

No. 668,669.

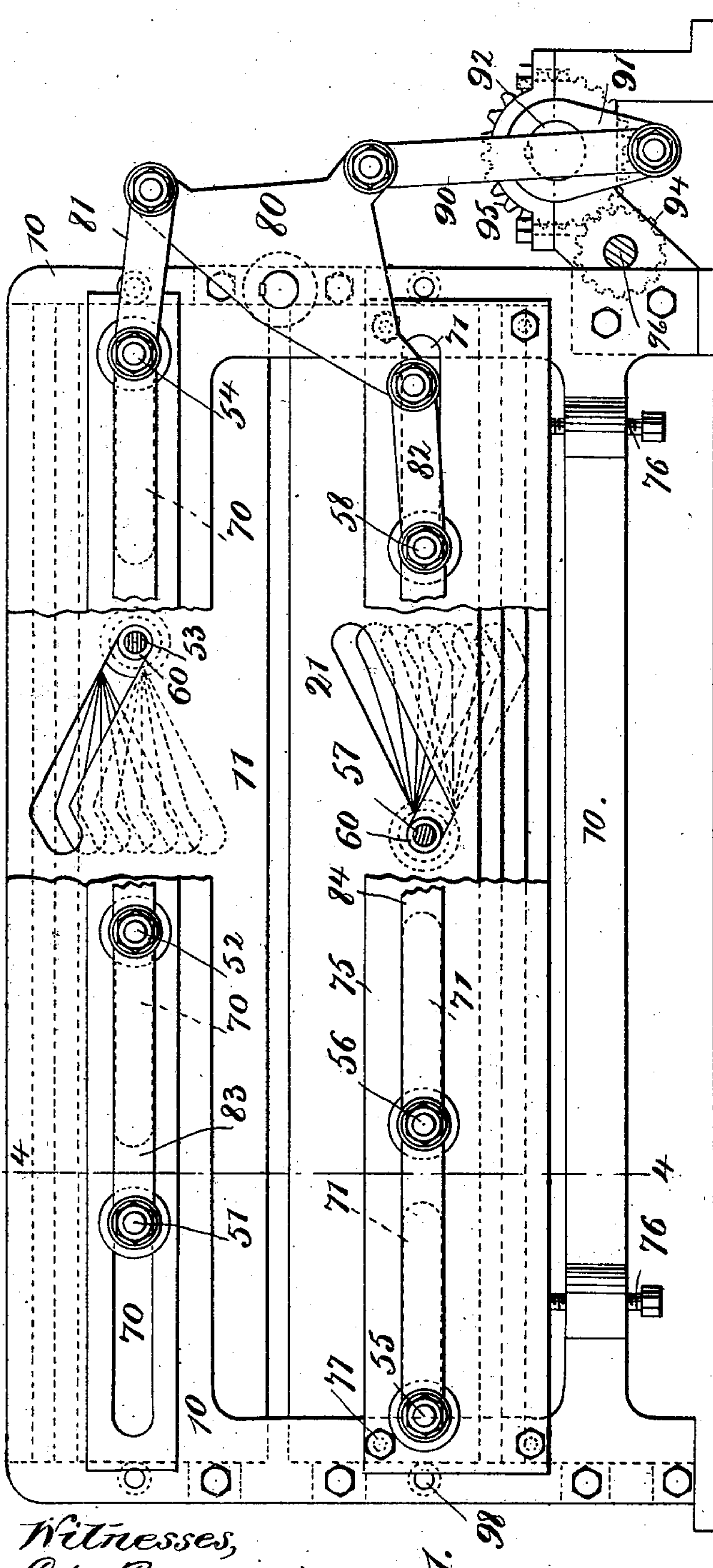
Patented Feb. 26, 1901.

H. E. WHITE.
MACHINE FOR MAKING EXPANDED METAL.

(No Model.)

(Application filed May 11, 1899.)

3 Sheets—Sheet 1.



Witnesses,
C. W. Benjamin
Fred R. Davis

Fig. 1.

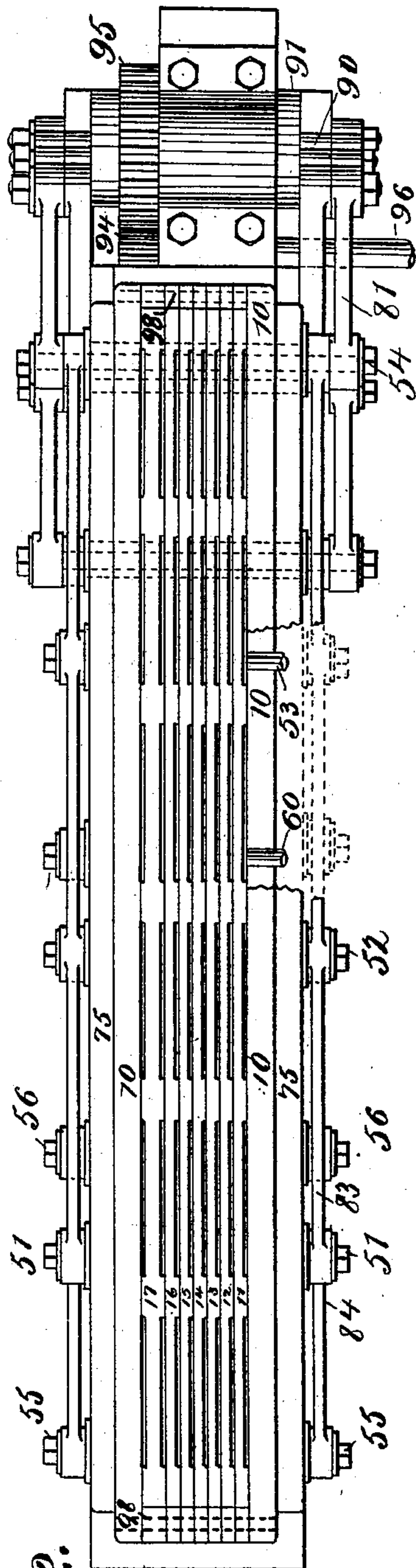


Fig. 2.

