

No. 670.606.

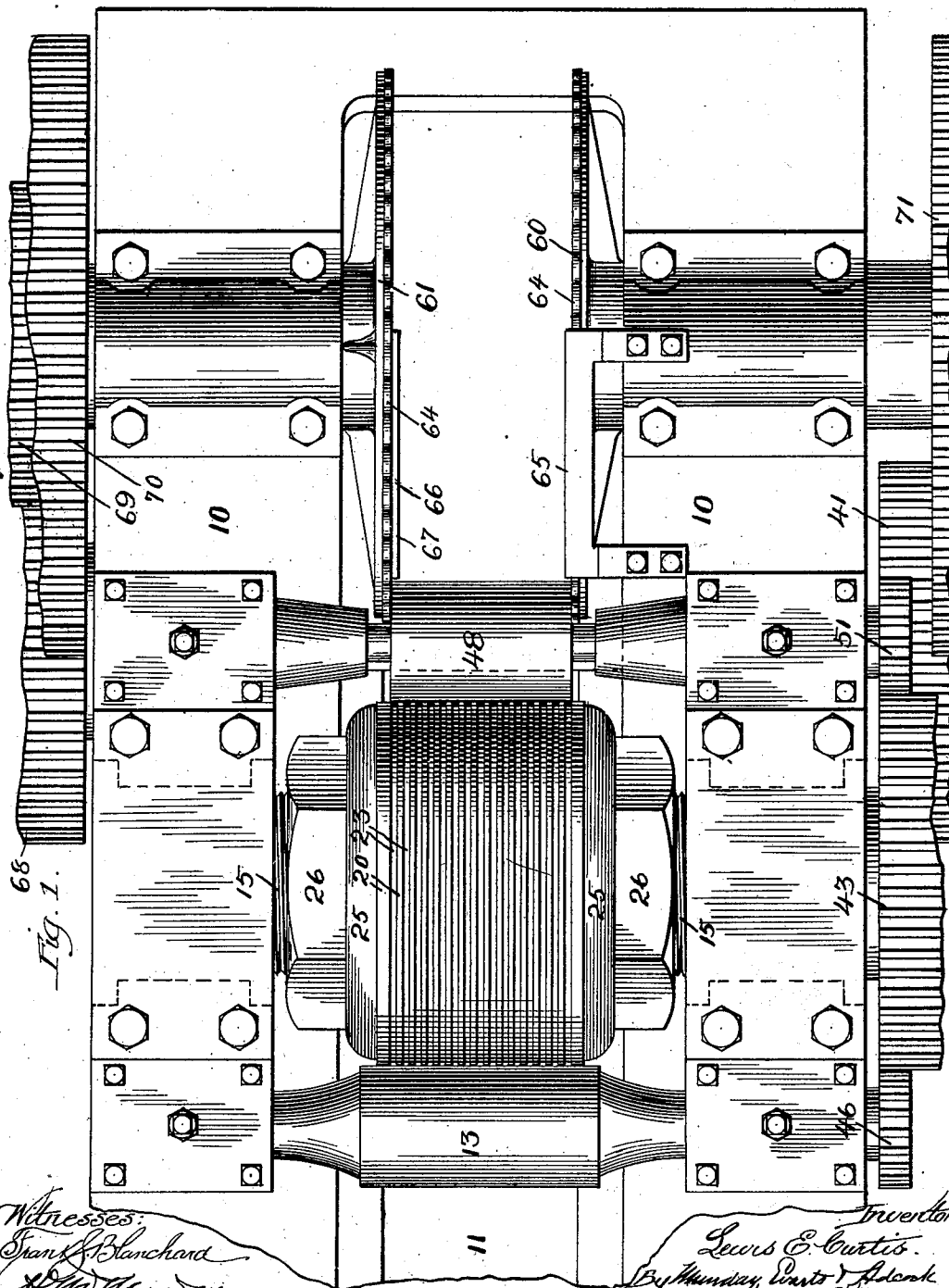
Patented Mar. 26, 1901.

L. E. CURTIS.
MACHINE FOR EXPANDING METAL.

(No Model.)

(Application filed Oct. 13, 1900.)

7 Sheets—Sheet 1.



No. 670,606.

