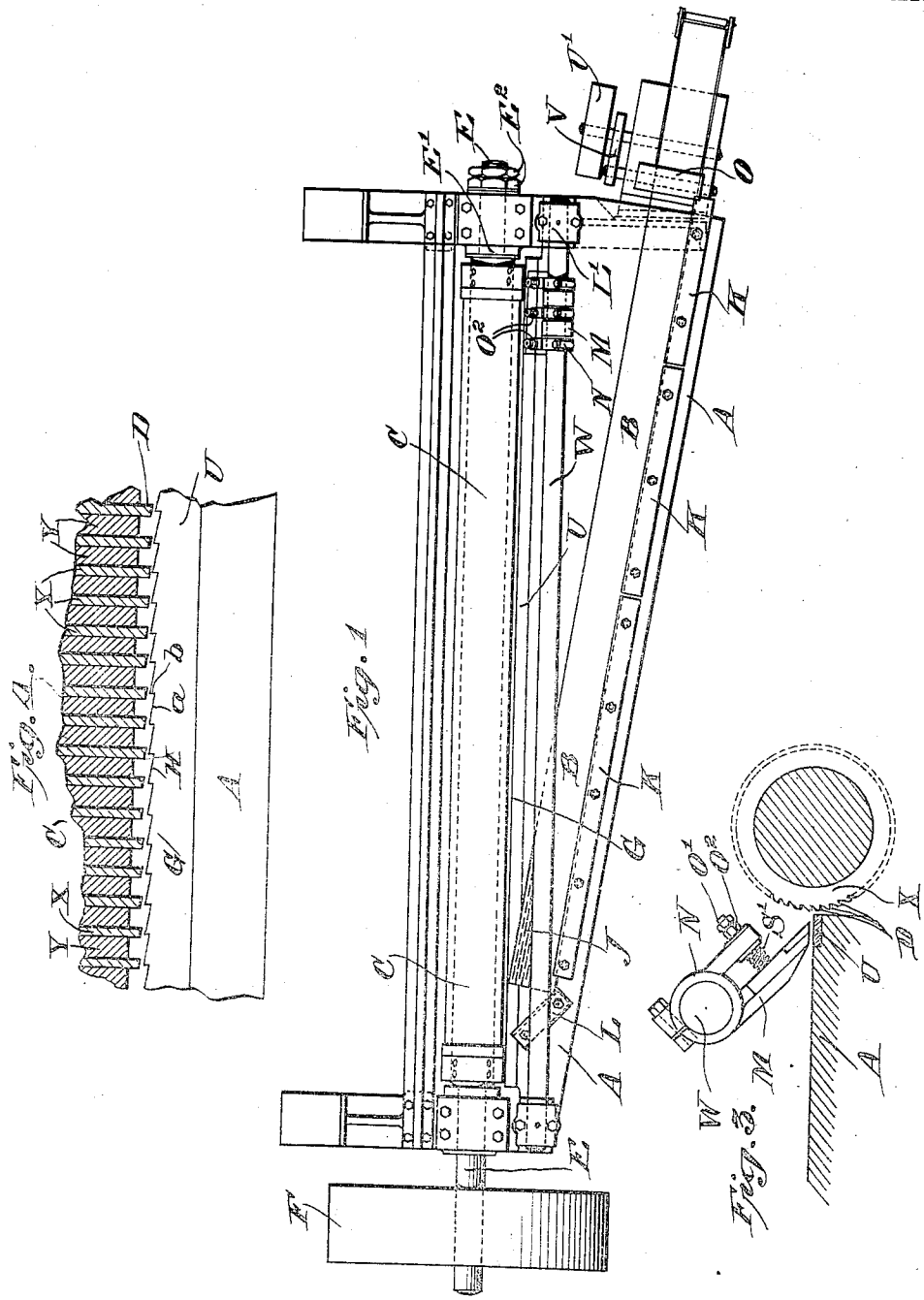
No. 843,728. PATENTED FEB. 12, 1907.

H. E. WHITE.

MACHINE FOR EXPANDING METAL.

APPLICATION FILED JULY 19, 1905.