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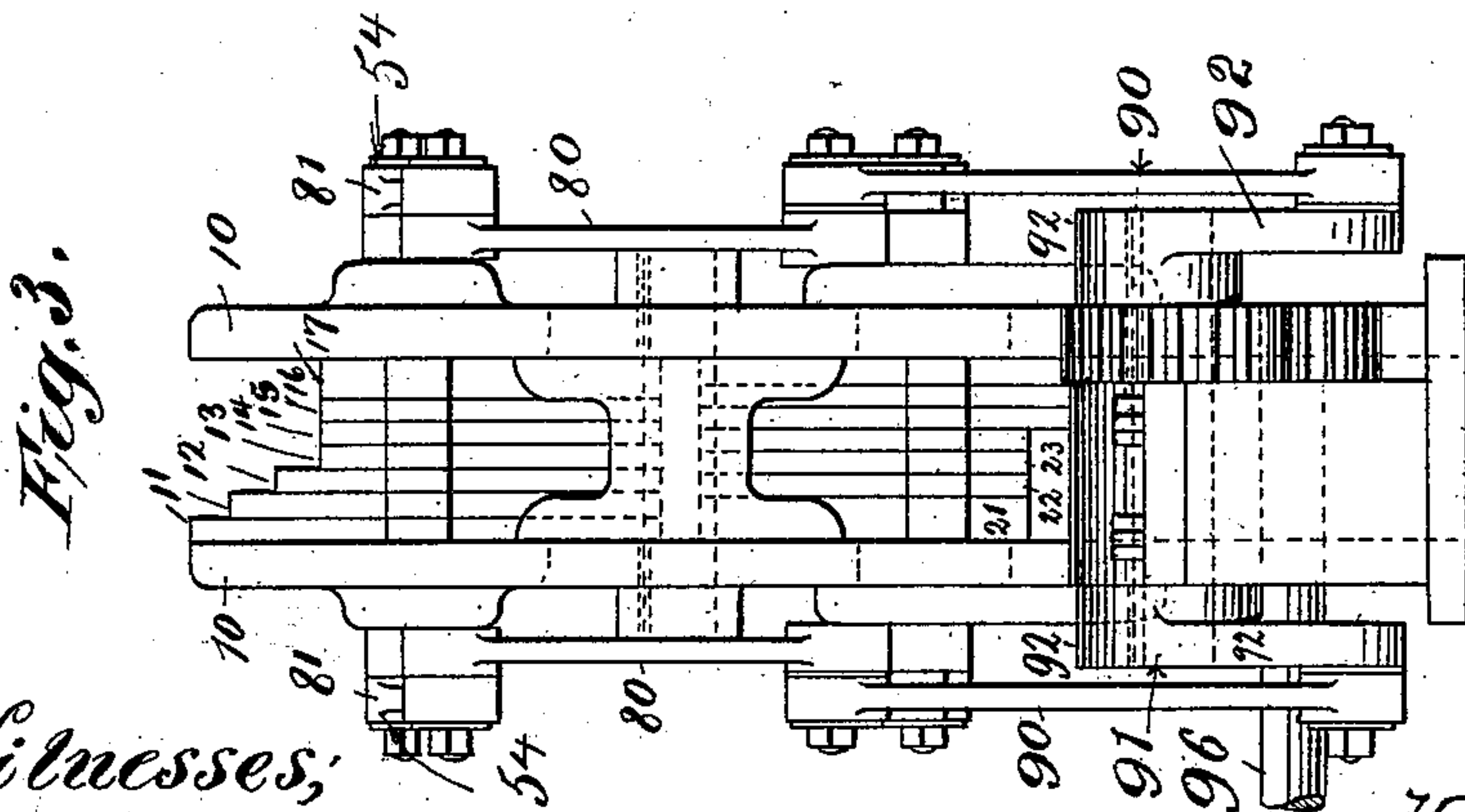
