No. 682,626. Patented Sept. 17, 1901.

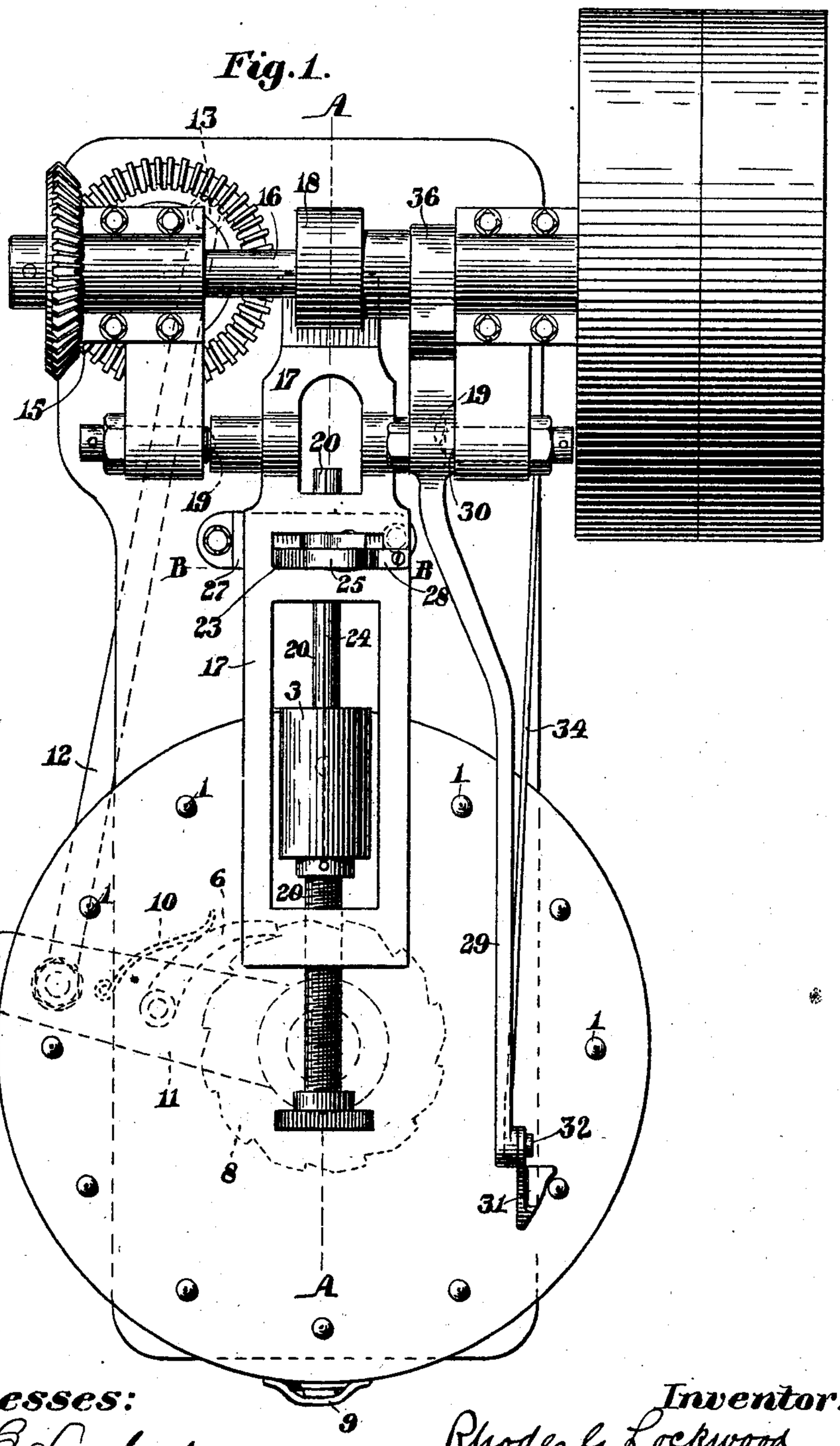
R. G. LOCKWOOD.

MACHINE FOR PUNCHING NIPPLES, &c.

(Application filed Jan. 30, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



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Joseph T. Brennan.