6 SHEETS—SHEET 1.



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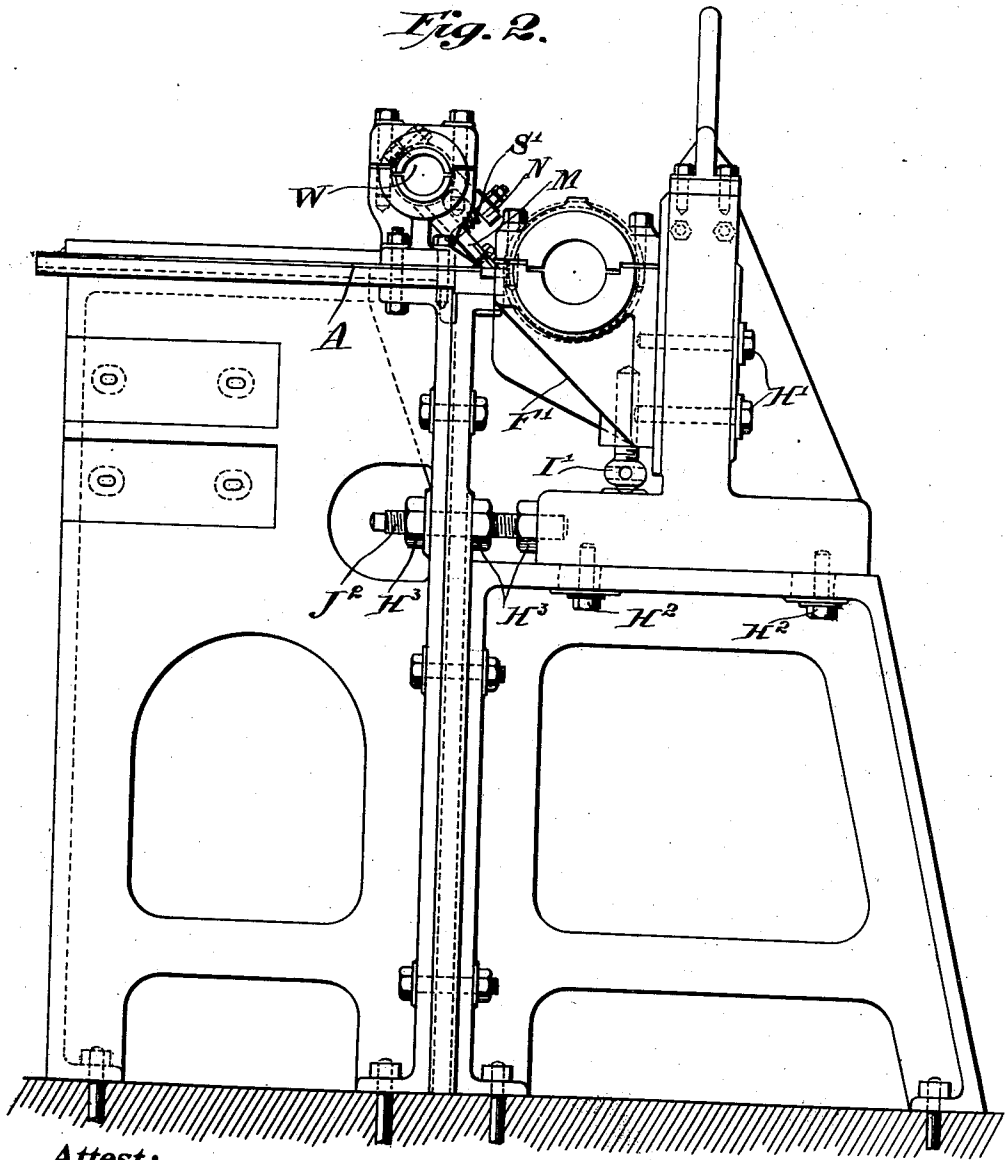
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6 SHEETS—SHEET 2.

Fig. 2.



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6 SHEETS—SHEET 3.

Fig. 1.