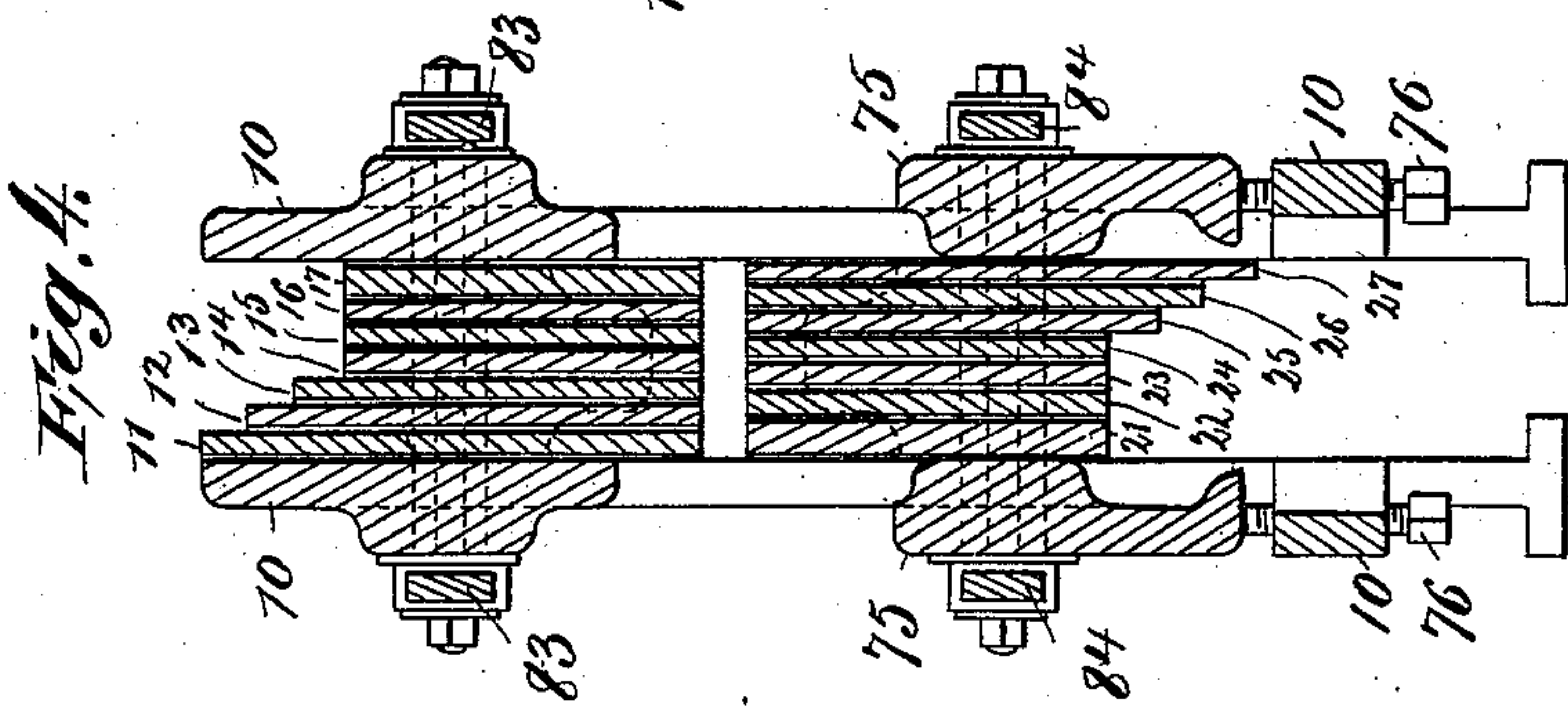
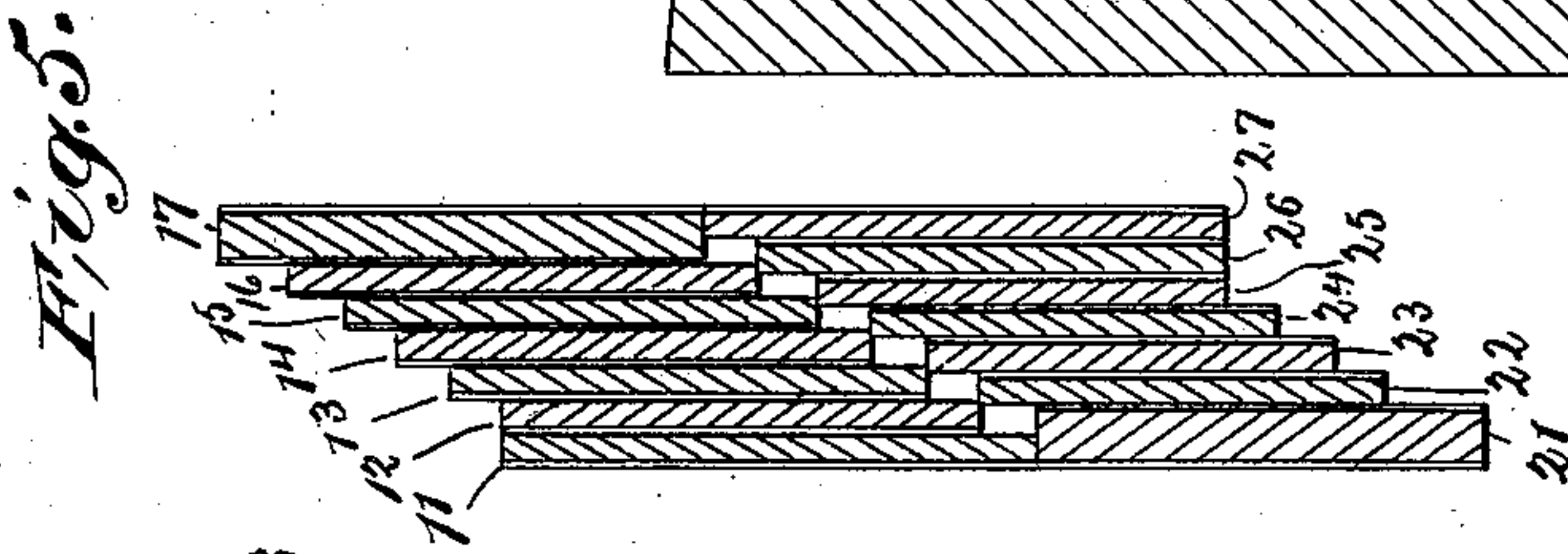
