(No Model.) 3 Sheets—Sheet 1.

G. B. LAMB.

NUT BLANK MACHINE.

No. 560,857. Patented May 26, 1896.

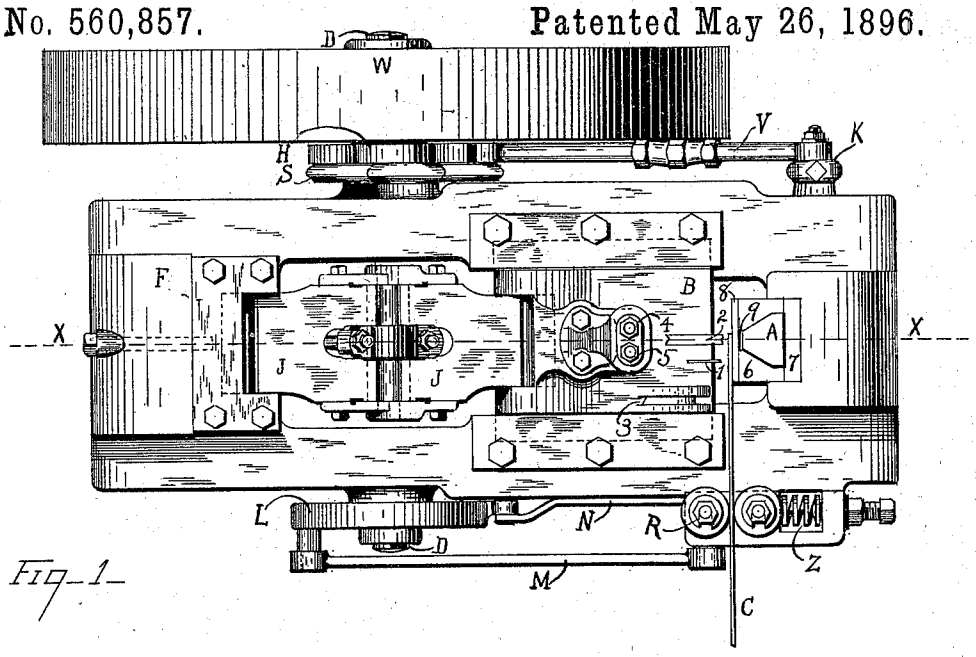
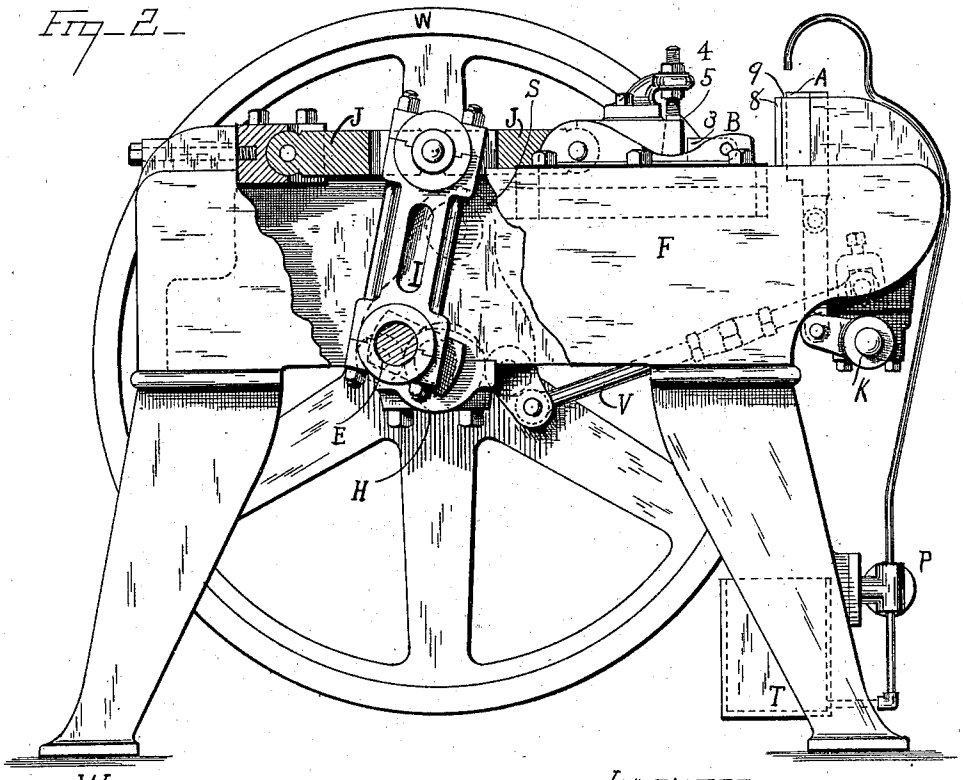