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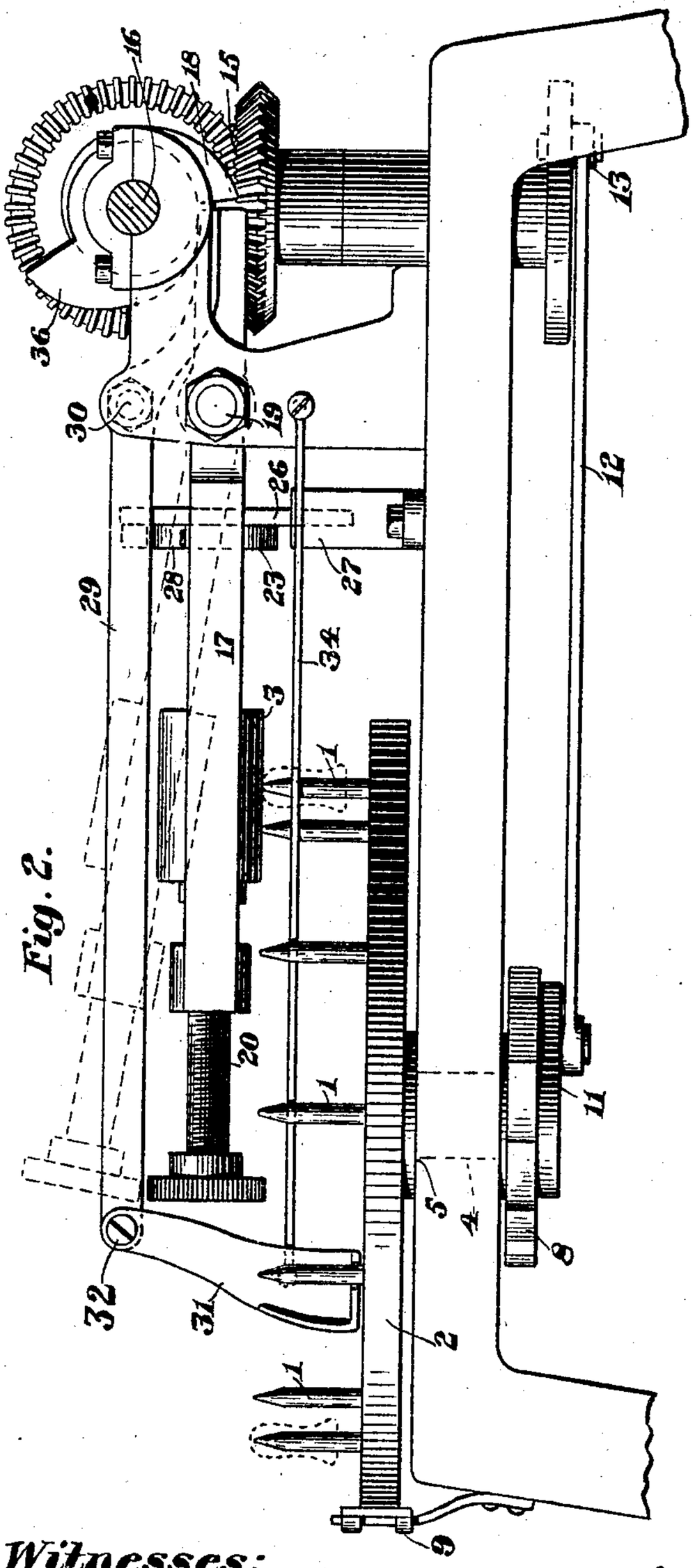

Fig. 2.

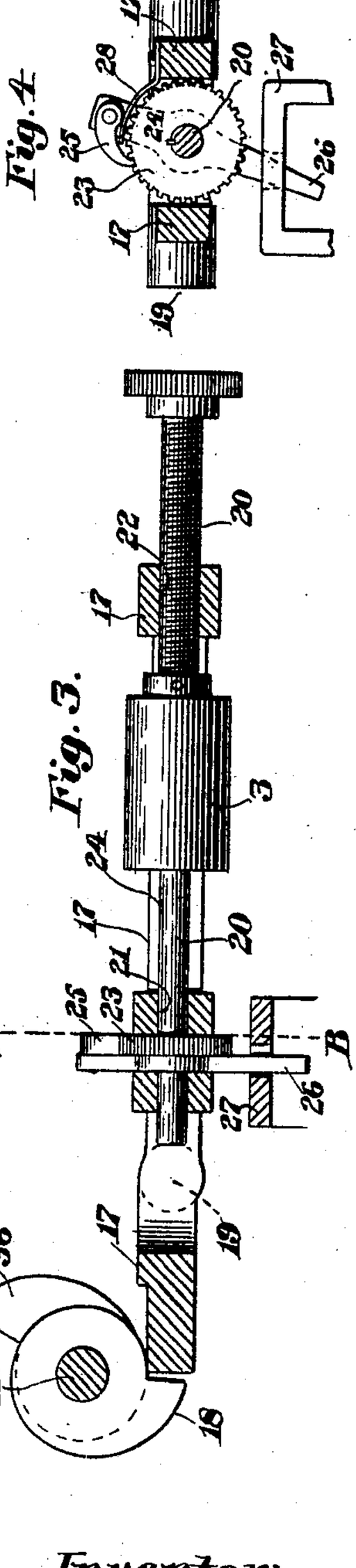

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

RHODES G. LOCKWOOD, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF TWO-THIRDS TO RHODES LOCKWOOD AND WILLIAM N. LOCKWOOD, OF SAME PLACE.