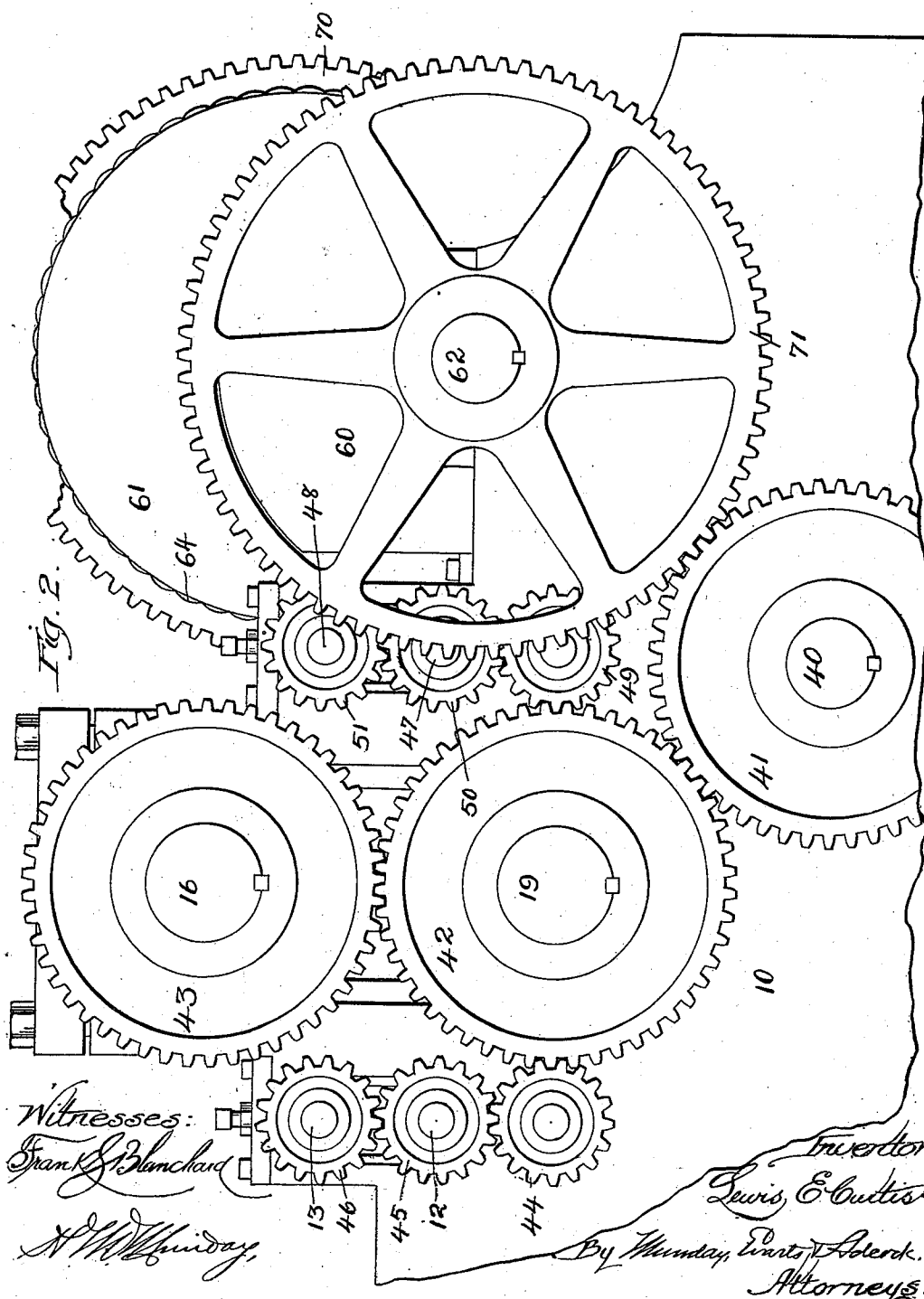
Patented Mar. 26, 1901.

L. E. CURTIS.
MACHINE FOR EXPANDING METAL.

(No Model.)

(Application filed Oct. 13, 1900.)

7 Sheets—Sheet 2.



No. 670.606.

Patented Mar. 26, 1901.