Fig. 1.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 2

G. B. LAMB.

NUT BLANK MACHINE.

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Fig. 3.

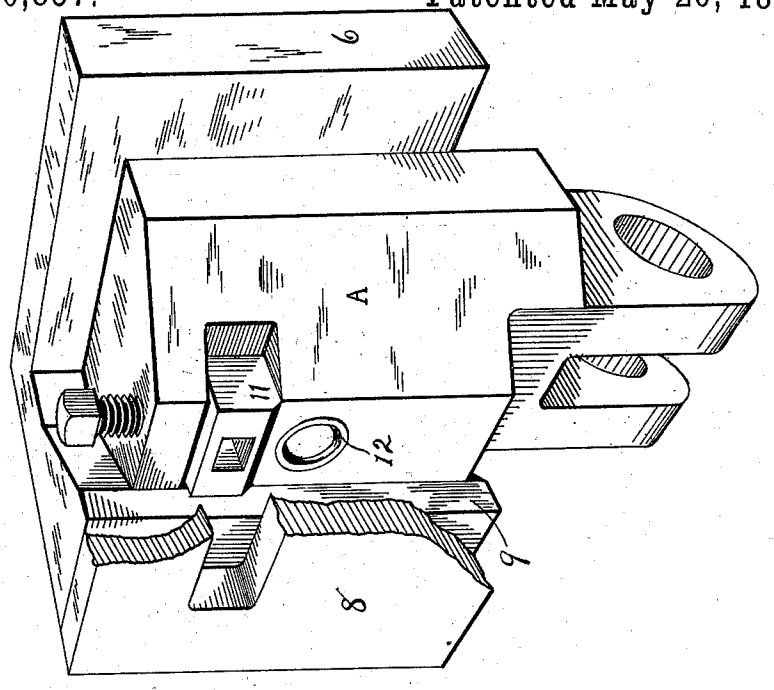


Fig. 4.

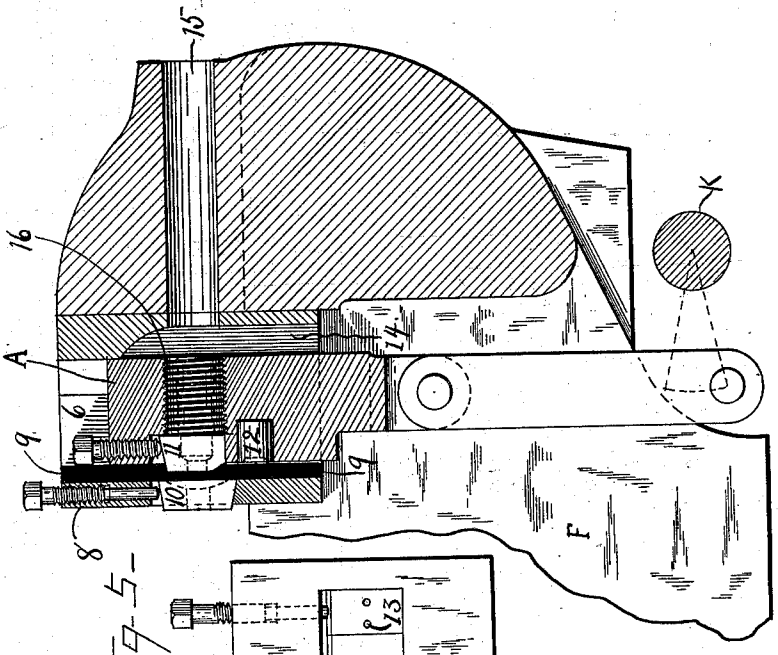
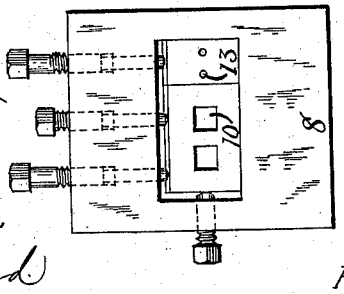