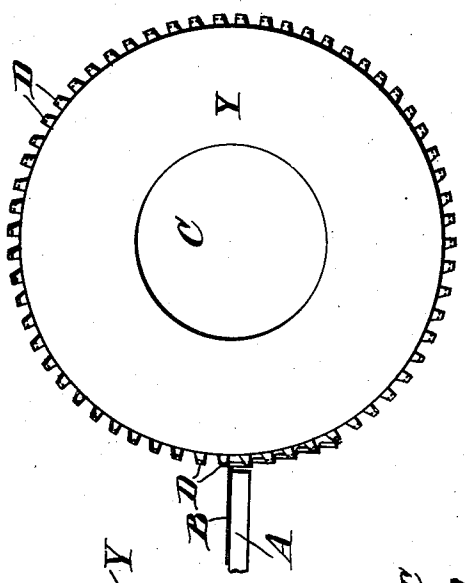
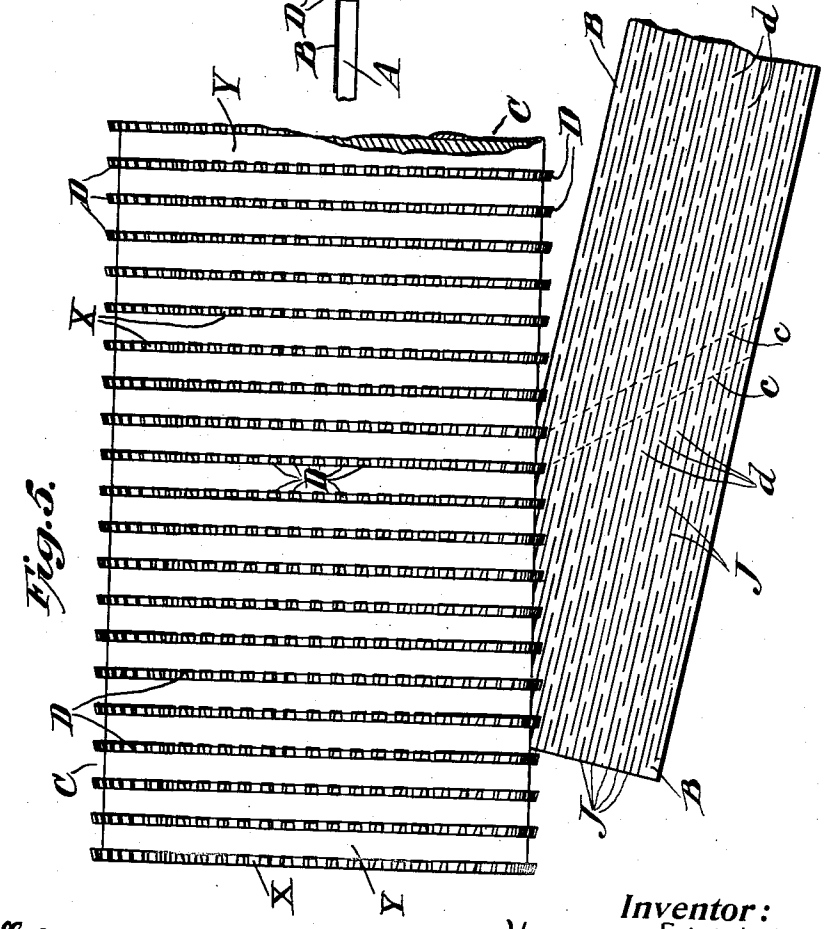


Fig. 3.



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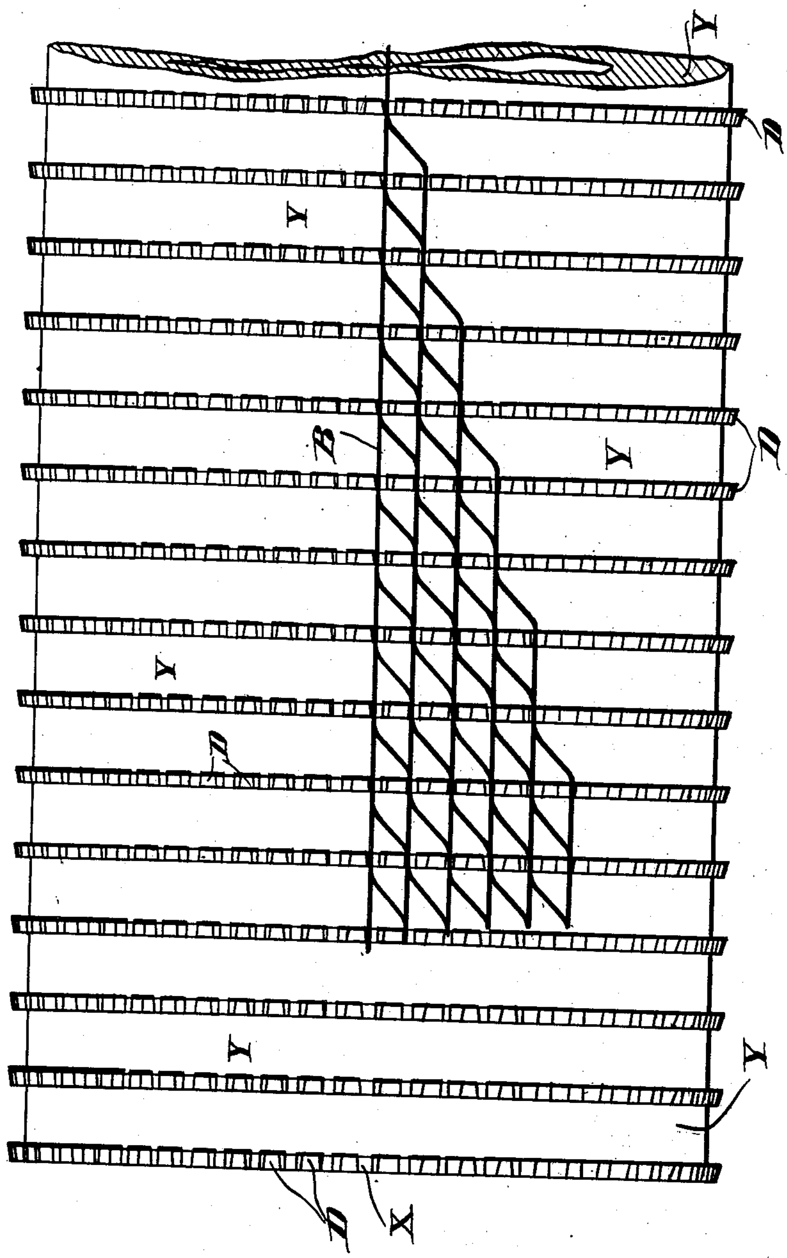
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6 SHEETS—SHEET 4.