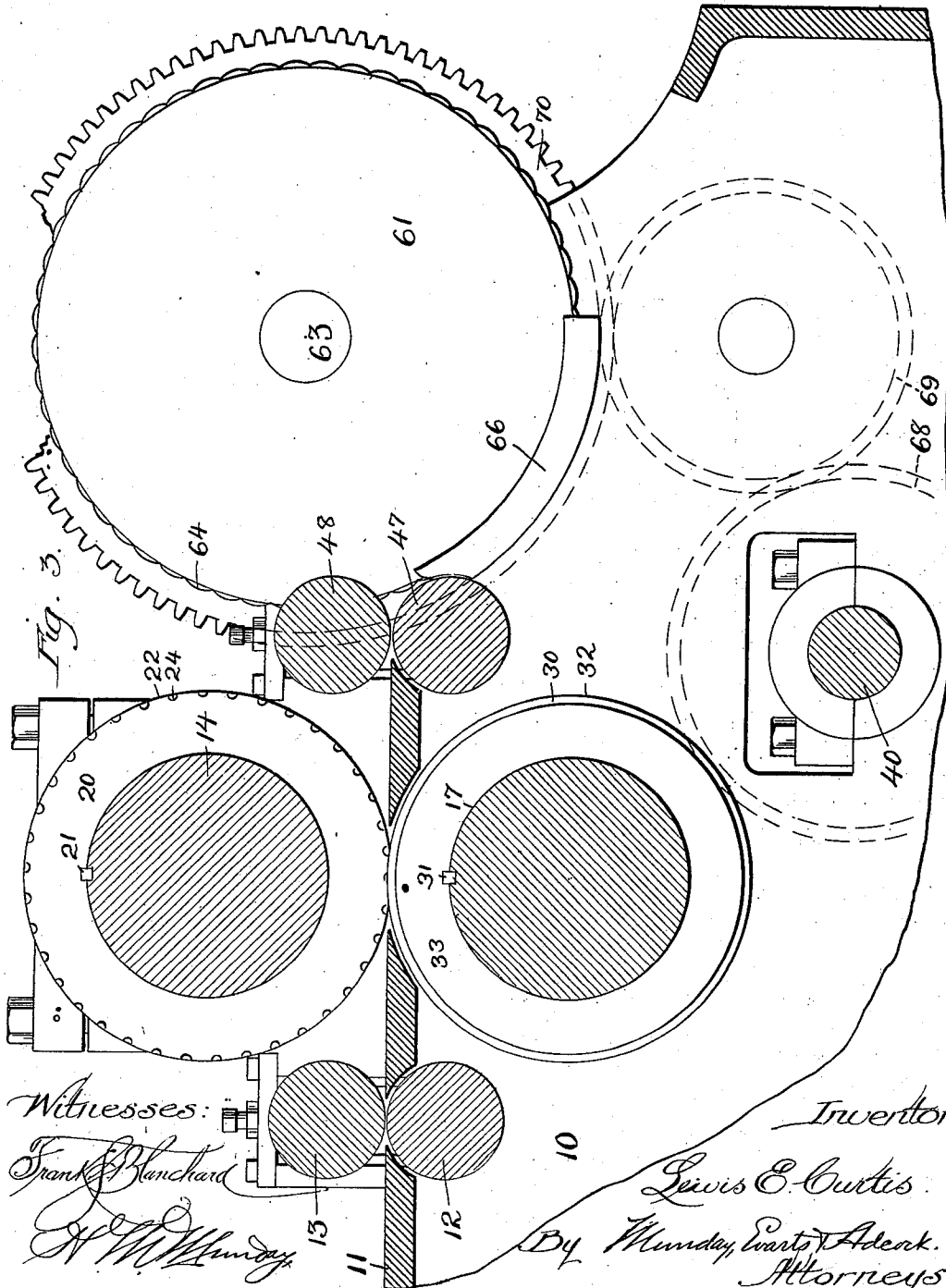
L. E. CURTIS.

MACHINE FOR EXPANDING METAL.

(Application filed Oct. 13, 1900.)

(No Model.)

7 Sheets—Sheet 3.



No. 670,606.

Patented Mar. 26, 1901.

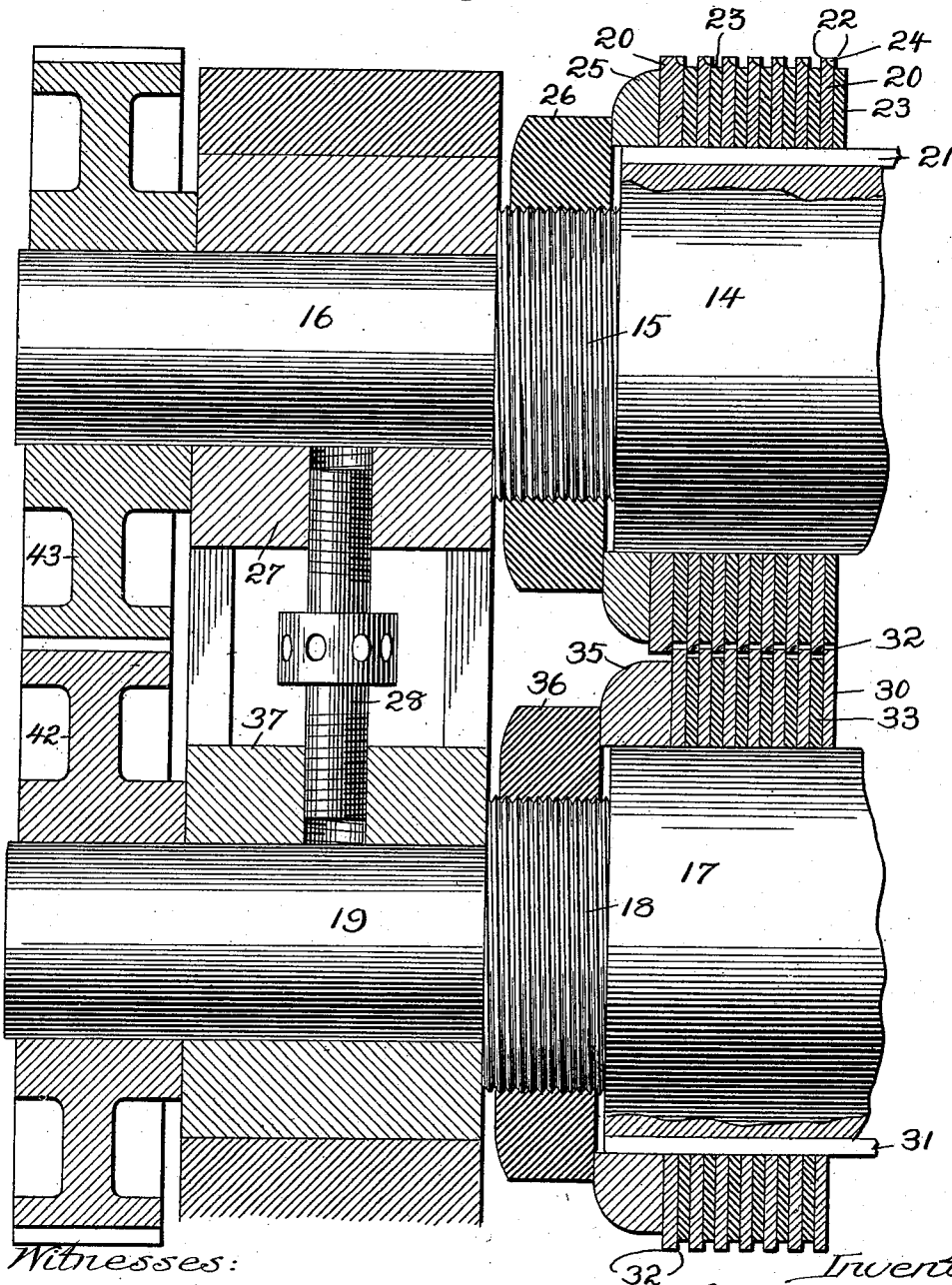
L. E. CURTIS.
MACHINE FOR EXPANDING METAL.

