(No Model.) 2 Sheets—Sheet 1.

J. K. PROCTOR & J. H. KNOWLES.

MACHINE FOR NOTCHING STRIPS OF METAL.

No. 365,020. Patented June 14, 1887.

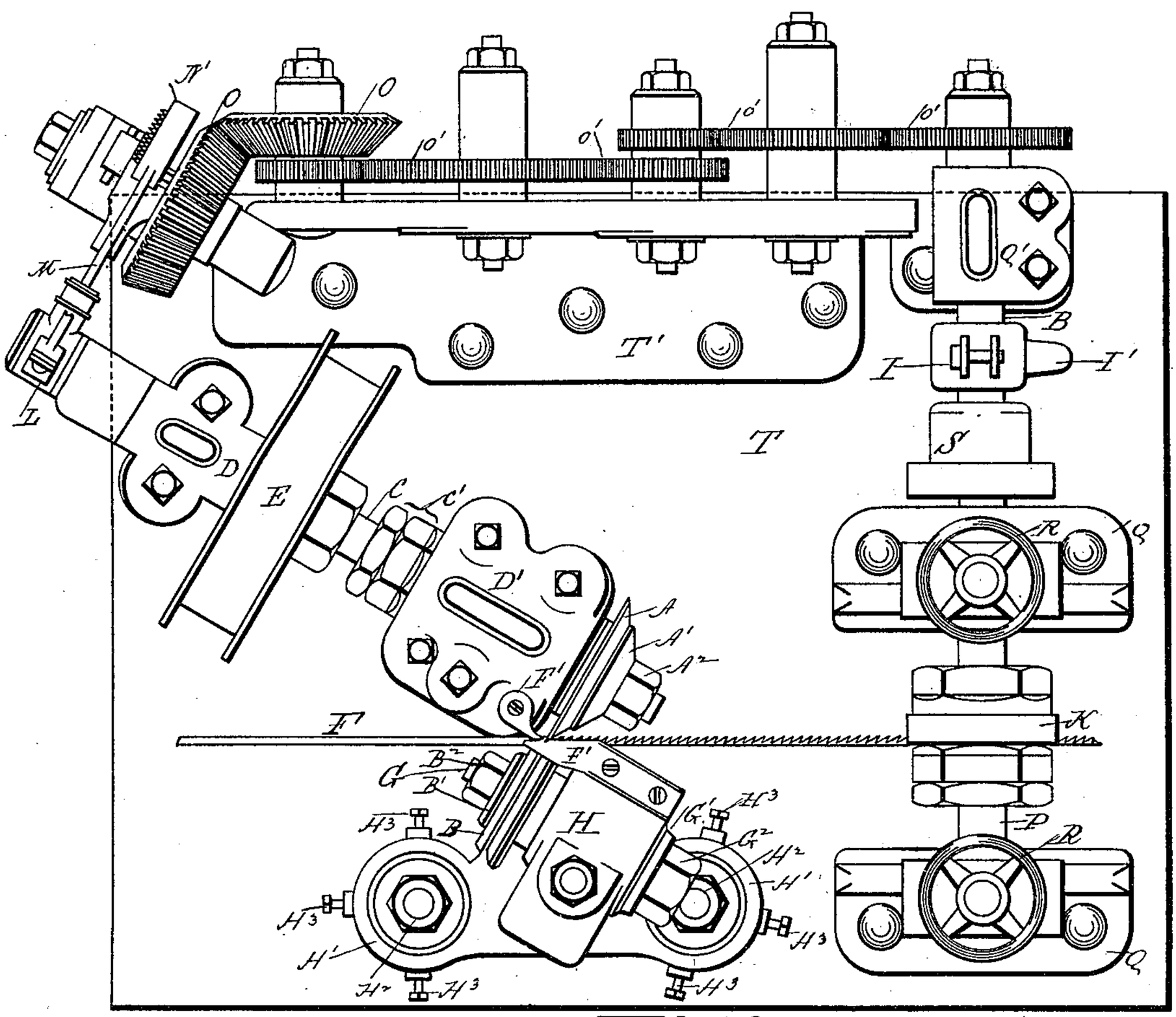

Fig. 1.