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 6.

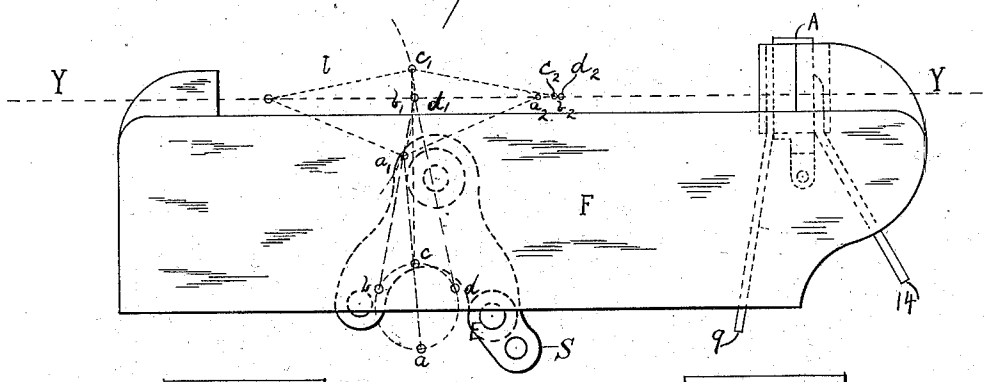


Fig. 7.

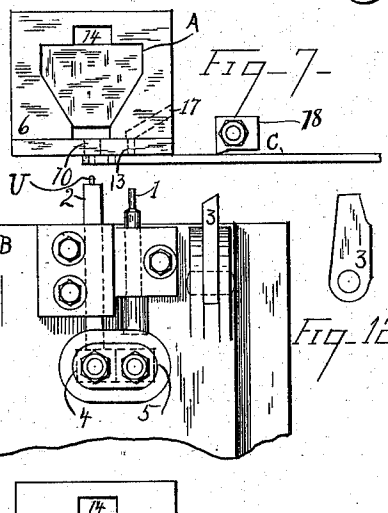


Fig. 8.

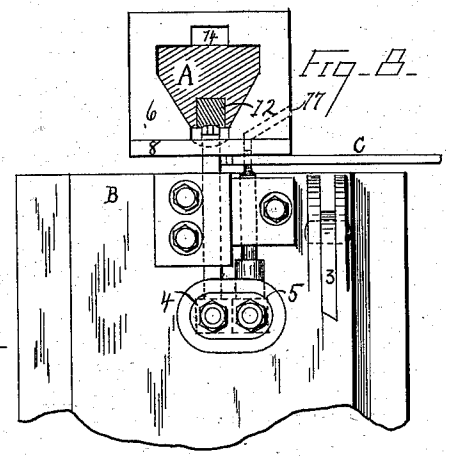


Fig. 12.

Fig. 9.