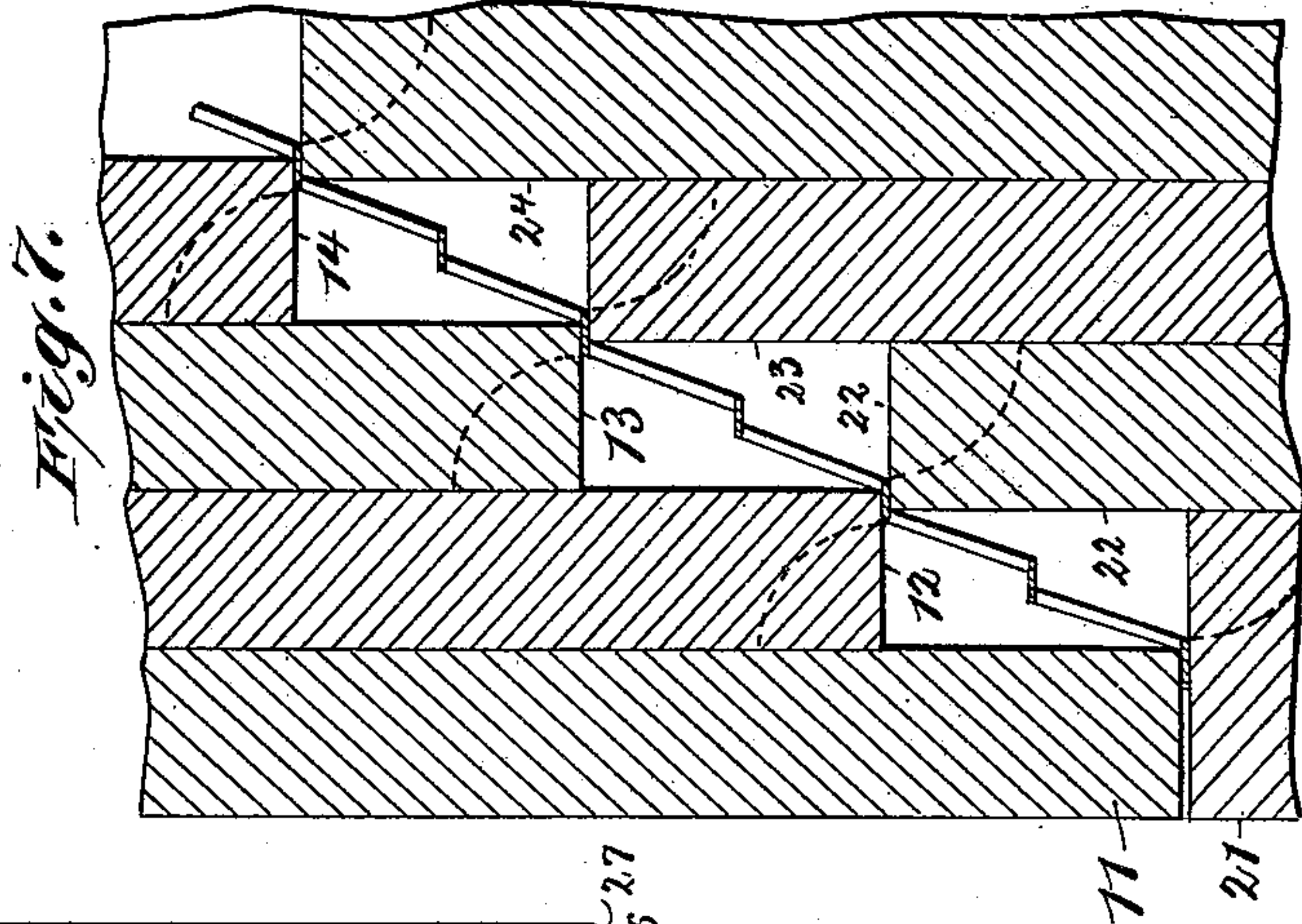
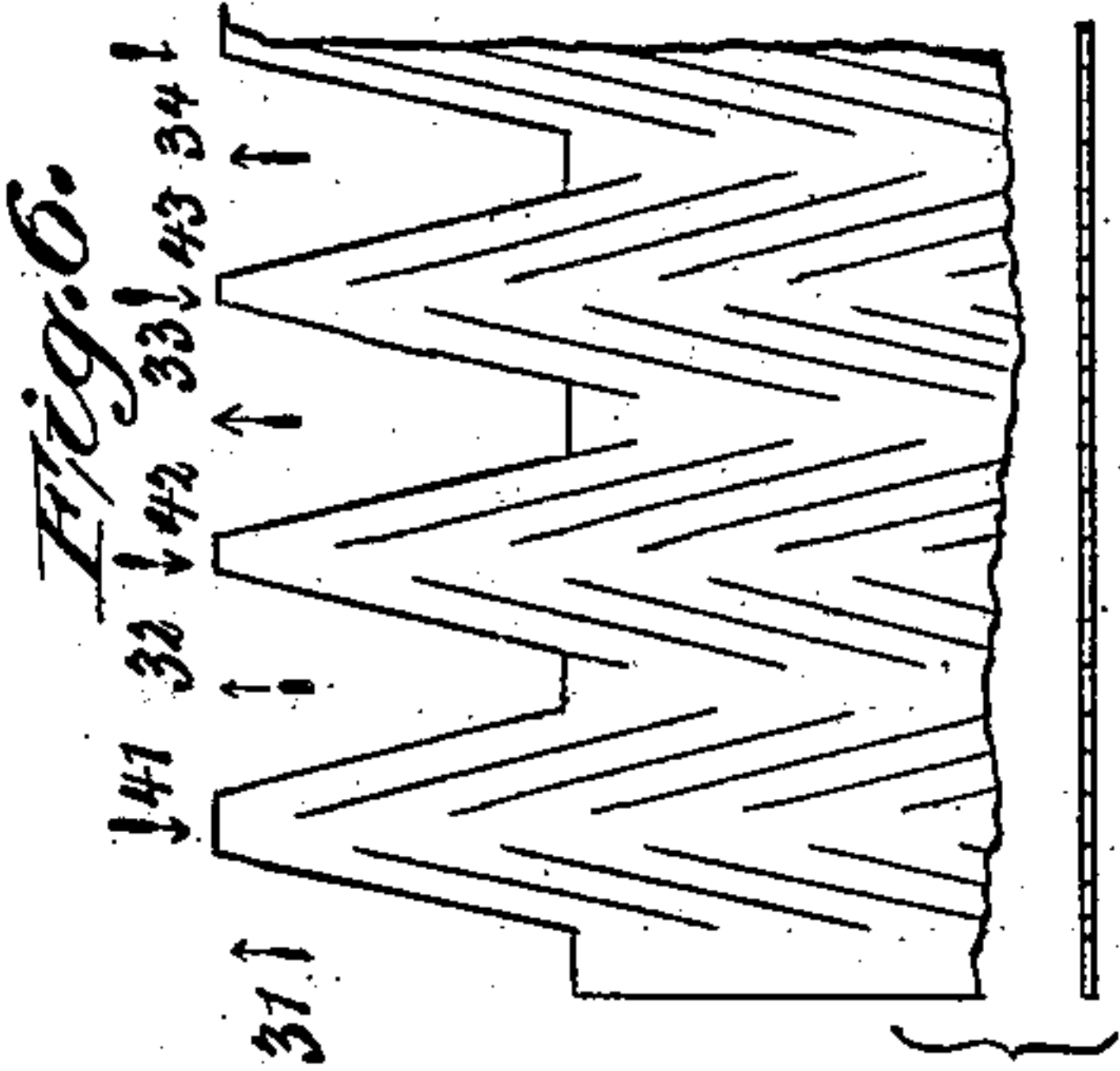
H. E. WHITE.