MACHINE FOR PUNCHING NIPPLES, &c.

SPECIFICATION forming part of Letters Patent No. 682,626, dated September 17, 1901.

Application filed January 30, 1901. Serial No. 45,301. (No model.)

To all whom it may concern:

Be it known that I, RHODES G. LOCKWOOD, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Machine for Punching Nipples and the Like, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is an elevation of the machine shown in Fig. 1, the driving-pulley being removed in order to show other parts better. Fig. 3 is a section showing in elevation details of the hammer and connected parts, the section being made on line A A of Fig. 1. Fig. 4 is a section showing in elevation a portion of the hammer-feed mechanism, the section being taken on the line B B of Figs. 1 and 3.

The object of my invention is to provide a machine by which in the process of manufacturing nipples of soft rubber or other suitable material, such as are commonly used in connection with nursing-bottles, one or more holes may be punched in the head of the cul-de-sac, which when completed is to constitute the nipple. Hitherto this operation has been done by hand, the workman picking up the nipples one after another in turn to punch them. The speed at which this could be done has been limited by the tax upon the physical endurance of the workman in wielding the hammer and by the relative slowness of his hand and eye in placing the blank nipples on the punch and removing them therefrom after the hole has been cut. In the machine which I have invented it is only necessary to feed the blank nipples to the machine, the operations of centering, punching, and discharging the punched nipple being performed automatically by the machine. A large increase in production, a considerable saving in labor, and other economies of operation result from the use of my machine, the features of which I shall now describe.

Referring to the drawings it will be seen that the machine consists of a multiplicity of punches arranged to receive and sustain in position the nipples to be punched, in connection with mechanism for presenting them in turn to receive the blow of a hammer, for operating the hammer, and for removing nipples that have been punched and discharging them from the machine.

A series of punches 1 1, arranged in an upright position at uniform distances apart on a turn-table 2, supported by the frame of the machine, are caused to move by rotation of the turn-table so that they pass in succession through a fixed point under the hammer 3, hereinafter to be described. A stud 4, on which is a shoulder 5, projects from the turn-table through the frame, the shoulder and stud constituting the bearing upon which the turn-table rotates. A ratchet-disk 8 is fixed to the stud, and a pawl 6, carried by an arm 11, journaled upon the stud, is adapted to engage notches on the disk, the pawl being kept pressed against the disk by the spring 10. A to-and-fro movement is imparted to the pawl-carrying arm 11 by a crank or eccentric 13, the two being connected by the rod 12. The crank 13 is driven, through bevel-gears 15, from the main driving-shaft 16. The main driving-shaft is equipped with tight and loose pulleys in the ordinary manner.

It will be seen that continuous rotation of the main driving-shaft will, because of the to-and-fro movement of the pawl, cause intermittent rotation to be imparted to the turn-table 2 and punches 1. A spring-brake 9 applies friction to the edge of the rotating turn-table, so that at the end of each stroke the table remains stationary in the position it then occupies until it is moved by the next stroke of the pawl. The number and distance apart of the notches on the disk 8 are so designed with respect to the throw of the crank 13 and with respect to the punches 1 that each forward movement of the pawl will cause a new punch to be brought into position under the hammer 3, where it will be stopped and held by the brake 9 without movement until another forward movement of the pawl carries it on and substitutes another in its place.

Pivoted in bearings 19, which are parallel with the main driving-shaft, is an arm 17, which carries the hammer 3. It has an end projecting toward the main driving-shaft and adapted to be engaged by a cam 18, mounted on that shaft. The cam 18 is so shaped that rotation of the shaft causes the cam to engage with the arm 17 and depress the end of that arm, thereby swinging the arm upon its bearings 19 and raising the hammer 3, as indicated by the dotted lines in Fig. 2, until the release portion of the cam 18 is reached, when the arm is released and the hammer 3 falls. In Fig. 2 the full lines indicate the position of parts shortly after the hammer has been released. The cam 18 is fixed on its shaft in such a position with respect to the crank 13 and pawl 6 that the release of the hammer will occur at a time when one of the punches 1 is stationary under the hammer.