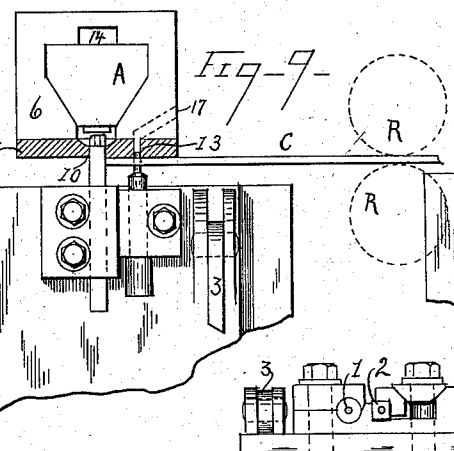
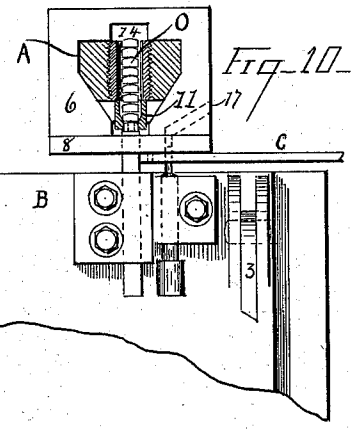


Fig. 10.



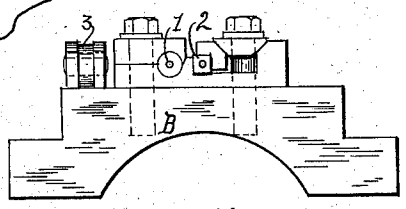


Fig. 11.

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UNITED STATES PATENT OFFICE.

GEORGE B. LAMB, OF WATERBURY, CONNECTICUT, ASSIGNOR TO THE WATERBURY FARREL FOUNDRY AND MACHINE COMPANY, OF SAME PLACE.

NUT-BLANK MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,857, dated May 26, 1896.

Application filed October 14, 1895. Serial No. 565,601. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. LAMB, of Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Automatic Nut-Blank Machines, of which the following is a specification.

My invention relates to improvements in machines in which a rectangular bar of metal is received and automatically reduced to what are commonly known as "finished nut-blanks." Up to the present time I find that all machines of this character employ at least three punches—one for piercing the round hole in the center of the blank, one for the two operations known as "cutting off" and "crowning," and one for "reshearing" or finishing—the unfinished blank in the meantime being carried from under one punch to the other by more or less complicated mechanism. Moreover, in none of the machines is there a satisfactory disposition made of the necessary scrap and chips, which often interfere with the proper working of the machine.

The objects of my improvements are, first, to simplify the construction and operation of the machine by using, besides the piercing-punch, only one other punch, which is adapted to perform the three operations of cutting off, crowning, and reshearing, thus doing away with any mechanism for carrying the unfinished blank to other punches; second, to make suitable provision for disposing of the necessary scrap and chips; third, to construct a machine in which the punches and dies are accessible; fourth, to make provision for readily cutting off the bar of stock; fifth, to provide against accident to the machine and dies in case a piercing-punch should break off in the bar of stock. I attain these objects by means of the machine illustrated in the accompanying drawings, in which—

Figure 1 is a general plan view; Fig. 2, a side elevation, part of the bed being broken away to show vertical central section at the line X X, Fig. 1. Fig. 3 is a perspective view of the die-block A and holder 6. Fig. 4 is a vertical central section of the dies and the end of the bed at the line X X, Fig. 1. Fig. 5 is a view of the front plate 8, showing cut-off die 10 and piercing-die 13 from the left of Fig. 4. Fig. 6 is a side elevation showing outline of bed and a diagram of the motion imparted to the sliding gate by means of the crank, connecting-link, and toggles. Figs. 7, 8, 9, and 10 are detail plan views showing relative positions of punches and dies at different parts of the stroke. Fig. 11 is a detail end view of the sliding gate B, showing clamps for holding punches. Fig. 12 is a detail side view of the knife 3.

