements in Machines for Making Articles of Flexible Material, of which the following is a specification.

This invention relates to machines for shaping or forming articles from a long piece of material such as stockinet combined with rubber, used in the manufacture of dress-shields; and it consists of a mechanical organization adapted to form continuously the piece of material into shape for the articles to be cut therefrom, thus reducing the waste of material to a minimum and expediting the manufacture of such articles.

The machine forming the subject of this invention comprises a set of formers arranged to form cells between them adapted to receive the material in folds formed transversely to the material fed to them from a roll of the same, a series of separate shapers adapted to be placed between the formers and to press the material into the cells, means for intermittently moving the formers forward as the cells are successively supplied with the material, and means for pressing the shapers down into the cells to impart the requisite shape to the folds of the same as the formers are moved forwardly and to hold the shapers in their lowest positions in the cells after they leave the pressing device. These special features, with minor details of the construction, will now be fully described by reference had to the accompanying drawings, in which—

Figure 1 is a longitudinal elevation, partly in section, of our improved machine for forming flexible material. Fig. 2 is a transverse section of the same on line 2 2 of Fig. 1. Fig. 3 is a transverse section of the curing-box on the line 3 3, Fig. 1; and Fig. 4 is a view showing one end of one of the nests of formers on an enlarged scale.

The formers *a* comprise end supports provided with pins *a'*, over which the edges of the material are placed and held against lat-

eral movement, and central supports over which the material is distorted. These formers are preferably combined in nests of six or more for ease of handling, and for lightness and strength are made up of T-irons having the ends and central supports secured to them and connected together at their ends by pieces of L-iron, as shown at Fig. 4. These nests of formers when arranged side by side form a continuous row of narrow cells, as shown at Fig. 1. Some of the formers are provided at their lower parts with pins *a<sup>2</sup> a<sup>2</sup>*, to which the ends of the piece of material are attached when the machine is to be started and when it is to be stopped at the end of a run. The shapers *b* are flat strips formed at their lower ends to correspond with the shape to be given the lower folds of the material and provided with end lugs *b' b'*, adapted to project beyond the ends of the formers, between which the shapers are placed to fold and form the material in the cells.

A suitable long frame *c* is provided having at its upper part longitudinal guideways in which the nests of formers *a* are placed and along which they are intermittently caused to travel in a continuous line from the filling end to the discharge end of the machine. The means here adopted to impart the intermittent forward movement of the formers *a* consists of the bars *d d*, fitted to slide in the frame *c* just below the guideways and provided with dogs or catches *d' d'*, arranged to engage with the lower bars of the formers, the extent of movement of said bars being just sufficient to permit the dogs or catches to engage with succeeding lower bars of the formers, so that the cells between the formers move forward one step for each successive operation of the machine; arms or levers *e e*, carried at their lower ends by the shaft *e'*, journaled in bracket-castings *e<sup>2</sup> e<sup>2</sup>*, secured to the front legs of the frame, having their upper ends engaging with slotted brackets *d<sup>2</sup> d<sup>2</sup>*, projecting downwardly from the bars *d d* and having rollers *e<sup>3</sup> e<sup>3</sup>* on their sides near their upper ends, and cams *f f*, secured to the driving-shaft *f'*, fitted to rotate in suitable bearings projecting from the front legs and arranged to positively move the formers forward through the medium of the levers *e e* and bars *d d* against the action of the springs



$e^1 e^4$ , which hold the rollers  $e^3 e^3$  against the cams and retract the bars  $d d$  for their dogs to take a fresh hold on the formers.