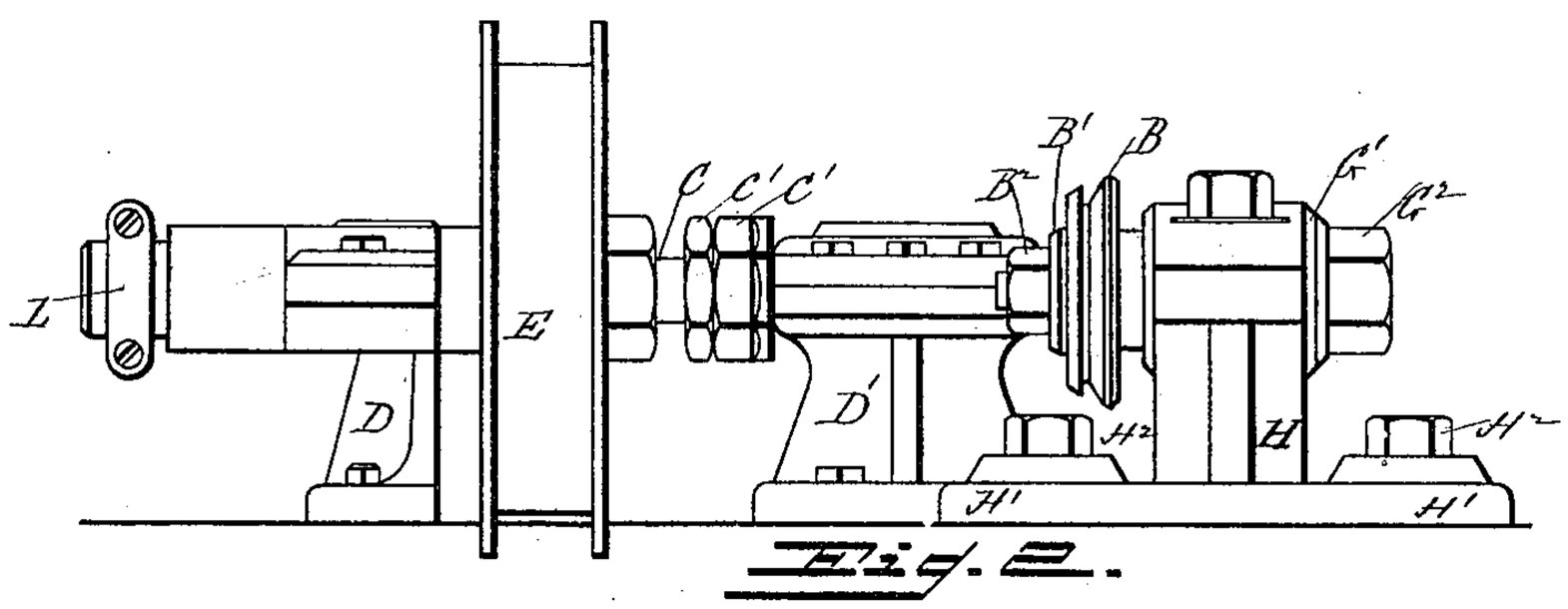

Fig. 2.

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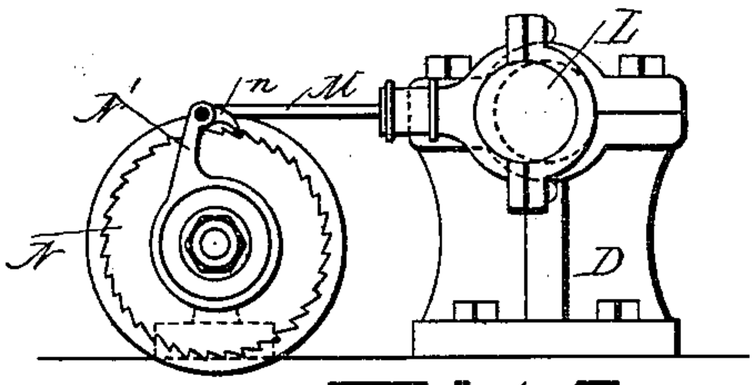

Fig. 3.