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(Application filed May 11, 1899.)

(No Model.)

3 Sheets—Sheet 2.



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Patented Feb. 26, 1901.

H. E. WHITE.

MACHINE FOR MAKING EXPANDED METAL.

(Application filed May 11, 1899.)

3 Sheets—Sheet 3.

(No Model.)

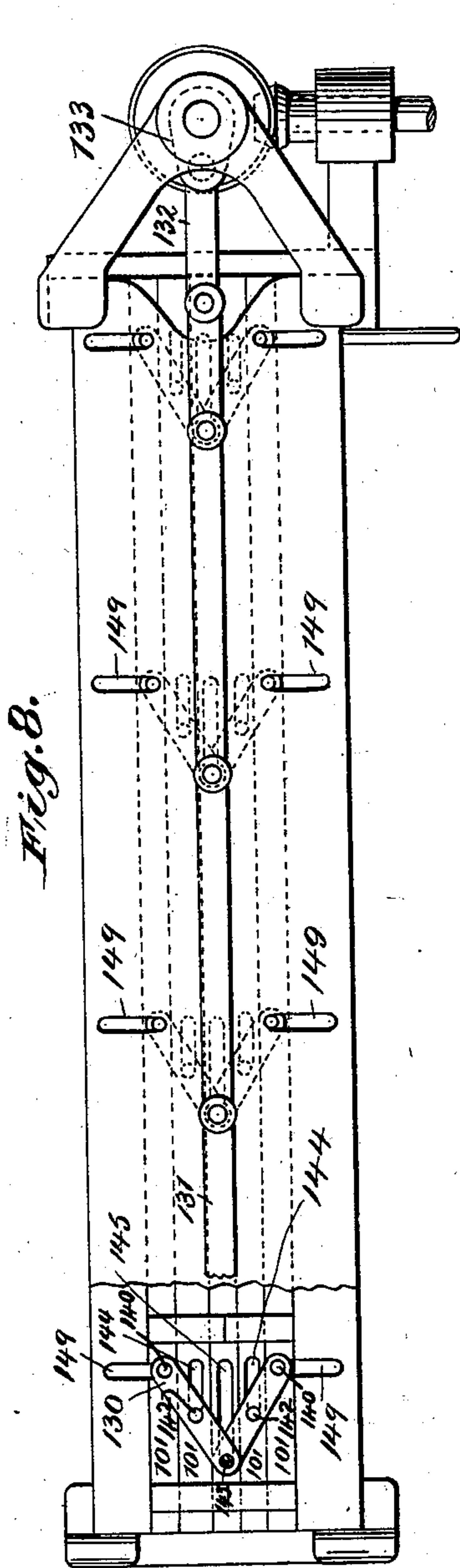


Fig. 8.

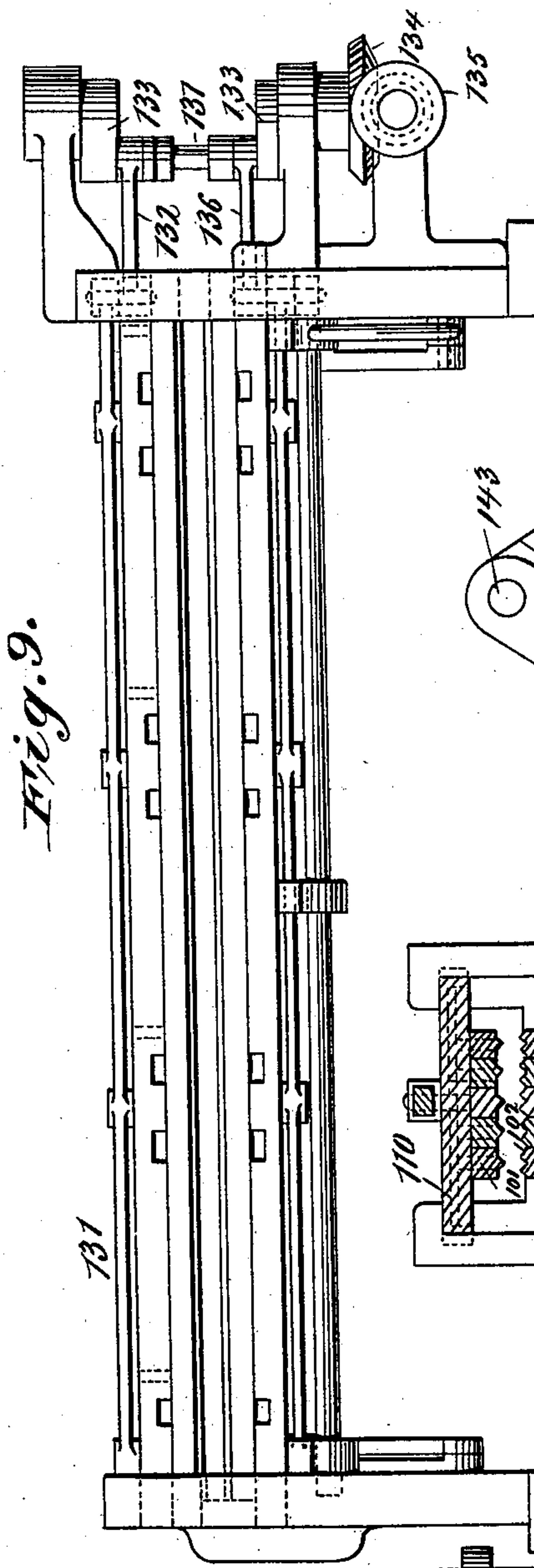


Fig. 9.