The material  $g$  passes from the roll  $g'$  to the  
5 cells of the formers to be filled over the bar or the roller  $g^2$  of the swinging frame  $g^3$ , whose range of movements is adjusted by the screw  $g^4$  to carry forward the material in sufficient quantity to form the folds of the de-  
10 sired depth in the cells, according to the sizes of the dress-shields or other articles to be made from the material. This swinging frame may be raised into feeding position by the spring  $g^3$  or be so raised by the operator  
15 who, standing at the front end of the machine, sees that the material is properly straightened as it passes over the frame and secures the edges over the pins  $a'$  of the formers, the material in sufficient quantity for  
20 each fold being formed by the forward movement of the swinging frame and carried down into a cell by one of the shapers  $b$ , which may be manipulated by another operator. One of such formers  $b$  is shown above the cell next  
25 to be filled in Figs. 1 and 2. These shapers  $b$  as they are deposited in the cells rest by their lugs  $b'$  upon the guide-stops  $h$  at the sides of the formers and so determine the depth of the folds of the material, said guide-stops  
30 being vertically adjustable to provide for different sizes of formers and depths of folds. As the cells are successively filled and intermittently moved forward the lugs  $b'$  of the shapers  $b$  pass under the inclined ledges  $i$   
35 and are thereby gradually depressed within the cells and so gradually distort the material at right angles to the folds until it assumes the desired shape, as shown in Figs. 2 and 3. These inclined ledges  $i$  may with ad-  
40 vantage to the forming operation be given a vertically-reciprocating motion, so as to alternately relieve the folds of strain under movements of the shapers and to positively gradually force the shapers down as they in-  
45 termittently move forward with the cells. From the inclined ledges  $i$  the lugs slide under the horizontal ledges  $j$ , which extend about the full length of the frame and through the curing or vulcanizing chamber, which will  
50 be hereinafter described. Where these horizontal ledges  $j$  end are located inverse inclined ledges  $j'$ , which raise the shapers partly out of the cells for their ready removal therefrom by the lugs  $b'$  riding up the same. To  
55 impart vertical reciprocating motion to the inclined ledges  $i$ , they are attached to the upper ends of the vertically-sliding bars  $i' i'$ , held in guides  $i^2 i^2$  at the sides of the upper part of the frame and in the bracket  $e^2 e^2$ ,  
60 projecting from the front legs, and these bars are vertically reciprocated by means of the eccentrics  $k k$ , secured to the shaft  $f'$  or forming parts of the cams  $f f$ , as shown, and the rods  $k' k'$ , embracing the eccentrics and  
65 attached at their lower ends to the shaft  $k^2$ , secured to the two sliding bars  $i' i'$ . This shaft  $f'$  is provided with a driving-pulley  $f^2$

when it is desired to run the machine by power or with a crank-handle  $f^3$  when the machine is to be run by hand-power, one full  
70 revolution of said shaft causing the shapers  $b b$  to be moved forward to bring a fresh cell into position for filling and the inclined ledges  $i i$  to be reciprocated, and thereby act to depress all of the shapers  $b b$  whose end lugs are  
75 beneath the inclined ledges. As the formers  $a a$  arrive at the discharge end of the machine with the folded and formed material in the cells each nest of cells is placed on the conveyer after the shapers  $b b$  and the material  
80 have been removed, said material being separated at the folds between the nests of cells, forming batches of six folds in convenient form for handling and have the article in finished condition cut therefrom. This con-  
85 veyer is shown as a traveling belt  $l$ , carried by rollers  $l' l'$  at one side of the machine, and may be operated by hand or by power to convey the nests of formers  $a a$  and the shapers  
90  $b b$ , which are also placed on it, from the discharge end to the filling end of the machine.