(No Model.)

(Application filed Oct. 13, 1900.)

7 Sheets—Sheet 4.

Fig. 4.



Witnesses:

Frank S. Blanchard
A. W. Munday

(32)

Inventor:

Lewis E. Curtis
By Munday, Curtis & Aldrich.
Attorneys.

No. 670,606.

Patented Mar. 26, 1901.

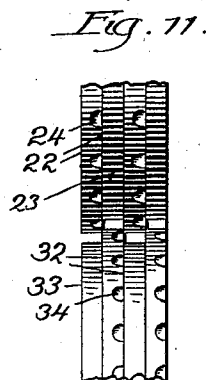
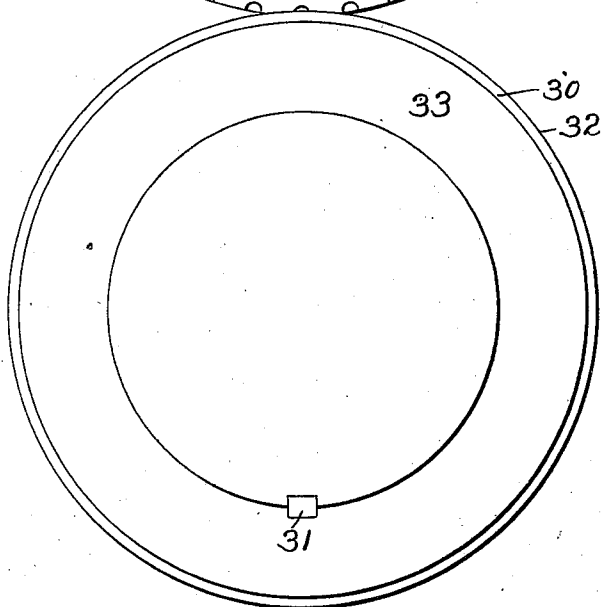
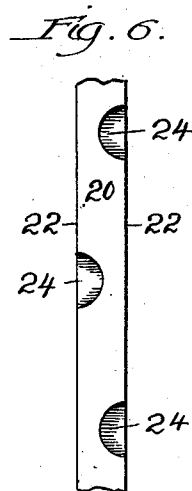
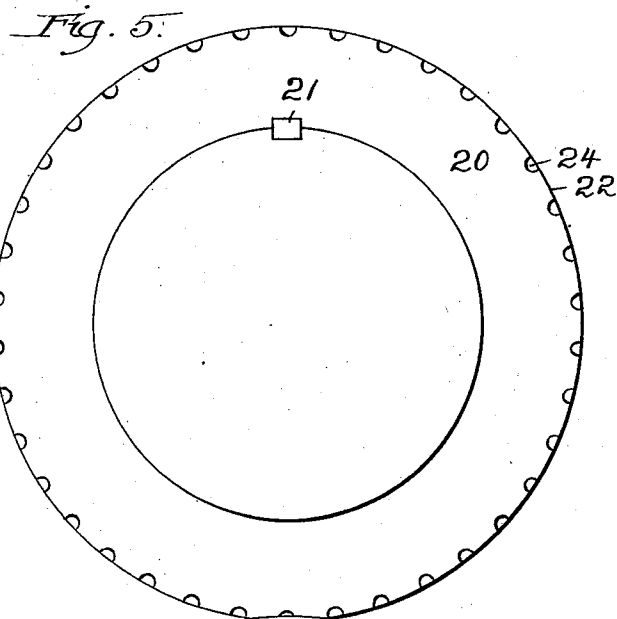
L. E. CURTIS.