The hammer 3 consists of a block, preferably cylindrical in shape and made, preferably, of Babbitt metal or other soft composition. Its position relative to the position occupied by the punch upon which its blow is to be delivered is automatically changed at each stroke, so that each blow is delivered by a fresh portion of the hammer. I accomplish this by mounting the hammer upon a shaft 20, supported by bearings 21 22 in the striking end of the hammer-arm 17. This shaft is free to slide through the bearing 21. The portion passing through the bearing 22 is screw-threaded to engage a thread cut in the bearing, so that upon rotation of the shaft the screw moves the hammer in the direction of its axis. A ratchet-wheel 23, through which the shaft 20 is free to slide, is mounted on that shaft and is keyed thereto by the spline 24. The ratchet-wheel, and with it the shaft, are rotated by a pawl 25. This pawl receives a to-and-fro motion from an arm 26, which is pivoted on the shaft 20 and projects through a hole in a plate 27, fixed to the frame of the machine. (See Fig. 4.) Whenever the striking end of the hammer-arm 17 is raised, the arm 26 comes in contact with the fixed plate 27 and is thereby rotated to some extent about the shaft 20, thus moving the pawl 25, which, through the ratchet 23 and shaft 20, rotates slightly the hammer 3 and brings a fresh part of the hammer over the point where the punch is to be struck.

The extent of the rotation of the hammer depends upon the amount which the ratchet-wheel is moved by the pawl 25 and is preferably just sufficient to present a fresh surface of the hammer to each succeeding punch.

In order to make sure that the pawl shall take up at each stroke the precise number of notches desired and no more, I have provided a smooth plate 28, incasing the ratchet-wheel and intervening between its teeth and the pawl during a portion of the pawl's stroke. The throw of the pawl on each return stroke carries it back several notches from the position where the upward motion of the hammer-arm left it. The plate 28 is set so as to leave uncovered only as many of those notches as it is desired to have the pawl engage. The pawl then slips smoothly over the plate where the notches are covered and does not on its driving stroke engage the ratchet until it reaches the end of the plate, when it slips off into the desired notch, engages the ratchet, and pushes it forward until the limit of the pawl's movement is reached. When this means is employed, it makes no difference how low the hammer may fall or over how many notches the pawl may be carried thereby, for the only portion of the stroke of the pawl that is operative is the conclusion of it, and that portion is controlled accurately by the cam 18 and the plate 27.

The pitch of the screw 22 is preferably such that at each complete revolution the hammer will advance just far enough in the direction of its axis to present a fresh surface to the punches. It follows that in the operation of the machine each blow to puncture a nipple is struck by a smooth portion of the hammer until the entire surface of the hammer has been covered. It has been the usual experience that the head or block on the hammer that receives and stops the penetration of the punch after the latter has pierced the material in which the hole is to be cut quickly acquires a rough and uneven surface the result of which is poorer work and a shorter life of the hammer or block. In my invention the hammer being once set in operation and allowed to work without interruption proceeds to do its work accurately and evenly, with mathematical precision, so long as a single spot on its entire surface remains fresh and unutilized. Then it may be removed and a complete new smooth surface produced without recasting the metal by placing it in a lathe and turning off the roughened surface.

A delivery-arm 29, pivoted to the frame of the machine at 30, is fitted with a scoop-like plate 31 at its end, the scoop being so located relative to the punches that when the turn-table is stationary the edge of the scoop will be close to one of the punches and adapted on being raised to lift from that punch the punched nipple resting upon it. The scoop is attached to the arm 29 by the pivot 32. A cam 36, carried on the main driving-shaft, is adapted to engage and depress the inner end of the delivery-arm 29, thereby raising the outer end carrying the scoop. A light rod 34, approximately parallel to the arm 29 and pivotally attached to the frame of the machine and to the scoop at points corresponding to the pivotal attachments of that arm, serves to keep the scoop in vertical position, without tipping, when it is raised. The rise on the cam 36 and the position of the cam on its shaft are so designed that the cam will come into operation after the hammer 3 has delivered its blow and will complete its operation

before the turn-table has started to move again or shortly afterward. A machine built according to my invention needs only to have nipples supplied to it to accomplish automatically and at high speed the punching and delivery of nipples. Nipples that are to be punctured are placed upon the punches about to go under the hammer. The weight of each nipple causes it to take a position like that indicated by dotted lines in the drawings, Fig. 2, the nipple thus automatically centering itself upon the point at which the blow of the hammer will be delivered.