The curing or vulcanizing chamber  $m$  is formed by an air-tight box of sufficient length to insure the proper conversion of the material  
95 as it travels from one end to the other of the chamber. It is provided with means for heating it to the desired degree, preferably consisting of steam heater-pipes  $n n'$ , arranged, respectively, above and below the line of traveling shapers and formers, with flap-doors  $m'$   
100  $m'$  at its ends, which fall down and close the openings through which the formers pass when the chamber is unoccupied by them and which are supplied with flexible cover-  
105 ings or shields  $m^2$  of a nature to lie closely to the upper sides of the formers and the curved portions of the upper folds of the material, so as to make the openings of the chamber as nearly as possible air-tight when the  
110 formers, with the folded and formed material, are passing through it, and also with a discharge-pipe  $m^3$ , provided with an adjustable damper  $m^4$ , preferably extending from the  
115 under side of the chamber, and which may be continued to any convenient location to carry the fumes or exhausted gases from the chamber, and thus leave the building or room free from inconvenience of the same. When the  
120 curing or vulcanization of the convertible part of the material is to be produced by means of a chemical in conjunction with heat, it is proposed to supply the chemical liquid to an open dish  $o$ , located above the material,  
125 and to maintain a uniform level of the same in the dish from an inverted bottle  $o'$ , having a long neck extending down through a hole in the top of the box  $m$  into and beneath the surface of the liquid in the dish, acting on the principle of a bird-fountain, said neck of the  
130 bottle being provided with a stop-cock which is used to prevent undue escape of the liquid from the bottle as it is placed in position after being filled and which may be used to regulate the flow of the liquid into the dish  $o$ .



This arrangement of the active curing or vulcanizing liquid is adopted when the gases given off from the same under the influence of heat have greater density than the atmosphere, the said chamber being kept fully charged with the gases, the residue of which is allowed to escape through the pipe  $m^3$  after the active principle has been taken up by the material as the gases pass over the material—as, for instance, in vulcanizing a pure-gum rubber combined with a fabric bichlorid of sulfur may be the liquid used, the fumes or gases of which are heavier than the atmosphere. A forced discharge of the gases from the chamber may be induced by means of an exhaust-fan applied to the pipe  $m^3$ . The discharge-pipe may in some cases be advantageously at the upper part of and liquid placed in the lower part of the chamber. To prevent the gases that may surround the material as it leaves the chamber  $o$  escaping into the room, a closed chamber  $p$  is formed at the discharge end of the chamber  $o$ , and this chamber  $p$  may also be used as a cooling-chamber to cool off the material as it passes therethrough before being handled, which is desirable to insure the material maintaining the set imparted to it in the forming and curing processes. This chamber is provided with a pipe  $p'$ , through which air, cooled, if desired, may be drawn, and may have a flap-door  $p^2$ , with a flexible shield like the door  $m'$  at the discharge-opening, and to insure a constant change of air to flow over the material in the chamber a suction-fan  $q$  is located and operated at the upper part of it. An antechamber  $r$  is located at the entrance end of the chamber  $m$  to collect such of the gases as may escape through the entrance-opening, and to cause a discharge of the same with the discharge from the chamber  $p$  the pipe connection  $r'$  joins the top of this chamber  $r$  to the inlet of the fan  $q$ , said pipe being provided with a damper  $r^2$  to govern the flow of air through the chamber  $r$ .

We claim as our invention—

1. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, and means for intermittently moving the formers forward as each successive cell is provided with a fold of the material and with a shaper in said fold.

2. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells to determine the depths of the folds of the material, means for intermittently moving the formers forward with the shapers holding the folded material in the cells, and inclined ledges at the ends of the formers under

which the ends of the shapers pass to depress them, and so form the material, as they are intermittently carried forward with the cells of the formers.

3. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells to determine the depths of the folds of the material, means for intermittently moving the formers forward with the shapers holding the folded material in the cells, and inclined ledges at the ends of the formers under which the ends of the shapers pass to depress them, and so form the material, as they are intermittently carried forward with the cells of the formers, and horizontal ledges under which the end of the shapers bear and by means of which they are held down in the cells when they leave the inclined ledges.

4. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, and means for intermittently moving the formers forward as each successive cell is provided with a fold of the material and with a shaper in said fold, and a swinging guide-frame over which the material passes and which is moved forward toward the cell being filled to form sufficient slack in the material for the requisite folds.

5. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, adjustable guide-stops at the ends of the formers upon which the ends of the shapers rest for determining the widths of the folds made by the shapers, means for intermittently moving the formers forward as each successive cell is provided with a fold of the material and with a shaper in said fold and an adjustable guide-frame over which the material passes adapted to be moved forward to present the right quantity of the material to the cell being filled to form the requisite folds.

6. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells to determine the depths of the folds of the material, means for intermittently moving the formers forward with the shapers holding the folded material in the cells, inclined ledges at the ends of the formers under which the ends of the shapers pass to depress them, and so form the material, as they are



intermittently carried forward with the cells of the formers and means for vertically reciprocating the inclined ledges to progressively depress all of the shapers under the action of said inclined ledges.

7. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells to determine the depths of the folds of the material, means for intermittently moving the formers forward with the shapers holding the folded material in the cells, and inclined ledges at the ends of the formers under which the ends of the shapers pass to depress them, and so form the material, as they are intermittently carried forward with the cells of the formers, and horizontal ledges under which the end of the shapers bear and by means of which they are held down in the cells when they leave the inclined ledges and means for vertically reciprocating the inclined ledges to progressively depress all of the shapers under the action of said inclined ledges.

8. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells to determine the depths of the folds of the material, means for intermittently moving the formers forward with the shapers holding the folded material in the cells, inclined ledges at the ends of the formers under which the ends of the shapers pass to depress them, and so form the material as they are intermittently carried forward with the cells of the formers, a frame provided with guideways in which the formers slide and at one end of which are located the guide-stops and inclined ledges, horizontal ledges extending along the frame and under which the ends of the shapers bear after they leave the inclined ledges and reverse-inclined ledges at the other end of the frame upon which the ends of the shapers slide so as to cause said shapers to be raised up in the cells.

9. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers adapted to fold the material into the cells between the formers, and means for intermittently moving the formers forward as each successive cell is provided with a fold of the material and with a shaper in said fold, a frame provided with guideways in which the formers slide, and a conveyer at the side of the frame for transmitting the formers and shapers from the discharge end of the frame to the filling end.

10. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between

them, separate shapers adapted to fold the material into the cells between the formers, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells to determine the depths of the folds of the material, means for intermittently moving the formers forward with the shapers holding the folded material in the cells, inclined ledges at the ends of the formers under which the ends of the shapers pass to depress them, and so form the material as they are intermittently carried forward with the cells of the formers, a frame provided with guideways in which the formers slide and at one end of which are located the guide-stops and inclined ledges, horizontal ledges extending along the frame and under which the ends of the shapers bear after they leave the inclined ledges, reverse-inclined ledges at the other end of the frame upon which the ends of the shapers slide so as to cause said shapers to be raised up in the cells, and a conveyer at the side of the frame for transmitting the formers and shapers from the discharge end of the frame to the filling end.

11. In a machine for forming articles of flexible material in combination, parallel-arranged formers spaced to form cells between them, separate shapers to hold the material folded in the cells, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells, means for moving the formers and shapers forward as the cells are provided with the material, means for depressing the shapers down into the cells to stretch the material into the desired shape, and means for holding the shapers in their depressed positions in the cells.

12. In a machine for forming articles of flexible material, in combination, parallel-arranged formers spaced to form cells between them, separate shapers to hold the material folded in the cells, guide-stops at the ends of the formers upon which the ends of the shapers rest when placed in the cells, means for moving the formers and shapers forward as the cells are provided with the material, means for depressing the shapers down into the cells to stretch the material into the desired shape, means for holding the shapers in their depressed positions in the cells, and a curing or vulcanizing chamber into which the formers and shapers enter as they are moved forward, and in which the formed material held in the formers is cured or vulcanized.

Signed at New York, in the county of New York and State of New York, this 24th day of January, A. D. 1899.

ALFRED SHEDLOCK.  
JAMES A. HUDSON.

Witnesses:

ARTHUR C. BLATZ,  
DAVID ROSENSTEIN.