

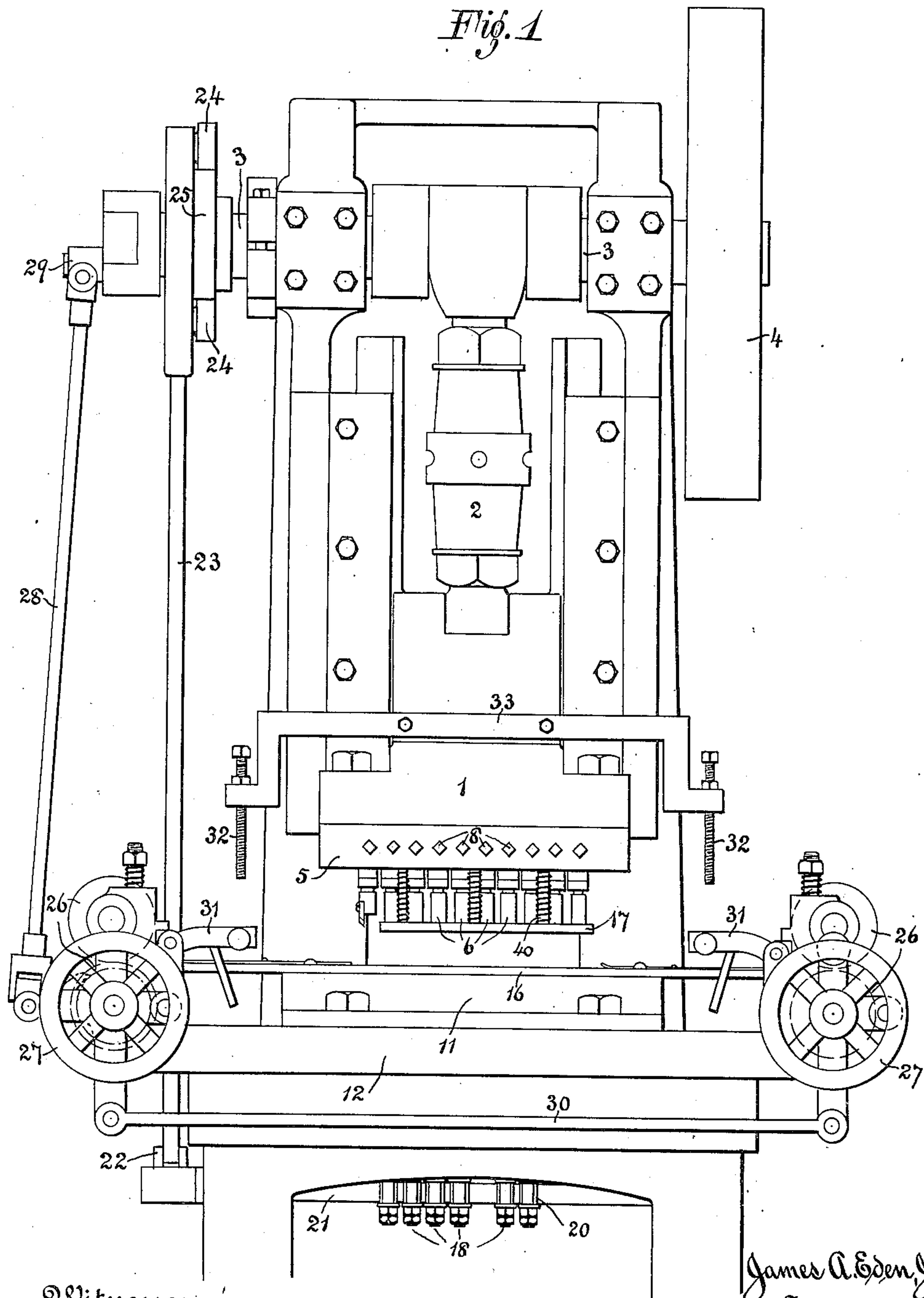
No. 854,706.

PATENTED MAY 21, 1907.

J. A. EDEN, JR.
SHEET METAL PUNCHING PRESS.

APPLICATION FILED JULY 27, 1905.