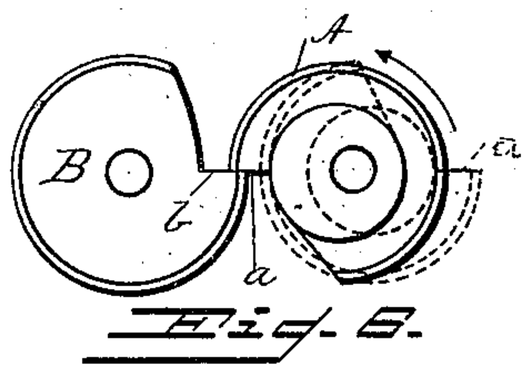

Fig. 6.

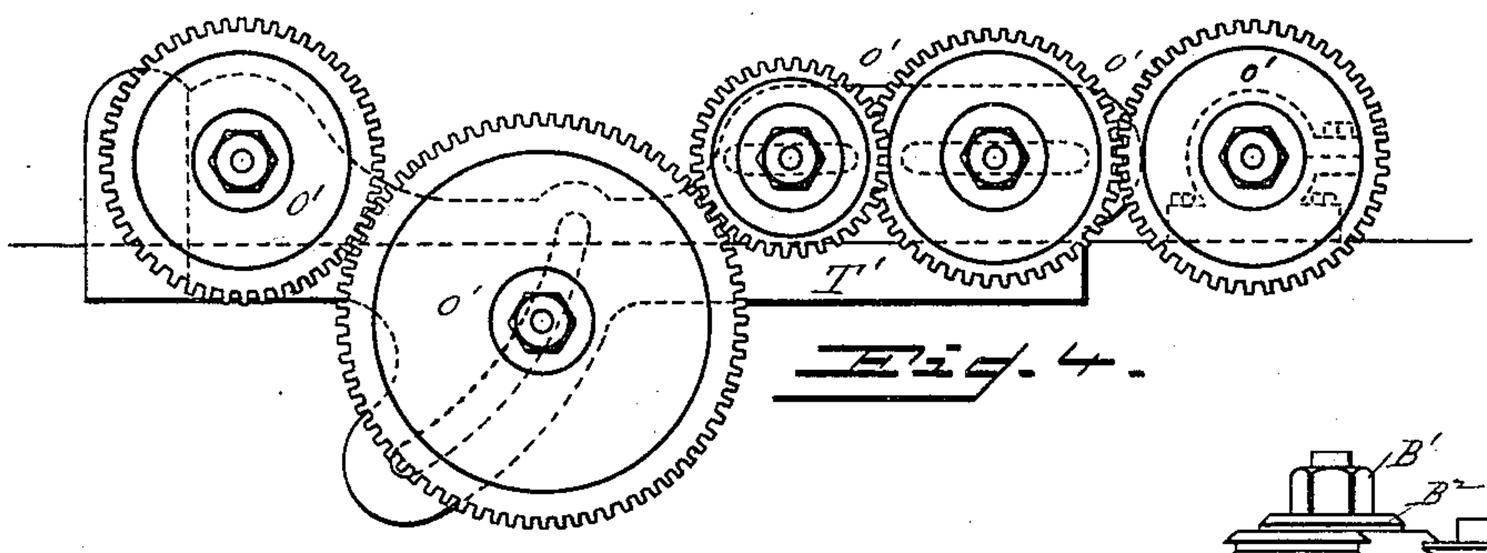

Fig. 4.

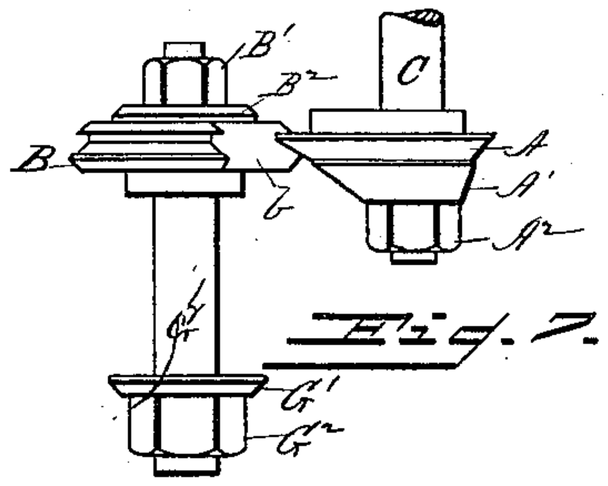

Fig. 7.