Fig. 6.



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6 SHEETS—SHEET 5.

Fig. 8

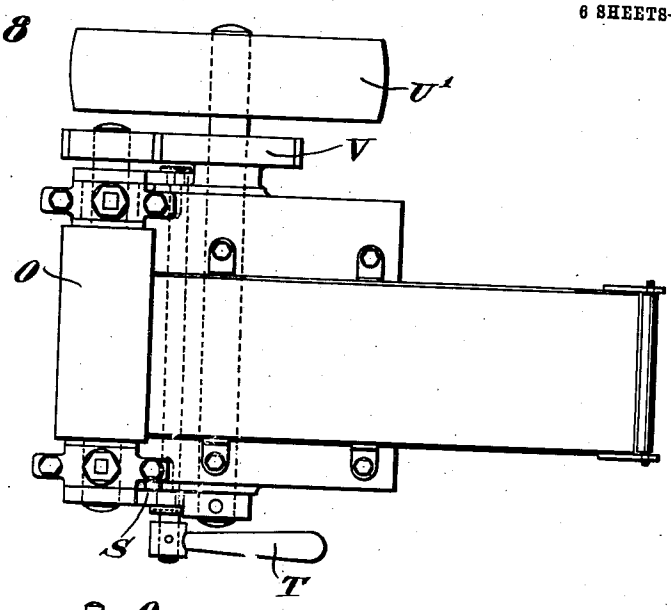


Fig. 9.

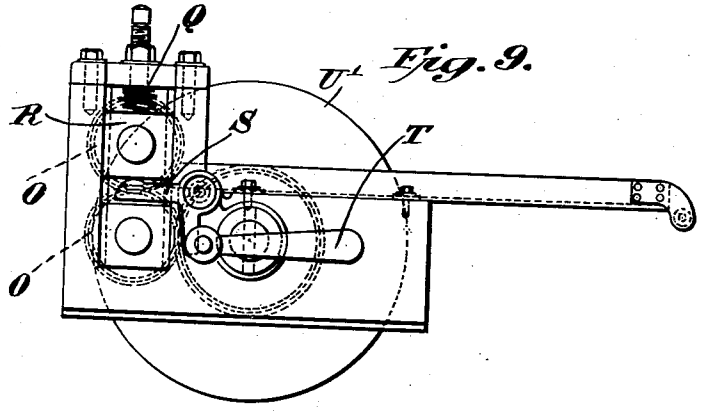
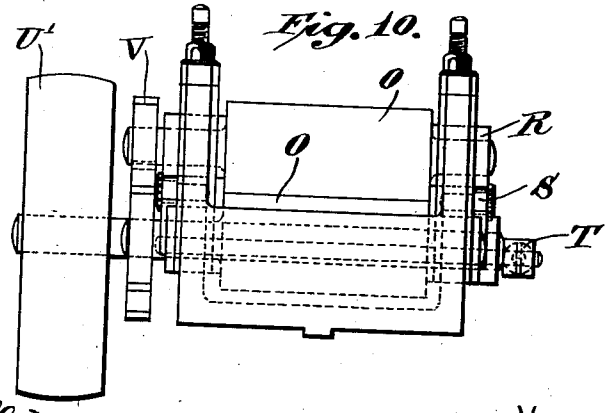


Fig. 10.



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APPLICATION FILED JULY 19, 1905.

6 SHEETS—SHEET 6.

Fig. 11.