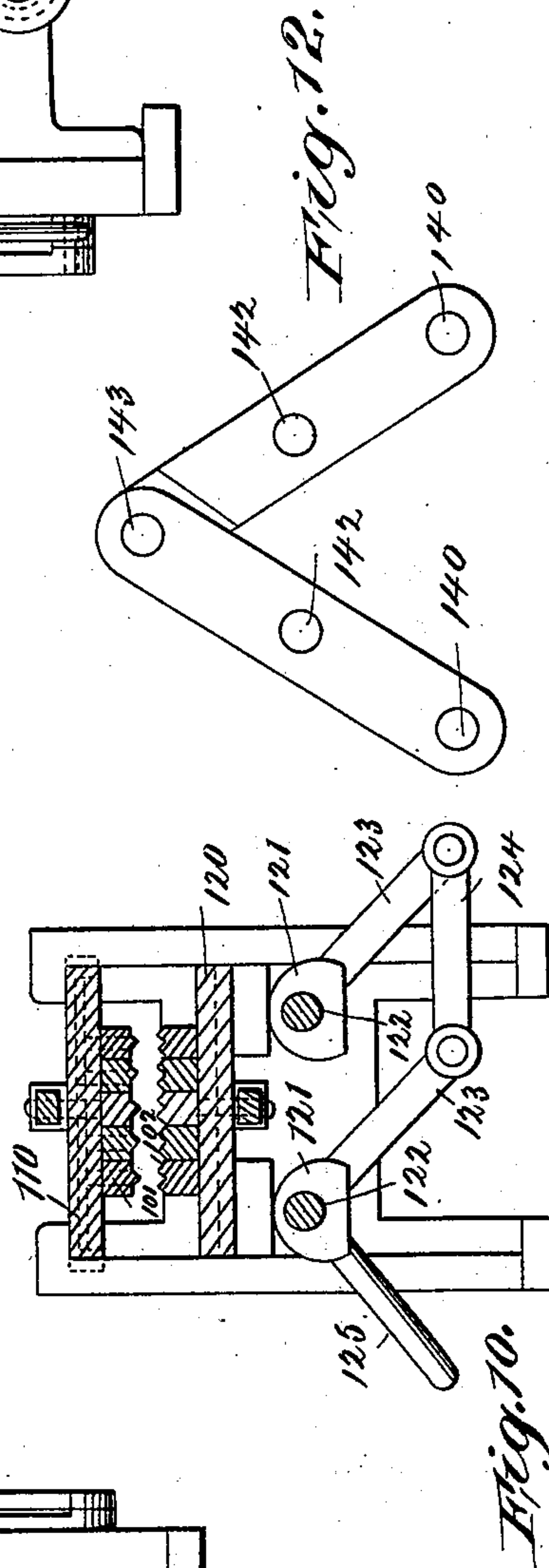


Fig. 12.

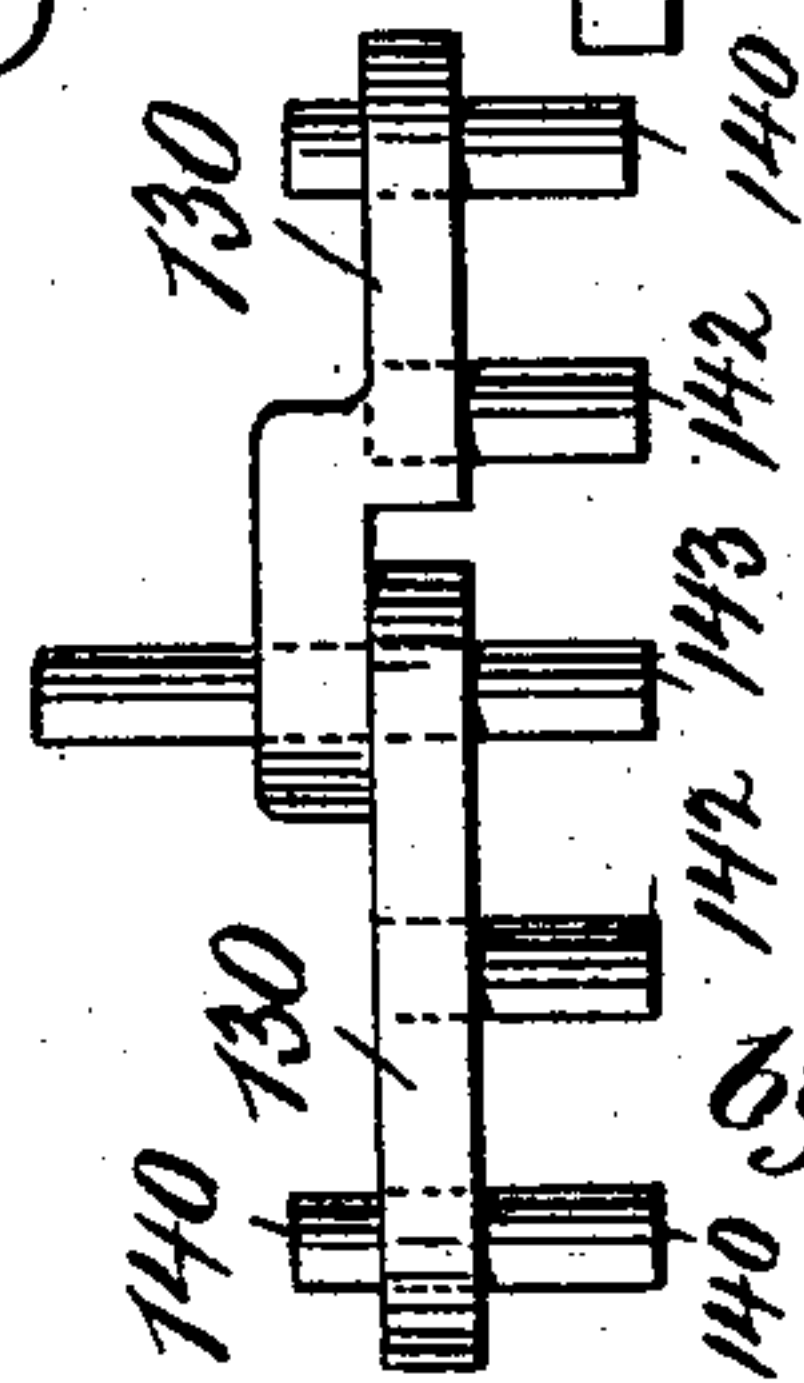


Fig. 11.

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att'y

UNITED STATES PATENT OFFICE.

HERBERT E. WHITE, OF BROOKLYN, NEW YORK, ASSIGNOR TO INTERNATIONAL METAL LATH COMPANY, OF NEW JERSEY.

MACHINE FOR MAKING EXPANDED METAL.

SPECIFICATION forming part of Letters Patent No. 668,669, dated February 26, 1901.

Application filed May 11, 1899. Serial No. 716,407. (No model.)