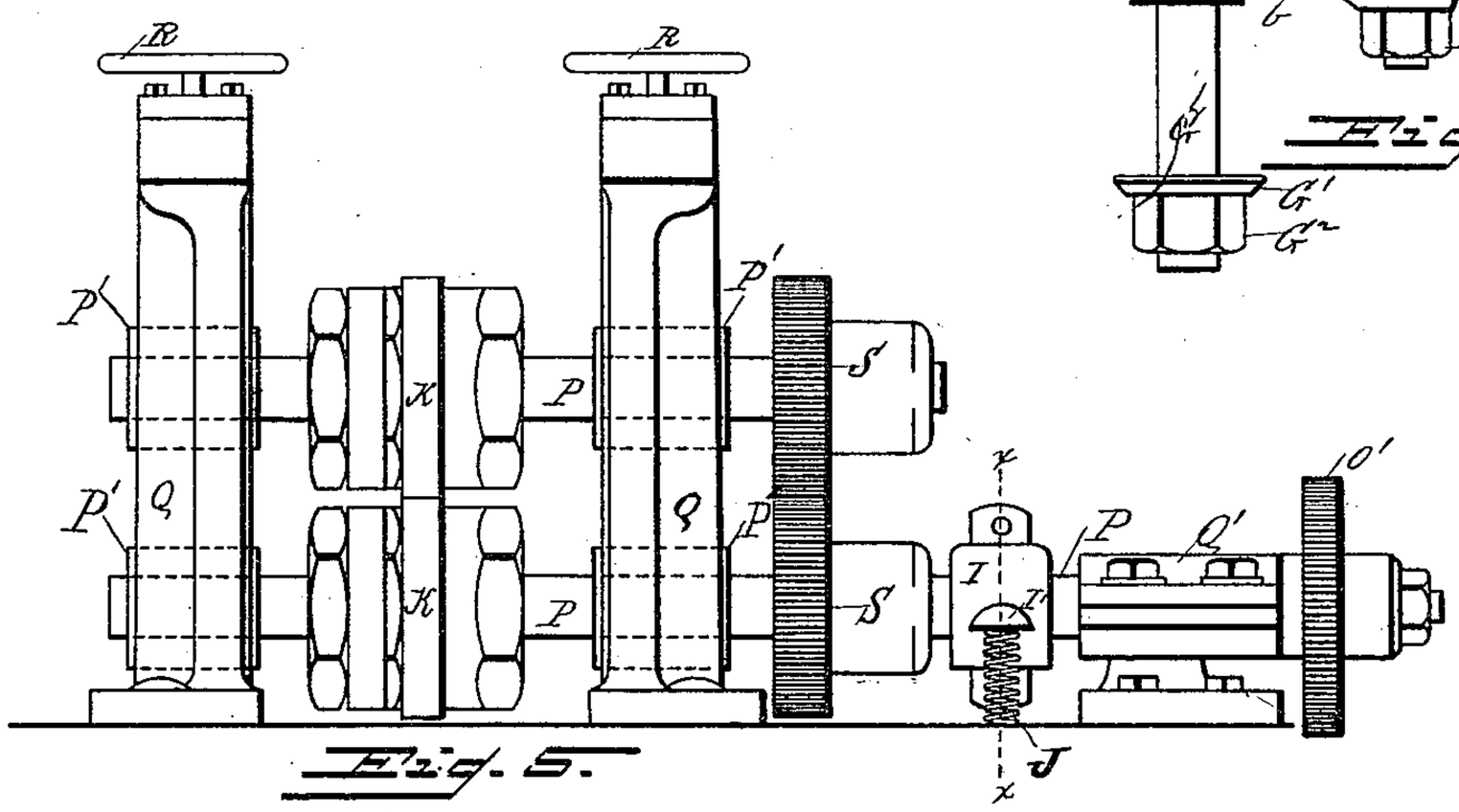

Fig. 5.

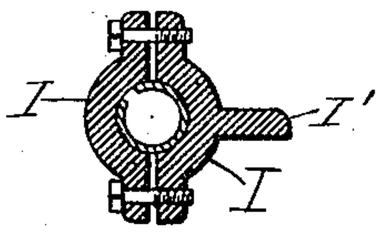

Fig. 8.

WITNESSES

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UNITED STATES PATENT OFFICE.