It will be obvious that variations may be made from the precise details of the machine which I have described without departing from the essence of my invention. For example, the turn-table may consist merely of a series of arms or spokes, each arm bearing a punch, or another form of hammer might be used or a different means of shifting the striking-surface of the hammer or of effecting the other motions I have described.

I claim—

1. In a punching-machine, a hammer; means to actuate that hammer; a multiplicity of punches, each punch being adapted to hold an article to be punched; a turn-table supporting those punches; means adapted to rotate the turn-table intermittently, and cause the punches to be set successively under the hammer.

2. In a punching-machine, a hammer; means to actuate that hammer; a multiplicity of punches, each punch being adapted to hold an article to be punched; a turn-table supporting those punches; means connected with the driving mechanism of the hammer adapted to rotate the turn-table intermittently, and cause the punches to be set successively under the hammer; and a cam-operated scoop to lift the articles from the punches in succession.

3. In a punching-machine, a hammer pivoted on the frame of the machine; a cam rotatably mounted on a driving-shaft of the machine, and adapted to actuate that hammer; a crank actuated by that driving-shaft; a pawl actuated by the crank; a turn-table bearing a multiplicity of punches, each adapted to hold an article to be punched; and a ratchet connected with the turn-table, whereby said pawl imparts to the turn-table and punches intermittent rotation; all organized and arranged so that the punches shall successively take position and remain stationary to receive the blow of the hammer.

4. In a punching-machine, a hammer pivoted on the frame of the machine; a cam rotatably mounted on a driving-shaft of the machine, and adapted to actuate that hammer; an eccentric connected with that driving-shaft; a pawl actuated by the eccentric; a turn-table bearing a multiplicity of punches, each adapted to hold an article to be punched; and a ratchet connected with the turn-table, whereby said pawl imparts to the turn-table and punches intermittent rotation; all organized and arranged so that the punches shall successively take position and remain stationary to receive the blow of the hammer; and a scoop pivoted to the frame of the machine; a cam on the driving-shaft whereby that scoop is thrown up and down close to one of the positions taken by the punches after passing the hammer.

5. In a punching-machine, a turn-table; a multiplicity of punches supported by the turn-table, each punch being adapted to hold an article to be punched; means to rotate the turn-table intermittently, whereby the several punches are successively set in the same position; a hammer adapted to strike a blow upon a punch set in said position, and means to actuate that hammer.

6. In a punching-machine having one or more punches set to receive the blow of a hammer, the combination of a hammer-arm; a screw-shaft journaled in said arm; a hammer-head fixed on that shaft; a ratchet-wheel on the shaft free to slide but not to rotate thereon; a pawl and arm therefor to actuate the ratchet-wheel; means to move the hammer-arm alternately from and to the punch, and a stationary bearing on the frame of the machine adapted to engage and actuate the arm of the pawl as the hammer-arm moves.

7. In the striking mechanism of a punching-machine, a hammer-head; a screw-threaded support for that hammer-head; means to move the hammer-head toward and from the point where the blow is delivered upon the punch; a ratchet-wheel connected with that head and free to slide but not to rotate with respect thereto; a pawl adapted to engage the ratchet; a smooth plate intervening between the teeth of the ratchet and the pawl during a portion of the travel of the pawl, and means on the stationary portion of the machine to actuate the hammer and the pawl.

8. In a punching-machine having one or more punches set to receive the blow of a hammer, a hammer; a relatively soft and penetrable striking-surface on the hammer; means to actuate the hammer; means to set the punch or punches always in the same position to receive the blow of the hammer; and means to shift the position of the striking-surface of the hammer at each stroke to present a fresh portion thereof to the punch.

9. In a punching-machine having one or more punches set to receive the blow of a hammer, a hammer; a rotatable striking part on the hammer; a relatively soft and penetrable surface on that striking part; means to support that striking part rotatably; means to actuate the hammer; and means to rotate the striking part when the hammer is actuated, to present a fresh portion of its surface to the punch.

10. In a hammer for a punching-machine, an adjustably-mounted striking part adapted to deliver the blow of the hammer; a relatively soft and penetrable surface on that

striking part; and means to adjust the striking part when the hammer is actuated.

11. In a punching-machine having one or more punches set to receive the blow of a hammer, the combination of a hammer-head; means to support that hammer-head; a screw adjustment in those supporting means; means to move the hammer-head alternately to and from the punch; and means on the stationary portion of the machine to operate the adjusting mechanism of the hammer-head at each stroke of the hammer.

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