MACHINE FOR EXPANDING METAL.

(No Model.)

(Application filed Oct. 13, 1900.)

7 Sheets—Sheet 5.



Witnesses

Frank J. Blanchard
A. W. Munday.

Inventor:

Lewis E. Curtis.
By Munday, Curtis & Adeock.
Attorneys.

No. 670,606.

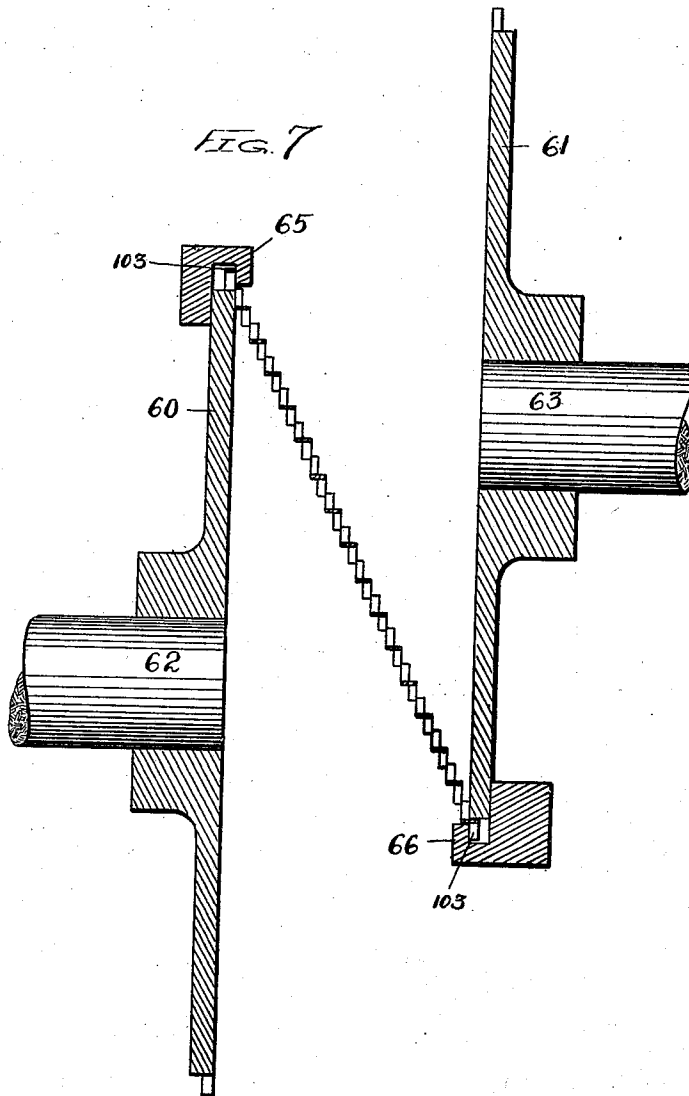
Patented Mar. 26, 1901.

L. E. CURTIS.
MACHINE FOR EXPANDING METAL.

(No Model.)

(Application filed Oct. 13, 1900.)

7 Sheets—Sheet 6.



WITNESSES:

J. W. Munday.
J. S. Martin

Lewis E. Curtis

INVENTOR:

By *Munday, Davis & Adcock.*

HIS ATTORNEYS

No. 670,606.

Patented Mar. 26, 1901.

L. E. CURTIS.
MACHINE FOR EXPANDING METAL.

(No Model.)

(Application filed Oct. 13, 1900.)

7 Sheets—Sheet 7.

Fig. 9.

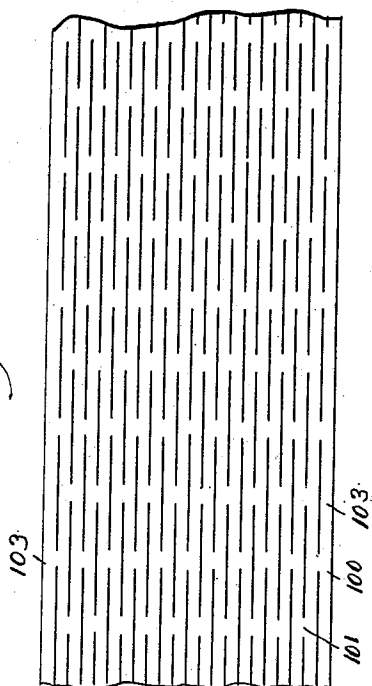


Fig. 10.