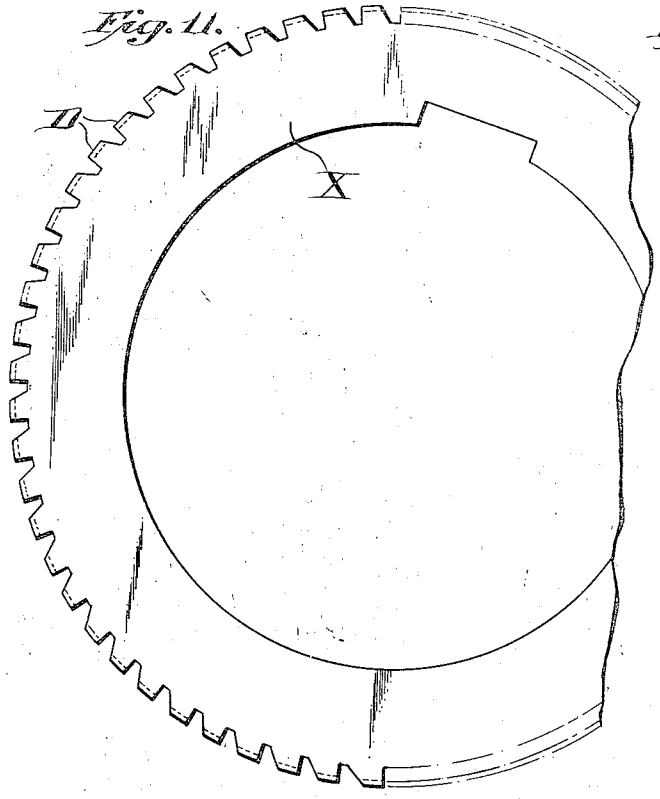


Fig. 12.

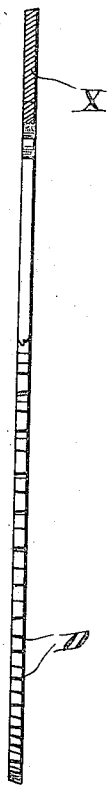
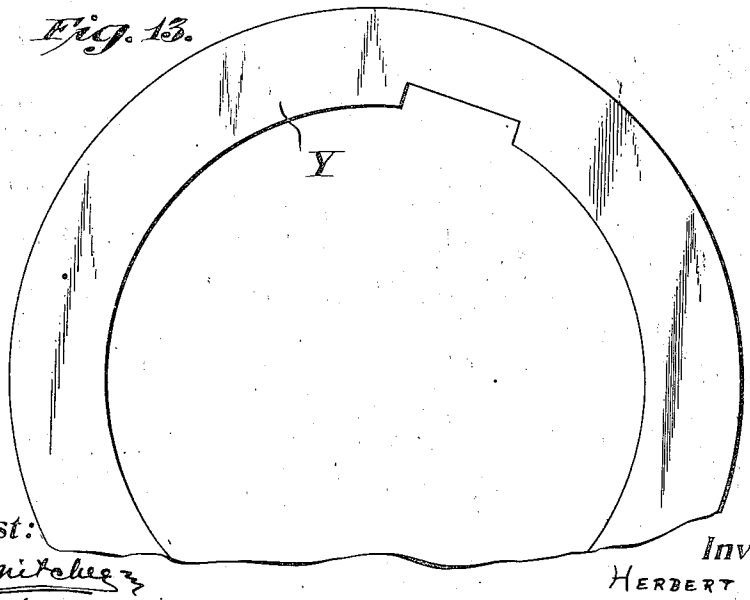


Fig. 13.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR EXPANDING METAL.

No. 843,728. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed July 19, 1905. Serial No. 270,327.

To all whom it may concern:

Be it known that I, HERBERT E. WHITE, a citizen of the United States, and resident of Youngstown, Ohio, have invented certain new and useful Improvements in Machines for Expanding Metal, of which the following is a specification accompanied by drawings.

This invention relates to machines for expanding metal; and its objects are to improve upon the construction of such machines and increase their efficiency, with simplicity of parts and reduction of cost.

Further objects of the invention will hereinafter appear; and to these ends the invention consists of a machine for carrying out the above objects embodying the features of construction, combination of elements, and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification, and shown in the accompanying drawings, in which—

Figure 1 is a top plan view of the machine with a portion of the holddown-guides for the sheet omitted for clearness. Fig. 2 is an end elevation of the machine. Fig. 3 is a detail transverse sectional view through the table, holddown-guides, and drum. Fig. 4 is a horizontal detail enlarged view, partly in section, taken through the drum, showing the construction of the edge of the table and the teeth of the drum. Fig. 5 is an enlarged detail plan view of a portion of the drum and a portion of the sheet of the metal as it is presented to the drum. Fig. 6 is a side elevation of Fig. 5. Fig. 7 is an end view of Fig. 5. Fig. 8 is a top plan view, in enlarged detail, of the feeding-rolls. Fig. 9 is an end elevation of Fig. 8. Fig. 10 is a side elevation of Fig. 8. Fig. 11 is an enlarged detail face view of one of the disks of the drum provided with teeth. Fig. 12 is an edge view of the disk shown in Fig. 11. Fig. 13 is a face view of one of the separators or spacing-disks of the drum.