A bar of stock C is intermittently fed forward the length of a nut-blank by a pair of feed-rolls R, Fig. 1. After each such feed a sliding gate B, Fig. 7, carrying two punches 1 and 2 advances, the first punch, 1, piercing a round hole a few spaces from the end, while the other punch, 2, shears off a sufficient length, pierced in the center, to form a blank. This blank becomes transfixed to a spear-head U (see Fig. 7) at the end of the punch 2, and is there carried a short distance till it comes into contact with a die 12, Fig. 8, which produces crowning. The punch and blank now retreat a distance equal to the thickness of the blank, Fig. 9. At the same time the crowning-die 12 is replaced by a reshearing-die 11, Fig. 10, the punch again advances, forcing the blank through this die to finish it. As the sliding gate now retreats to its original position (shown in Fig. 7) the finished nut-blank is drawn off from the spear-head and is in turn pushed along with the other finished blanks O till it falls into the space 14 and out through the tube connected therewith. (See Fig. 6.) The bar of stock is again fed forward and the operation repeated, the gate advancing twice to complete each blank.

F represents the bed, which is supported horizontally and upon which is arranged the operative mechanism; D, the driving-shaft, hung below the bed in proper bearings, power being applied at one extremity of the shaft through the pulley W. Fixed to the other extremity of the shaft is a face-cam L, from which an intermittent feed of the bar to the machine is obtained at each revolution of the shaft. Any of the usual feeding devices may be employed. I use the well-known roll-feed and have indicated its location and mechanism in Fig. 1. About midway of the shaft D is a crank E, which operates through the me-

dium of a pitman I and the toggles J J to reciprocate the sliding gate B, causing it to advance twice and retreat twice at each revolution of the shaft. A diagram of the motion is given at Fig. 6. Four different positions of the center of the crank are indicated, respectively, by a, b, c, and d. The corresponding positions of the center of the toggles is represented by a', b', c', and d', and of the sliding gate by a^2, b^2, c^2, and d^2. It should be noticed that the toggle-center is carried farther on one side of the line of centers Y Y than on the other, the effect on the motion of the gate being a long stroke and a short stroke alternately at each revolution of the shaft. To the forward end of the gate are attached a piercing-punch 1, a finishing-punch 2, and a cutter 3, the cutter being swung on a pin, so as to be easily thrown in or out of position for cutting the bar of stock C when desired. A fixed blade 18 (shown in Fig. 7) is bolted to the bed and coöperates with the knife 3.

Situated between the power-wheel and the bed is a surface-cam H, attached to the shaft and operating upon the sliding die-block A, to which it imparts a vertically-reciprocating motion through the medium of the swing-arm S, the link V, and the rock-shaft K. A side view of the swing-arm S is shown on Fig. 6. In the face of the die-block (see Fig. 3) are a reshearing-die 11 and a crowning-die 12, one vertically over the other, which register alternately with the punch 2 in the sliding gate as it advances to its extreme forward position.

An oil-tank T is supported beneath the machine and a small pump P causes a circulation of oil through a pipe, which leads the oil to flow over the face of the dies, thus lubricating them and carrying off any loose scrap that might accumulate. The oil is then led back to the tank, where the chips are caught on a strainer in the upper part and the oil is again pumped around as before.

The sliding die-block A and its holder 6, which is suitably fastened to the bed F, require particular description. (See Figs. 3, 4, and 5.) To the front of the holder 6 is fastened a plate 8, which holds the piercing-die 13 and the cut-off or blanking-die 10. These dies are made double, as shown, so that they may be turned end for end as they become worn. Between the plate 8 and the die-block A is a space 9, through which a stream of oil constantly flows. The oil enters at the top and is led away from the bottom of the passage 9 by tubes, the lower one returning it to the reservoir T. In the face of the die-block A are set the crowning-die 12 and directly above it the reshearing-die 11, which is backed by a hollow screw-plug 16 for adjustment. A hole 15 drilled in the back end of the bed permits the use of a screw-driver on the plug 16. As the finished nut-blanks are forced one by one through the die 11 they push each other through the hollow plug 16 until they fall into the opening 14 prepared in the back part of the holder 6, from where they are led away finished to a convenient receptacle.