JOSIAH K. PROCTOR AND J. HENRY KNOWLES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE PHILADELPHIA TEXTILE MACHINERY COMPANY, OF SAME PLACE.

MACHINE FOR NOTCHING STRIPS OF METAL.

SPECIFICATION forming part of Letters Patent No. 365,020, dated June 14, 1887.

Application filed November 26, 1886. Serial No. 219,951. (No model.)

To all whom it may concern:

Be it known that we, JOSIAH K. PROCTOR and J. HENRY KNOWLES, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Toothing Saws or Notching Metal Strips; and we do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 represents the top view of our improved machinery. Fig. 2 is a side view of the cutter-operating mechanism and the die with their mandrels and appurtenances. Fig. 3 is a side view of the pitman and ratchet connection for operating the feeding mechanism. Fig. 4 is a side view of a train of gears constituting a part of the feed mechanism. Fig. 5 is a side view of the feed-rolls with their mandrels and appurtenances. Fig. 6 is a detailed view showing end view of cutter and die. Fig. 7 is a detailed view showing the top view of the cutter and die and adjacent portions of their respective mandrels. Fig. 8 is a vertical section of the friction-clamp through the dotted lines *x x*.

This invention relates to a novel and improved construction of apparatus for notching or cutting strips of metal or other material, and consists, essentially, of a cutter mounted on a revolving eccentric-head, and adapted to work into a stationary die, with feeding mechanism, whereby a strip of metal being drawn across the top of the die any desired portion of said strip may be removed. Heretofore machines for this purpose have generally been made with punches operating with an up-and-down stroke—*i.e.*, the punch descends through the piece of metal and rises again in the same path in which it descended.

Referring to the accompanying drawings, T is a table, which may be supported by suitable legs and adapted to furnish support for all of the various portions of the mechanism forming parts of this invention, as hereinafter described.

A is a cutter, which is turned out of a circular piece or disk of steel, and is mounted on the end of the mandrel C, the said end being turned eccentrically with the axis of the mandrel C. This cutter is shown in the face view in Fig. 6, where a portion of its edge is shown removed for the purpose of presenting a cutting-edge, *a*, as the cutter impinges against the die. In Fig. 6 the full lines show the position of the cutter as it is just about to enter the die, while the dotted lines show the opposite position. It will be seen that the cutter, being placed on an eccentrically-revolving head, when the high side of the eccentric is toward the die, is adapted to enter and strike through the die, while, as the eccentric-head revolves, the cutter is withdrawn from the die, and during the interval of this withdrawal an opportunity is presented for the advancement of the strip being operated upon. The cutter A is secured on the eccentric-head at the end of the mandrel C by means of a nut, A^2, A′ being a washer interposed between the nut A^2 and the cutter A. The mandrel C is supported by the standards D D′ on the top of the table T.

C′ C′ are nuts and check-nuts placed on the mandrel C, and adapted to screw up endwise against the bearings of the standard D′, for the purpose of taking up backlash and preventing endwise movement of said mandrel.

E is a pulley fitted on the mandrel C.

B is the die into which the cutter A operates. This die, which is stationary, may be of any convenient shape—as, for instance, a rectangular block with a suitable groove cut in it adapted to the shape of the cutter, or the die could be made of any other shape well known to the art in this kind of machinery. For convenience, we prefer to make the die of a circular disk-like form, with a groove cut around the outside circumference adapted to the shape of the cutter. This die may be constructed as shown in the face view in Fig. 6, where the portion of the edge of the die is removed, so as to present a flat surface, *b*, opposed to the operation of the cutter A. In our use of the die B we secure the die on the end of the mandrel G by means of the nut B^2, B′ being a washer interposed between the nut

B^2 and the die B. The mandrel G, on which the die B is mounted, is supported by the standard H, and is rigidly secured thereto by means of the nut G^2, which clamps the mandrel endwise against its bearing in said standard.