According to this invention a suitable support or table is provided for the slitted sheet of metal, and operative means are provided constructed to engage the portions of the sheet adapted to form the strands of the mesh of the expanded sheet and bend said strands over the edge of the table out of the plane of the sheet. In this instance the operative expanding means shown are of rotary form and preferably consist of a toothed drum adapted to revolve upon an axis extending longitudinally of the table and sheet of metal. As shown, the axis of the revolving drum extends substantially parallel to the working edge of the table over which the sheet is expanded, and the teeth of the drum are adapted to engage the uncut portions of the sheet between the slits and bend the strands of metal over the edge of the table, thereby opening the metal into mesh-like or expanded form.

Referring to the drawings, which illustrate one suitable form of apparatus for carrying out the invention, A represents a suitable table or support for the slitted sheet of metal B, and C is a toothed drum having teeth D and arranged to revolve upon the longitudinal shaft E, provided with a driving-pulley F, and suitably supported in bearings in such manner that the teeth D revolve opposite the working edge G of the table, which in this instance is preferably toothed or corrugated, as shown in an enlarged detail in Fig. 4, the depth of the corrugations H being substantially equal to the width of a strand of the completed mesh. As shown, the longer portion *a* of each corrugation extends at an acute angle to the longitudinal edge of the table, while the shorter portion *b* of each corrugation extends at substantially right angles to the longer portion *a*. The strands of the slitted sheet metal are bent over the shorter side *b* of the corrugations. The corrugations are formed in a steel edge U, which is suitably secured to the table.

The sheet B to be expanded is first slit in any suitable manner so that it will coöperate with the drum. Preferably the lines of slits J of the sheet, as shown in detail in Fig. 5, are staggered on diagonal lines—that is to say, the uncut portions of the sheet between the ends of each pair of slits in one line do not fall directly opposite the center of the slits at each side, so that the uncut portions between the ends of the slits form substantially diagonal lines across the sheet, as indicated by the dotted lines *c*. This construction is found preferable in working the sheet in a machine of the character of the present one, because a symmetrical lozenge-shaped mesh

is formed in the completed article, as clearly illustrated in Fig. 6 in enlarged detail. In presenting the slitted sheet to the drum the sheet is fed forward at such an angle that a corner of the sheet will first be presented to the action of the teeth on the drum. The angle at which the sheet is fed forward, as illustrated in Figs. 1 and 5, is determined by the amount of staggering or offset of the cuts in the slitted sheet. After the corner of the sheet has been presented to the teeth on the drum the sheet is continuously moved forward by the action of the teeth, and the sheet moves along the table A and is guided by the guides K, which are preferably formed in sections. The end of the sheet abuts against another guide L. According to this arrangement the uncut portions *d* of the sheet between the ends of slits on the lines *c c* move toward the teeth of the drum in the direction of said dotted lines *c c*. The teeth of the drum as the drum revolves engage the uncut spaces or portions *d* and drag or bend the metal over the edge of the table, as shown in Fig. 7, thereby expanding the strands into the form of mesh shown in Fig. 6. As the metal is bent over the edge of the table by the teeth which are just coming into action the teeth which have advanced beneath the top of the table are gradually leaving engagement with the sheet, as shown in Fig. 7, and the action of all the teeth which are in engagement with the metal at each instant is not only to expand the sheet, but to pull the whole sheet forward, so that no automatic means for feeding the sheet are necessary. It is only necessary to feed the corner of the sheet up to the toothed drum, and after the drum has taken hold of the sheet automatic feeding takes place thereafter.

As shown, the feeding-rolls O are arranged at the head end of the table A in suitable bearings in the housing. Preferably a spring Q forces the feeding-rolls together, and suitable means are provided for separating them after the sheet has reached the drum. In this instance the spring-pressed bearing R of the upper roll O may be raised by means of the bell-crank lever S and hand-operated lever T. Suitable means are provided for driving the rolls, as the driving-pulley U′ V′ and the belting V.