To all whom it may concern:

Be it known that I, HERBERT E. WHITE, of Brooklyn, in the city of New York, State of New York, have invented certain new and useful Improvements in Machines for Making Expanded-Metal Structures, of which the following is a description, referring to the accompanying drawings.

While my invention is to some extent applicable to a great many forms of expanded-metal structures, it is particularly applicable to the forms shown in Letters Patent to Gibson, No. 451,418, dated April 28, 1891, and to Hilton, No. 588,576, dated August 24, 1897, and of the structures which form the subject-matter of my application, Serial No. 702,522, filed January 18, 1899. Such structures are formed from a sheet having portions slitted with parallel slits and alternating with unslitted portions, which are frequently but preferably not grooved or corrugated. The slitted portions after expansion form slatted or open-work sections admirably adapted for laths.

The process carried out by the machine is as follows: The sheet, which has been previously slitted, is placed in the machine and the ribs, or, better still, the alternate ribs, are gripped and simultaneously drawn apart at a rate of motion which is proportional to the distance between the ribs in the finished structure and a simultaneous or strictly-proportional expansion takes place in each slitted section.

The metal sheet has a tendency to always bend along lines lying in the plane of the sheet and not edgewise of the metal. Therefore the several sections all expand in a perfectly regular manner when treated as I have just described. This can be illustrated by an example: If a sheet having four slitted sections alternated with five ribs be laid flat on the table and if the first rib at one edge of the plate be held flat on the table, the third rib may then be drawn vertically upward, say, two inches, keeping the surface of the rib always parallel with the table. The fifth rib similarly may be raised vertically and without turning double the distance or four inches above the table, and there will be found to be an even and perfectly regular

expansion throughout all the sections that form the slatted portions. This principle is illustrated in Figures 6 and 7 of the drawings, as will be hereinafter shown. Such a process forms the subject of a divisional application, the present application being for means or apparatus.

In the drawings, Fig. 1 is a front view, partly broken away to show details. Fig. 2 is a plan view, partly broken away. Fig. 3 is a right end view. Fig. 4 is a vertical cross-section centrally through the machine. Fig. 5 is a detail showing the movable jaws in position when a sheet is just reaching its full expansion. Fig. 6 shows, in full scale, part of a sheet after slitting and prior to expansion. Fig. 7 shows such a sheet expanded in the jaws, which are enlarged to full scale and form part of the machine shown in Figs. 1 to 5. Figs. 8, 9, and 10 are plan front view and cross-section of another form of machine embodying the invention and adapted to expand the structures shown in the Hilton and Gibson patents. Figs. 11 and 12 are end view and plan of elbow links or toggles which produce the proportional movement of the jaws in the machine shown in Figs. 8, 9, and 10.

Throughout the drawings like numerals of reference indicate like parts.

The machine shown in Figs. 1 to 5 has seven pairs of jaws or jaw-plates, (numbered, respectively, 11 to 17 and 21 to 27.) As the jaws act on alternate ribs the machine is adapted to expand a sheet having thirteen ribs and twelve slitted expansible sections. The jaws are mounted to move vertically in the frame or housing 10 between friction-rollers 98 at each end. Each jaw is independently movable (by means that will be presently described) to effect the expansion; also, the jaws are all movable to grip and release the sheets. The motions of the several jaws will first be explained in order to facilitate the description and understanding of the details and functions of the mechanical connections by which they are actuated. As they first grip, then expand, and then release the sheet and finally return to their usual positions and as each jaw has its individual motion, the motion will first of all be studied in connection with one of the slitted sheets. In Fig. 6 I

show a corner of such a sheet, including seven ribs. The sheet is put in place between the jaws, separated as shown in Fig. 4. The jaws are then brought together to grip the ribs firmly between each pair and are then moved to the relative positions shown in Fig. 5, each pair of cooperating jaws moving as a unit and being brought to the position shown in Figs. 5 and 7 either by the proportional and simultaneous movement of all of the jaws or by successive proportional movements of the several pairs of jaws. The opposed cooperating jaws of each pair are not exactly and directly opposite each other. This is because they act upon the unslitted portions or ribs only, and it is convenient to have each jaw rest against and be guided by the neighboring jaw, as clearly indicated in the figures. The jaws may also be cut away, as shown in dotted lines in Fig. 7. It is apparent, however, that the effective gripping-surfaces of the jaws are directly opposite each other, for it is their function to hold between them the narrow unslitted rib of metal. When the slits are alternately inclined in opposite directions in neighboring sections, as seen in Fig. 6 and in the Hilton patent, a relative endwise movement also takes place between the ribs, as shown by the arrows, Fig. 6, during the expansion. Ribs 31 32 33 34 move relatively to the ribs 41 42 43, &c., but they do not move endwise relatively to each other. As ribs 31 32 33 34 only are held in the jaws of the machine during the expansion, the alternate ribs 41, 42, and 43 are free to move endwise in the rectangular spaces or intervals formed between the jaws when expanding, as seen in Figs. 5 and 7. When expansion has taken place to the full extent, the jaws open, allowing the metal to slide or be withdrawn down the incline step-like series of the lower jaws. The jaws then return to the position shown in Fig. 4, ready to expand another sheet.

A great variety of mechanical connections may be employed to give proper motion to the jaws; but the mechanisms I have shown effect the purpose in a very direct and simple manner.