G′ is a washer interposed between the nut G^2 and the bearing of the standard H. The standard H and the standards D D′ are, for convenience, constructed with caps fastened in place by means of screws. This construction affords an easy means for removing the mandrels whenever desired. In the case of the standard H, however, the cap is provided with a clamping-screw larger than ordinary, and the cap being made a tight fit on the mandrel G and severe pressure being produced by the clamping-nut, it forces said cap firmly against the surface of the mandrel G, thereby assisting to hold the same. The bottom part of the standard H is expanded on two sides, forming lugs or ears H′, fitted with powerful clamping-nuts H^2 H^2, placed on bolts which extend upward through the table T, thus securing the standard H in any desired position. H^3 H^3 are adjusting-screws passing through the sides of the lugs H′, and their ends operating against the clamping-bolts, which pass upward through said lugs H′, afford convenient means for close adjustment of the standard H, and consequently of the die B.

F′ F′ are two guides, one fastened to the standard D′, the other fastened to the standard H, and adapted to guide or direct the strip F in its passage over the die B.

The movement of the strip F over the die B may be accomplished by any suitable feeding mechanism so constructed that said strip F shall, during one revolution of the die B, be advanced a distance equal to the distance between the adjoining notches or cuts in the edge of the strip. This feeding mechanism may be of any convenient construction, and in the drawings is constructed and operated as follows: On that end of the mandrel C opposite the cutter A is formed a small eccentric or crank end, on which is fitted the eccentric-strap L. In the end of this eccentric-strap L is fitted the pitman-connection M, which connects the eccentric-strap with the upper end of the oscillating arm N′, which is free to oscillate on the stud or mandrel of the ratchet N. By means of this eccentric crank and its connection the arm N′ is caused to oscillate in such manner that one complete to-and-fro motion of the arm N′ shall occur during each and every revolution of the mandrel C. On the upper end of the arm N′ is fitted a small pawl, *n*, which works into the ratchet N. The ratchet N is secured to one of the pair of bevel-gears O. The other of the pair of bevel-gears O is connected with the train of spur-gearing *o′ o′ o′*, so adapted and arranged as to communicate the motion of the ratchet to the mandrel P of the feed-roll K. This train of gears is supported by suitable studs or mandrels adjustable in the bracket T′, which in turn is bolted down to the table T. As will be seen, the eccentric-crank on the end of the mandrel C being unadjustable, the ratchet N and the bevel-gears O O must always have one and the same constant movement; and were all the individual gears of the train of spur-gears *o′ o′ o′* always the same then the feed-rolls K would always have one and the same movement, and consequently the nicks cut in the edges of the strip F would always be one and the same distance apart. However, by means of change-gears of different numbers of teeth used in the train of gears *o′ o′ o′* we are enabled to secure any desired movement of the feed-rolls K, thereby cutting the notches in the edge of the strip F at any desired distance apart. The feed-rollers K K are securely fastened by means of clamping-nuts on their mandrels P P, the ends of these mandrels being held in suitable bearings, P′ P′, which are supported in the standards Q Q.

Q′ is a standard-bearing to support the extended end of the journal P of the bottom feed-roller, K.

S S are gears connecting the journals P P of the rollers K K.

R R are hand-wheels fixed on the ends of screws, which, working through properly-placed nuts, are adapted to produce pressure on the bearings P′ P′ of the top feed-roll, K, through the medium of which a nipping pressure is brought to bear on the strip F as it passes between the rolls. With each progressive or step-by-step motion of the rolls K K, produced by means of the pawl and ratchet N and the connecting train of gears, the strip F is continually advanced by a succession of progressions or impulses.

Interposed between the standard Q′ and the gear S is a friction brake or clamp adapted to clamp onto the journal P of the lower feed-roll, K. This brake consists of two parts, I I, adapted to be clamped together by suitable bolts. Inside of this clamp and between it and the journal P is fitted a piece of leather or other friction material, which completely encircles the journal P. By varying the pressure exerted by the clamping screws of the brake I any desired amount of pressure can be produced on the journal P. One portion of the clamp I has an elongated arm, I′, between which and the top of the table T is placed the spring J, which may be of any desired construction. In the drawings a spiral spring is shown. The object of the clamp is to operate as a retarder to the action of the mandrel P and the lower feed-roll, K. Without this clamp the momentum of the feed-roller and the train of gears would have a tendency to throw the roll farther than intended, thereby producing irregular and uneven cuts in the strip F. The object of the spring J is to make the operation of the clamp gentle and elastic. When the machine is running at a high rate of speed, the successive movements of the feed-roll K are very rapid, and at the commencement of any movement of the feed-

roll the clamp I gives a sudden forward movement and compresses the spring J. So rapid is this forward movement that an uneven feed would be produced were it not for the spring J. The clamp I having enjoyed a brief interval of rest prior to the sudden movement of the feed-roll, with the piece of leather inside of the clamp pressed with considerable firmness against the mandrel, the parts in frictional contact resist the sudden disturbances; hence the spring J during its interval of compression allows time for the slipping of the parts in frictional contact within the clamp I. After the sudden movement mentioned has passed the spring J extends itself and the parts of the clamp come into their former position ready for the next movement.