The cut-off die 10 is adjusted to be in exact line to receive the punch 2, which, as it advances into the die 10, shears off a nut-blank. As before stated, the blank becomes fixed to the end of the punch, and is in this manner carried through the space 9 and into forcible contact with the die 12, the die-block A being timed to be at its extreme upper position, thus performing the operation of crowning. The gate B is now at its extreme forward position, as indicated in the diagram Fig. 6 by b b' b^2 and shown in plan in Fig. 8, which also gives a horizontal section of the die-block A through center of die 12. The gate B now retreats to the position indicated in Fig. 6 by c c' c^2 and shown in plan at Fig. 9. In this position the nut-blank is in the space 9, being still supported on the spear-head U. If the gate should retreat to its original position, the nut-blank would be stripped off by the die 10. Hence the necessity for the second stroke of the gate being short. The back of the die 10 is concaved slightly, as shown, to prevent any possibility of the nut-blank being started from its support, on which it is held by friction only. While in this position the die-block A drops to its extreme lower position, so as to bring the reshearing-die 11 in line to receive the punch 2. The gate B now advances to its extreme forward position again, (indicated in the diagram Fig. 6 by d d' d^2 and shown in plan at Fig. 10,) which also gives a horizontal section of the die-block A through the center of the die 11. By this motion the nut-blank is forced through the die 11. The gate now makes its final retreat, which strips the nut-blank off the support U.

The die-block A is so designed that by disconnecting from the rock-shaft K it can be readily withdrawn from the top of the holder 6 for setting the dies 11 and 12. The manner of fastening the punches 1 and 2 to the gate B will be readily understood by reference to the detail views, particularly Fig. 11. The punch 2 is clamped rigidly to the gate. It may be adjusted forward by a wedge 4 back of it, which takes the thrust. The piercing-punch 1 is allowed sufficient lost motion, so that it remains stuck in the die 13, while the gate makes its second or short stroke. This prevents unnecessary wear on the delicate end of the punch. By so adjusting the punch 1 that it enters its die 13 an appreciable distance the bar of stock C is prevented from being fed ahead in case the punch should break off in it, otherwise the bar might be cut off with the broken punch in it and cause a breakage of some other part of the machine.

I claim—

1. The combination in a nut-blank machine, of a piercing device consisting of a die 13, fixed to the frame; a sliding gate B, and mechanism substantially as described for imparting alternate long and short strokes to

said gate; a punch 1, attached to said gate and adapted to enter the die 13, and remain therein, during the said short strokes, for the purpose specified.

2. The combination in a nut-blank machine, of a piercing device; an intermittent feed, for presenting the stock to be operated upon; a sliding gate B, and mechanism substantially as described for imparting alternate long and short strokes to said gate; a punch 2, fixed in the end of said gate and adapted to enter a die 10, attached to the frame; for blanking; a sliding die-block A, carrying the two dies 11, and 12, and mechanism substantially as described, whereby the die 12, registers with the punch 2, at each said long stroke for crowning, and the die 11, registers with the punch 2, at each said short stroke for reshearing.

3. The combination in a nut-blank machine, of the punch 2, having the motion described; the sliding die-block A, having dies 11, and 12, attached thereto; the fixed die-plate 8, having dies 10, and 13, the said die-block, and die-plate, being supported in relation to each other so as to leave a space 9, of sufficient width to contain a nut-blank; a spear-head U, on the end of said punch 2, adapted to transfix the nut-blank and support it in the said space 9; and the oil-pump P, and tank T, whereby a current of oil is maintained through the space 9.

4. The combination in a nut-blank machine, of a fixed blade 18, attached to the frame and across the cutting edge of which the bar of stock is fed; a sliding gate B, having the motion specified; a knife 3, attached near the forward end of said gate, and adapted to shear with the said fixed blade; said knife 3, being movable on a pin about which it may be turned.

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