Suitable means are provided for preventing the sheet from tilting up when engaged by the toothed drum. In this instance hold-down-guides are provided, carried upon the longitudinal rod or frame W, arranged above the table and in such position that the guides are adapted to bear upon the outer edge of the sheet. Preferably each guide consists of the two parts M and N, connected by the studs C and nuts O^2 and separated by the springs S′. The parts N are rigidly clamped to the shaft W, which in turn is clamped in the pedestal L′. The parts M are free to turn on the shaft W in so far as they are allowed to do so by the restrictive action of the springs S′. Normally the edges of the part M will be slightly above the table and the pressure on the sheet may be regulated by the adjustment of the nuts O′ O^2 on the studs. Although only one section of the holddown-guides is shown in Fig. 1, it is to be understood that these guides extend the whole length of the shaft W, and they are made in sections to permit of variation in pressure on the sheet at different parts of its length, it being found that very slight pressure is desirable at the entering and emerging corners of the sheet, while suitable pressure is required in the center to prevent the sheet from being drawn in too rapidly.

To prevent endwise movement of the drum, the shaft E of the drum is preferably constructed with a shoulder E′ just inside of the right-hand bearing as Fig. 1 is viewed, and nuts E^2 on the outside hold the shaft closed up to its bearing, so that it cannot travel endwise.

For convenience in manufacturing the drum is preferably built in sections, made up of the toothed disks X and the separators or spacing-disks Y. In order to obtain a firmer hold on the slitted sheet, it is desirable to bevel the face of the teeth D of the drum at an angle, as illustrated more particularly in Fig. 4, which angle should correspond substantially to the angle at which the sheet is presented to the drum. The feeding-rolls and guides are so set that the corner of the sheet to reach the drum first will present an uncut spot or portion under a tooth of the drum.

In order to provide for expanding sheets of different gages, means are provided for varying the clearance between the teeth of the drum and the table edge and for also varying the relative height of the drum and table, in this instance provision being afforded for varying the height of the drum. In order to adjust the drum vertically, the cap-screws H′ are loosened and the screw I′ is turned in the proper direction to raise or lower the support or frame F′, which carries the end bearing of the drum-shaft. Substantially this same construction is provided at each end of the shaft. The screws H′ are thus again tightened, thereby securing the bearing-frame in the desired position. Obviously any change in the height of the drum will vary the clearance between the drum-teeth and the table edge. In order to adjust the clearance, the screws H^2 are loosened and the nuts H^3 on the screw J^2 are turned until the proper position is reached. The drum is then secured by tightening the screws H^2.

According to the construction of this machine it is not necessary to wait until one sheet is entirely out of the machine before another can be inserted. Since the sheet travels in the direction of the guides K, it

will be seen that as soon as it is moved a sufficient distance beyond its original position another sheet may be fed in.

Obviously some features of this invention may be used without others, and the invention may be embodied in widely-varying forms.

Therefore, without limiting the invention to the devices shown and described and without enumerating equivalents, I claim, and desire to obtain by Letters Patent, the following:

1. In a machine for expanding slitted sheet metal, the combination of a suitable table for supporting the slitted sheet of metal in substantially one plane, and rotary means constructed to engage the portions of the sheet adapted to form the strands of the mesh and bend and open said strands without stretching over the edge of the table out of the plane of the sheet, the axis of said rotary means extending longitudinally of the table.

2. In a machine for expanding slitted sheet metal, the combination of a suitable table for supporting the slitted sheet of metal in substantially one plane, and rotary means operating continuously in one direction constructed to engage the portions of the sheet adapted to form the strands of the mesh and bend and open said strands over the edge of the table out of the plane of the sheet, the axis of said rotary means extending longitudinally of the table.

3. In a machine for expanding slitted sheet metal, the combination of a suitable table or support for the slitted sheet of metal, and a toothed drum for bending the strands over the edge of the table whereby the sheet is at the same time drawn toward the drum.

4. In a machine for expanding slitted sheet metal, the combination of a suitable table or support for the slitted sheet of metal, and rotary means for bending and opening the slitted strands without substantially stretching over the edge of the table to expand the sheet into mesh-like form, the axis of said rotary means extending longitudinally of the table.

5. In a machine for expanding slitted sheet metal, the combination of a suitable table or support for the slitted sheet of metal, and rotary means continuously operating in the same direction for bending and opening the slitted strands over the edge of the table to expand the sheet, the axis of said rotary means extending longitudinally of the table.

6. In a machine for expanding slitted sheet metal, the combination of a suitable table or support for the slitted sheet of metal, and a toothed drum revolving continuously in the same direction on an axis substantially parallel to the edge of the table for bending the strands over the table to expand the sheet.

7. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal and a toothed drum for expanding the sheet, said drum revolving upon an axis extending longitudinally of the support, whereby the slitted edge of the sheet is continually presented to the action of the teeth on the drum.

8. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal and a revolving toothed drum operating continuously in the same direction adapted to coact with the slitted edge of the sheet and bend and open the same, said drum extending longitudinally of the support.

9. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal and a toothed drum adapted to revolve on an axis substantially parallel to the working edge of said support, and means for presenting the slitted sheet of metal to the action of the drum at an angle to the working edge of the support.

10. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal and a toothed drum adapted to revolve continuously in the same direction on an axis substantially parallel to the working edge of the support.

11. In a machine for expanding slitted sheet metal, the combination of a suitable table for supporting the slitted sheet of metal in substantially one plane and operative means extending longitudinally of the table constructed to engage the uncut portions of the sheet between the slits and bend and open the strands without stretching out of the plane of the sheet to form the mesh.

12. In a machine for expanding slitted sheet metal, the combination of a suitable table for supporting the slitted sheet of metal in substantially one plane, and rotary means operating continuously in one direction and extending longitudinally of the table for engaging the uncut portions of the sheet between the slits and thereby bending and opening the strands to form the mesh, out of the plane of the sheet.

13. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a toothed drum adapted to coact with the sheet to expand the same, and means for first presenting the corner of the sheet to the action of the toothed drum.

14. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a toothed drum adapted to coact with the sheet to expand the same, and means for presenting the sheet to the drum at an angle so that the corner of the sheet will first be acted upon by the teeth of the drum.

15. In a machine for expanding slitted sheet metal, the combination of a suitable

support for the slitted sheet of metal, and a revolving toothed drum operating continuously in one direction adapted to coact with the slitted sheet to bend and open the strands, the edge of the support or table adjacent the drum being provided with teeth of a depth substantially equal to the width of the strands to be formed in the completed mesh.

16. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a toothed drum revolving continuously in one direction on an axis substantially parallel to the working edge of the table or support for expanding the sheet and means for preventing the sheet from tilting up from the support when engaged by the drum.

17. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a toothed drum revolving on an axis substantially parallel to the working edge of the table or support for expanding the sheet and yielding means for preventing the sheet from tilting up from the support when engaged by the drum.

18. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a toothed drum revolving on an axis substantially parallel to the working edge of the table or support for expanding the sheet and adjustable yielding means in the form of hold-down-guides for preventing the sheet from tilting up from the support when engaged by the drum.

19. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a revolving toothed drum for expanding the sheet, revolving on an axis extending longitudinally of the support, and means for feeding the sheet up to the drum.

20. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a revolving toothed drum for expanding the sheet, revolving on an axis extending longitudinally of the support, means for feeding the sheet up to the drum, and means for releasing the hold of the feeding means on the sheet when the drum engages the sheet.

21. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a revolving toothed drum for expanding the sheet, revolving on an axis extending longitudinally of the support, and feed-rolls for feeding the sheet up to the drum.

22. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal, a revolving toothed drum for expanding the sheet, revolving on an axis extending longitudinally of the support, feed-rolls for feeding the sheet up to the drum, and means for releasing the hold of the feed-rolls on the sheet when the drum engages the sheet.

23. In a machine for expanding slitted sheet metal, the combination of a suitable support for the slitted sheet of metal and a toothed drum revolving on an axis substantially parallel to the working edge of the support or table for expanding the sheet, and means for presenting the sheet to the toothed disk at an angle so that the corner of the sheet is first acted upon, the face of the teeth on the disk being beveled at an angle substantially equal to the angle at which the sheet is presented to the drum.

24. In a machine for expanding slitted sheet metal, the combination of a suitable table for the slitted sheet of metal, a toothed drum arranged longitudinally of the table for expanding the sheet and means for first presenting an uncut portion of a corner of the sheet to the action of the drum.

25. In a machine for expanding slitted sheet metal, the combination of a suitable table for the slitted sheet of metal, a revolving toothed drum arranged longitudinally of the table opposite the working edge thereof, and means for varying the clearance between the working edge of the table and the teeth of the drum.

26. In a machine for expanding slitted sheet metal, the combination of a suitable table for the slitted sheet of metal, a revolving toothed drum arranged longitudinally of the table opposite the working edge thereof, and means for varying the height of the drum relatively to the table.

27. In a machine for expanding slitted sheet metal, the combination of a suitable table for the slitted sheet of metal, a revolving toothed drum arranged longitudinally of the table opposite the working edge thereof, and means for varying the relative height of the drum and table.

28. In a machine for expanding slitted sheet metal, the combination of a suitable table for the slitted sheet of metal, a revolving toothed drum arranged longitudinally of the table opposite the working edge thereof for expanding the sheet, means for varying the clearance between the working edge of the table and the teeth of the drum, and means for varying the height of the drum relatively to the table.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HERBERT E. WHITE.

Witnesses:
H. T. SMITH,
O. D. KAISER.