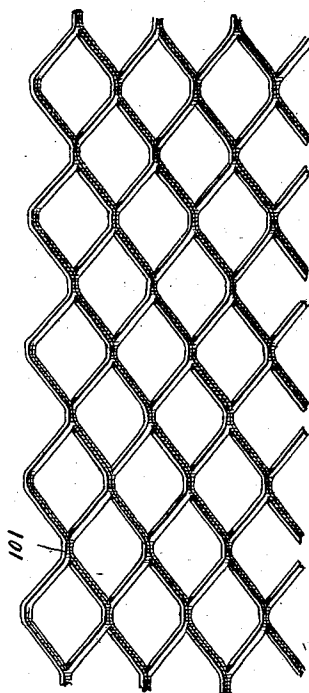
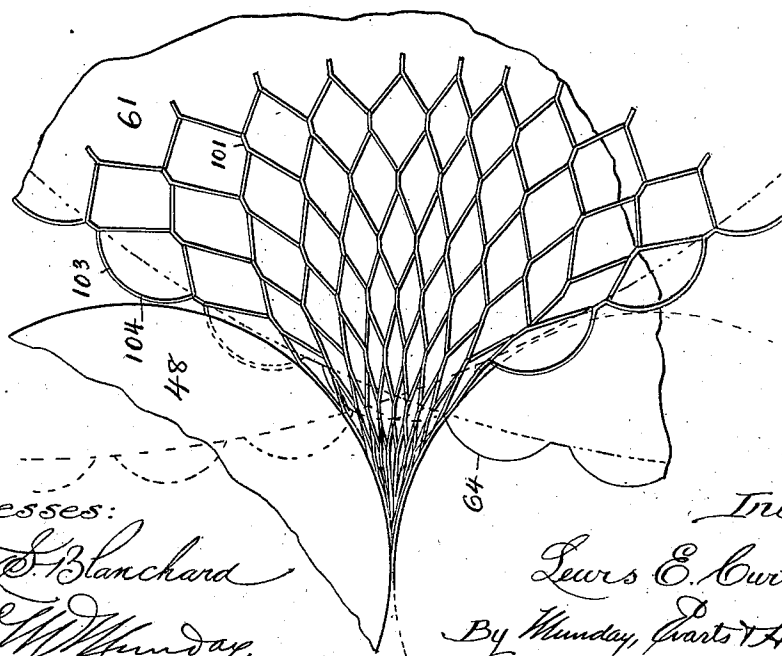


Fig. 8.



Witnesses:

Frank S. Blanchard
A. W. Munday.

Inventor

Lewis E. Curtis
By Munday, Curtis & Adcock,
Attorneys.

UNITED STATES PATENT OFFICE.

LEWIS E. CURTIS, OF CHICAGO, ILLINOIS, ASSIGNOR TO OSCAR BRADFORD,
OF SAME PLACE, AND WILLIAM L. CALDWELL, OF NEW YORK, N. Y.

MACHINE FOR EXPANDING METAL.

SPECIFICATION forming part of Letters Patent No. 670,606, dated March 26, 1901.

Application filed October 13, 1900. Serial No. 32,905. (No model.)

To all whom it may concern:

Be it known that I, LEWIS E. CURTIS, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Expanding Metal, of which the following is a specification.

This invention relates to improvements in machines for expanding slitted sheet metal.

My endeavor in the invention has been to devise a practical construction of machine in which the opening of the sheet may be done at right angles approximately to the plane of the sheet—that is to say, instead of pulling out the sheet in directions coincident with the plane of the sheet I deflect its edges at angles to its plane, thereby offsetting the metal in the direction of its thickness and causing the opening of the meshes. It has also been my endeavor to produce a rapidly-working machine adapted to receive the sheets from slitting-rolls and to open them in one continuous operation as rapidly as they are slit.

The invention consists in the combination, with means for feeding the slitted sheet, of means for deflecting and carrying the edge of the sheet from its plane while the other edge is suitably held, and thus to open the slits and form meshes.

In my improved expander I prefer to employ two oppositely-revolving disks arranged at opposite sides of the path of the sheet, so as to engage its edges and carry the edges in opposite directions away from the plane of the sheet. These disks are also preferably supported at different levels in order that the initial end of the sheet may approach them tangentially, and thus avoid a too-abrupt change in direction at the commencement of the operation.