I employ slots in the jaw-plates and operate all the jaw-plates by horizontally-moving shafts 51, 52, 53, 54, 55, 56, 57, and 58, carrying small friction-reducing rollers 60. To produce the proper motion of the jaws becomes only a question of proper laying out and designing of the inclines which form the cam-like surfaces of the slots. Take, for illustration, the jaw-plate 11 and analyze its motion. First, it should descend to grip a rib against the cooperating jaw 21, then it should descend to its lowest position, as shown in Fig. 5, then it should rise half an inch or so to release the expanded sheet, and finally it should return to its initial position without any particular requirements as to its return movement. The shape of the slot which accomplishes this is shown in Fig. 1, and from

this it will be seen that as the shaft 53 travels toward the left the three movements corresponding to the gripping, descending, and opening are accomplished. The return movement is accomplished by the return of the shaft 53 to its initial position. As each of the shafts 51, 52, 53, and 54 operates in a corresponding slot in the jaw, a parallel motion throughout the jaw-plate is assured. The slots in the lower jaw-plate 21 are designed, as shown in Fig. 1, to force the plate upward to grip the rib, then downward simultaneously with the jaw 11, and then a little farther downward to open the jaws, all of which is accomplished by the movement to the right of the cooperating shafts 55, 56, 57, and 58. The slots for the other jaws are shown partly in dotted lines in Fig. 1 and they differ merely in displacing the several pairs of jaws after gripping a proportionately different amount. The jaws 17 and 27 and 16 and 26 move upward, the central pair of jaws 14 and 24 merely grip and ungrasp without carrying the ribs either up or down, and the jaws 11 and 21 and 12 and 22 move downward during the expanding movement. The shafts 51, 52, 53, and 54 travel horizontally in horizontal guide-slots 70 in the frame of the machine, friction-rolls being provided to save wear and power. The shafts 55, 56, 57, and 58 travel in horizontal slots 71 in a rigid but adjustable plate 75, provided with adjusting-screws 76 and set-bolts and nuts 77. This adjustment permits a slight variation between the two sets of jaws to allow for different thicknesses of metal sheets. The horizontal movement of the shafts 51 to 58 is produced by the three-armed levers 80, connected by links 81 and 82 and connecting rods or bars 83 and 84 with the respective sets of shafts. Pitman or link 90 and crank 91 on each side of the machine actuate the three-armed levers 80 from the shaft 92, which power is applied through the power-gearing 94 and 95 and driving-shaft 96. To further reduce power and take the end thrusts, I provide several short friction-rollers 98 for the ends of the several jaw-plates. Starting from the position shown in Figs. 1 to 4, a single revolution of the shaft 92 effects the expansion of the metal and the return of all the parts of the machine to their initial positions.

The machine is capable of much modification. In Figs. 8 to 12 a modification is shown in which the movement of the gripping-jaws is horizontal instead of step-like. This form of machine can be used for expanding the Gibson and Hilton forms of lath or the form shown in my patent application, Serial No. 4,354, filed February 7, 1900. In this modification of the machine there are five pairs of jaws, the upper set being marked 101 and the lower set 102. The upper set consists of jaw-bars supported against the lower face of the plate 110, but free to move laterally. The lower jaw-bars 102 rest on the vertically-adjustable table 120, which is manually raised

by cams 121, coöperatively connected by shafts 122, cranks 123, and links 124 to be manually operated by the lever-arm 125. By this means the lower jaws are brought against the upper jaws to grip the rib of metal to be expanded. The horizontal proportional movement of the jaws after gripping is effected by means of elbow links or toggles, such as is shown in Figs. 11 and 12. As the upper and lower jaws are moved simultaneously by mechanism essentially similar each to the other, I will describe in detail only the movement of the upper jaw-bars, which is clearly shown in Figs. 8 and 9.

A series of links 130 are pivoted in pairs to a connecting-rod 131, which is operated by a pitman 132 and crank 133. Power is applied to turn the crank by means of the bevel-gears 134 135. The similar connections for the lower jaws differ only in the sliding connection between the pitman 136 and the crank-pin 137 to permit the raising and lowering of the lower jaws. The outer ends of the links 130 are pivotally secured by pin 140 to the two outer jaw-bars 101. Pins 142 143, inserted in the links 130 at intervals proportionate to the expansion desired between the jaws, operate the longitudinal slots 144 145 in the jaw-bars 101. To coöperatively guide the transverse movements of the pins 140, the slots 149 in the upper plate of the frame of the machine are provided. It will now be seen as the pin 143 is drawn to the right of Fig. 8 pins 140 and pins 142 are thrust outward through distances corresponding to their spacing on the links 130, and therefore the jaw-bars 101 are expanded to the same proportional extent. After the expansion has taken place the lever 122 is lowered to release the expanded metal by dropping the lower jaws. One complete revolution of the cranks 133 effects the expansion of the metal and the return of the machine to its initial position, ready for the insertion of another plate.

It will be seen that the jaws are provided with coöperative projections and recesses which may be designed to form any shape of groove in the ribs of the metal plates that may be desired.

What I claim as the characteristic features of my invention are the following:

1. In combination in a machine for expanding slitted metal sheets, a plurality of coöp-

erating jaws, and means for proportionately displacing the several pairs of jaws, substantially as set forth. 55

2. In combination in a machine for expanding slitted metal sheets, means for gripping the ribs or unslitted portions of the sheet, and means for displacing the ribs when so gripped, proportionally throughout the sheet, substantially as set forth. 60

3. In combination in a machine for expanding slitted metal sheets, means for gripping the ribs or unslitted portions of the sheet, and means for displacing the ribs when so gripped transversely to the original plane of the sheet, substantially as set forth. 65

4. In combination in a machine for expanding slitted metal sheets, a plurality of coöperating pairs of gripping-jaws, means for giving parallel motions to the several pairs of jaws and drawing them apart, and means for gripping and ungripping the jaws, substantially as set forth. 70

5. In combination in a machine for expanding slitted metal sheets, a plurality of coöperating pairs of gripping-jaws, means for supporting and guiding the jaws to permit movement in parallel planes, means for gripping the coöperating pairs of jaws together and un-gripping them, and means for simultaneously actuating all the said jaws proportionately as to speed of movement and as to distance traversed, substantially as set forth. 75

6. In combination in a machine for expanding slitted metal sheets, two sets of coöperating jaw-plates mounted to move in parallel planes, and means for simultaneously giving to each of the said jaw-plates a successive gripping and step-like expansion movement, substantially as set forth. 80

7. In a machine for expanding slitted metal sheets, mechanism for gripping such a sheet at its marginal portions and mechanism for drawing apart the said gripped portions in directions transverse to the plane of the said sheets, whereby such sheets may be regularly and uniformly expanded throughout their extent at a single operation. 85

Signed this 3d day of May, 1899, at New York city, New York. 100

HERBERT E. WHITE.

Witnesses:

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HAROLD BINNEY.