The operation is as follows: The cutter A having been properly adjusted to the die B, and the gears *o' o' o'* having been properly adjusted to give the required interval to the space between the cuts in the edge of the strip F, the latter is placed between the nip of the feed-rolls K K and the guide-piece F' F' properly adjusted against it. The machine is now set in operation, power being applied by a belt running on pulley E. The cutter A strikes downward through the edge of the strip and cuts out a portion of the material, forming a cut or nick. Then the cutter A, being mounted on an eccentric-head, withdraws itself out of the die, and during the interval of such withdrawal a progressive movement of the feed-rolls K K is performed by means of the ratchet and pawl and the connecting mechanism previously mentioned and described, and the strip F is advanced one degree. Then the cutter A makes a second stroke, cutting out a second piece of metal and forming a second cut or nick, and so on continuously. Where the strip of metal is of a great length, as is generally the case, it is fed from a reel or coil. After passing by the feed-rolls the strip is wound on a second reel.

The advantage obtained by our improved form of construction is that the entire top surface of the strip is exposed to view and to the ready manipulation of the operator, because all the large and cumbrous head-piece required in the vertically-moving punch over the wire is dispensed with.

A second advantage of our improved form is that the piece of metal or other material removed from the strip is thrown out at once by the centrifugal velocity of the revolving cutter, whereas in the old form of punch described the piece removed by the punch was apt to follow up on the return-stroke of the latter, thereby clogging up and retarding the proper operation of the machine. Further, in our form of construction, there being no ponderous cutter-head to be rapidly vibrated, we are enabled to drive the cutter at a much more rapid rate of speed than is common with this class of machinery, thereby enabling us to produce at a less cost.

What we claim as our invention is as follows:

1. In a machine for cutting strips of metal or other material, a notched circular cutter adapted to work with an eccentric revolving motion into a stationary die, for the purpose described.

2. In a machine for cutting strips of metal or other material, a circular cutter fitted on a revolving eccentric-head, in combination with a fixed stationary die, substantially as and for the purpose described.

3. In a machine for cutting strips of metal or other material, the circular cutter A, fitted on a revolving eccentric-head, in combination with the circular stationary die B, substantially as and for the purpose described.

4. In a machine for cutting strips of metal or other material, the combination of the circular cutter A, mounted on the eccentric-head of the mandrel C, the standards D D', to support said mandrel, the pulley E on said mandrel, the circular die B, and the mandrel G and standard H, supporting said die, substantially as shown and described.

5. In a machine for cutting strips of metal or other material, the combination of a mandrel, C, having an eccentric-head, with a circular cutter, A, mounted on said head and adapted to work into a stationary die, B, said mandrel C being placed at an angle with the line of feed of the machine, substantially as shown and described.

6. In a machine for cutting strips of metal or other material, a circular cutter and a stationary die, in combination with feeding apparatus constructed and adapted to give an intermittent longitudinal motion to said strip while being operated upon, substantially as shown and described.

7. In a machine for cutting strips of metal or other material, the combination, with a feed-roll mandrel, P, of friction-brake I and spring J, substantially as shown and described.

8. In a machine for cutting strips of metal or other material, the combination of the cutter A, die B, mandrels C and G, standards D, D', and H, pulley E, eccentric L, pitman M, ratchet N, train of gears *o' o' o'*, mandrels P P, feed-rolls K K, friction-brake I, and spring J, substantially as shown and described.

In testimony that we claim the foregoing invention we have hereunto set our hands this 20th day of November, 1886.

JOSIAH K. PROCTOR.
J. HENRY KNOWLES.

Witnesses:
HARRY CUMMINGS,
WM. F. BOYD.