The nature of my invention is more fully disclosed below and also in the accompanying drawings, in which—

Figure 1 is a plan of a machine for manufacturing expanded metal embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a longitudinal vertical section. Fig. 4 is a partial section of the slitting-rolls. Fig. 5 is an end view of the slitting-rolls. Fig. 6 is an enlarged partial edge view of one of the cutting-rings. Fig. 7 is an enlarged vertical

section of the expanding-disks, showing also a section of a metal sheet being operated upon by the disks. Fig. 8 is a diagram view showing the manner of opening the metal. Fig. 9 shows a portion of a sheet of the metal before it is expanded, and Fig. 10 shows the same after being expanded. Fig. 11 is a partial edge view of a modified construction of the slitting-rolls.

In said drawings, 10 represents suitable side frames in which the moving parts are supported, and 11 is a table from which the metal sheets are supplied to the feed-rolls 12 and 13, by which they are fed to the slitting-rolls. These rolls are constructed as follows: The shaft of the upper roll has its main body or central portion 14 enlarged, so as to properly support and carry the cutting-rings, and at its ends it is threaded, as at 15, and further reduced, as at 16, to form end journals. The shaft of the lower roll is constructed in the same way, having its body enlarged, as at 17, and its end portions threaded at 18 and reduced at 19 to form the journals. The cutting-rings of the upper roll are shown at 20 and are mounted upon and keyed to the enlarged portion 14 of the shaft by key 21. They are flat rings with unbroken peripheries cut at right angles to the side faces, so that their peripheral corners 22 may act as cutters. They are spaced at even distances apart by spacing disks or rings 23, placed between each pair of adjacent cutters and agreeing in thickness with the thickness of the cutting-rings on the lower roll, the spacing-disks being of less diameter than the cutters, so that open annular spaces are formed between the cutters into which the cutters of the other roll may enter. In order that the cut of the rings may be interrupted at the points where the bonds 101, uniting the strands of the cut sheet 100, occur, I notch out the side faces of the rings 20 from the periphery inward, as shown at 24, and I prefer to form these notches upon both sides of all the rings, as shown at Fig. 6, arranging the notches in staggering fashion, so that those upon one side of each ring will be in planes between those upon the other side of the same ring. The notches extend only part way through the ring in the direction of its thickness, and consequently the periphery re-

mains continuous and uninterrupted, except that its cutting-corners are broken at intervals. The cutter-rings 30 of the lower roll are also made flat, with continuous or unbroken peripheries cut square with reference to the side faces, and they are mounted upon the enlarged portion 17 of the shaft and keyed thereto by key 31, and their corners 32 form the cutters proper. Like the rings of the upper roll, the rings 30 are also spaced apart by spacing-disks 33 of smaller diameter than rings 30 and agreeing in thickness with the thickness of the cutting-rings upon the upper roll, so that annular open spaces are formed between cutters 30, adapted to admit the edges of cutters 20. I do not notch the rings 30, as that is unnecessary if the rings 20 are notched upon both sides, as shown at Fig. 5; but instead of that construction the upper rings may be notched upon one side only, and the lower rings should in that case also be notched upon one side, as seen at 34 in Fig. 11. Either construction works well.

The cutters 20 and 30 and their spacing-disks are clamped together firmly upon the rolls by washers and nuts (shown at 25 and 26 in the case of the upper roll and at 35 and 36 in the case of the lower roll.) The cutters should lap by each other only enough to enable them to completely sever the metal.

The journals of the upper slitting-roll are supported in bearings 27, which are removably held in ways in the frames, and the journals of the lower roll revolve in bearings 37, also removably held in the same ways. The distance between the rolls is regulated by right and left handed screws 28, threaded into the bearings 27 and 37, as shown at Fig. 4. The rolls are driven from the power-shaft 40 by gears 41, 42, and 43, the two latter being on the journals of the rolls, and the feed-rolls 12 and 13 are driven from gear 42 by pinions 44, 45, and 46. After being slitted the sheet passes into the embrace of another pair of feed-rolls 47 and 48, driven from gear 42 by pinions 49, 50, and 51, and these feed-rolls deliver it to the mechanism now to be described, by which the slits will be opened and the sheet expanded. This mechanism in its preferred form consists of two large expanding-disks 60 and 61, mounted upon the ends of shafts 62 and 63, respectively. The shafts are by preference located at different heights, one with its center above the plane of the sheet and the other with its center below that plane, so that the sheet is caused to approach both disks in a plane located midway between the planes of the axes of the disks, and thus be easily deflected onto the peripheries of the disks. The disks are also arranged in planes coincident with those of the outer strands 103 of the sheet, so that such strands may be engaged and held by the disks during the expanding operation. The disks act to carry the edges of the sheet in opposite directions from the plane of the sheet. Thus disk 60, which rotates upward

from said plane, carries the edge engaged by it upward, and disk 61, which rotates downward, carries the opposite edge of the sheet downward from said plane.

The feed-rolls 47 48 are made of a length corresponding to the width of so much of the sheet as is embraced between the outer slits of the sheet, so that the disks are allowed to lap by the ends of the rolls, as seen at Figs. 1 and 3, and come against the margins of the sheet, and thus be enabled to depress the severed parts of the margins from the plane of the sheet through the medium of the series of rounded projections 64, with which the peripheries of the disks are provided. These projections are spaced to correspond with the length of the slits in the sheet, and they act to bend the outer strands into the form shown at 104, Fig. 8.

The margins of the sheet are engaged and deflected by the disks and caused to enter curved guards 65 and 66, one above disk 60 and the other below disk 61. These curved guards are of the form in cross-section particularly shown at Fig. 7, and they act to confine the margins of the sheet upon the disks until the margins have passed beyond the crowns of the disks. During the expanding the strain caused by the resistance of the sheet is in directions nearly parallel with the side faces of the disks, and consequently the margins are easily retained upon the disks, and these guards are intended to serve this purpose. They are L-shaped in cross-section and cover the rims of the disks, with flanges 67 on the inner sides extending toward the axes of the disks. The sheet is gradually expanded by the divergence in the paths through which its margins are carried by the disks and is fully expanded when the margins reach the upper and lower crowns, respectively, of the disks. It then leaves the guards and is free to be carried into suitable setting-rolls for setting the walls of the meshes or to be discharged.

The shafts of the expanding-disks are both driven from shaft 40, the shaft 63 by gears 68, 69, and 70 and shaft 62 by gears 41 and 71. They are independent of each other, and an open space is left between their adjacent ends and between the disks to give room to the sheet during the expanding operation. This will be fully apparent from Fig. 7, which shows the sheet at the moment it is fully expanded.

I have shown herein in detail the slitting mechanism; but it will be understood that such mechanism forms the subject-matter of another application filed herewith, and hence is not claimed herein, and while the construction shown of the expanding mechanism is the best construction now known to me it will be understood that I do not wish to be limited to that construction except where my claims require it, as I believe myself to be the first to devise any form of expanding mechanism acting independently of the slit-

ting mechanism to bend the metal away from the plane of the sheet.

I claim—

1. The combination with means for feeding the slitted sheet, of means for deflecting and carrying the edge of the sheet from its plane while the other edge is held, thus opening the slits and forming the meshes, substantially as specified.

2. The combination with means for feeding the slitted sheet, of means for deflecting and carrying both edges of the sheet from its plane, and thus opening the slits and forming the meshes of the expanded sheet, substantially as specified.

3. The combination with means for feeding the slitted sheet, of means for deflecting and carrying the edge of the sheet from its plane and means moving with the sheet serving to hold the other edge of the sheet, substantially as specified.

4. The combination with means for feeding the slitted sheet, of means for deflecting and carrying the edge of the sheet from its plane consisting of a revolving disk and means for holding the other edge of the sheet, substantially as specified.

5. The combination with means for feeding the slitted sheet, of means consisting of oppositely-moving expanding-disks for deflecting and carrying both edges of the sheet from its plane, and thus opening the slits and forming the meshes of the expanded sheet, substantially as specified.

6. The combination with means for feeding the slitted sheet, of means consisting of oppositely-moving expanding-disks for deflecting and carrying both edges of the sheet from its plane, and thus opening the slits and forming the meshes of the expanded sheet, said disks being supported at different levels, substantially as specified.

7. The combination with means for feeding the slitted sheets of the revolving expanding-disks provided with projections for bending the outer strands of the sheet, substantially as specified.

8. The combination with means for feeding

the slitted sheets, of the revolving expanding-disks and the guards covering the initially-acting portions of the disks, substantially as specified.

9. The combination with means for feeding the slitted sheets, of the revolving expanding-disks provided with projections for bending the outer strands of the sheet and the guards covering the initially-acting portions of the disks, substantially as specified.

10. The combination with means for feeding the slitted sheets of a revolving expanding-disk provided with projections for bending the outer strands of the sheet, and means for holding the other edge of the sheet while said disk is operating, substantially as specified.

11. The combination with means for feeding the slitted sheets of a revolving expanding-disk and a curved guard covering the initially-acting portion of the disk, and means for holding the other edge of the sheet while said disk is operating, substantially as specified.

12. The combination with means for feeding the slitted sheets of a revolving expanding-disk provided with projections for bending the outer strands of the sheet, a curved guard covering the initially-acting portion of the disk, and means for holding the other edge of the sheet while the disk is operating, substantially as specified.

13. The machine for opening or expanding sheet metal all the slits in which have been previously cut, wherein are combined means for feeding the slitted sheets and means acting to open them by bending the strands between the slits in a direction substantially at right angles to the plane of the sheet, substantially as specified.

14. The machine for opening or expanding sheet metal which has been previously slitted, provided with means for deflecting the edges of the sheet in opposite directions and away from the plane of the sheet, substantially as specified.

LEWIS E. CURTIS.

Witnesses:

EDW. S. EVARTS,

H. M. MUNDAY.