3 SHEETS—SHEET 1.



Witnesses
J. H. Brien
L. V. Stoltz

James A. Eden, Jr.
Inventor
By his Attorney Eugene Diven

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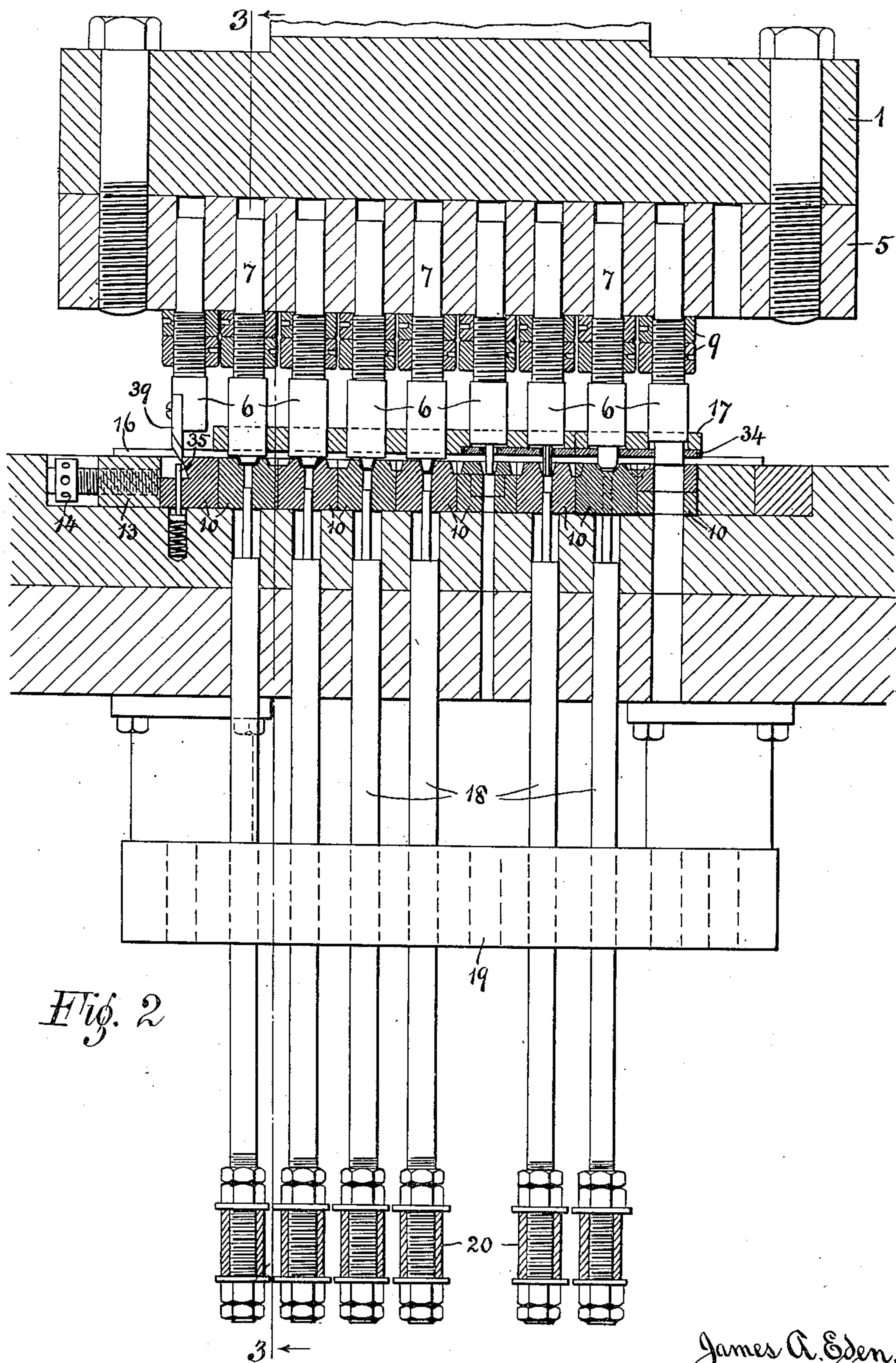


Fig. 2

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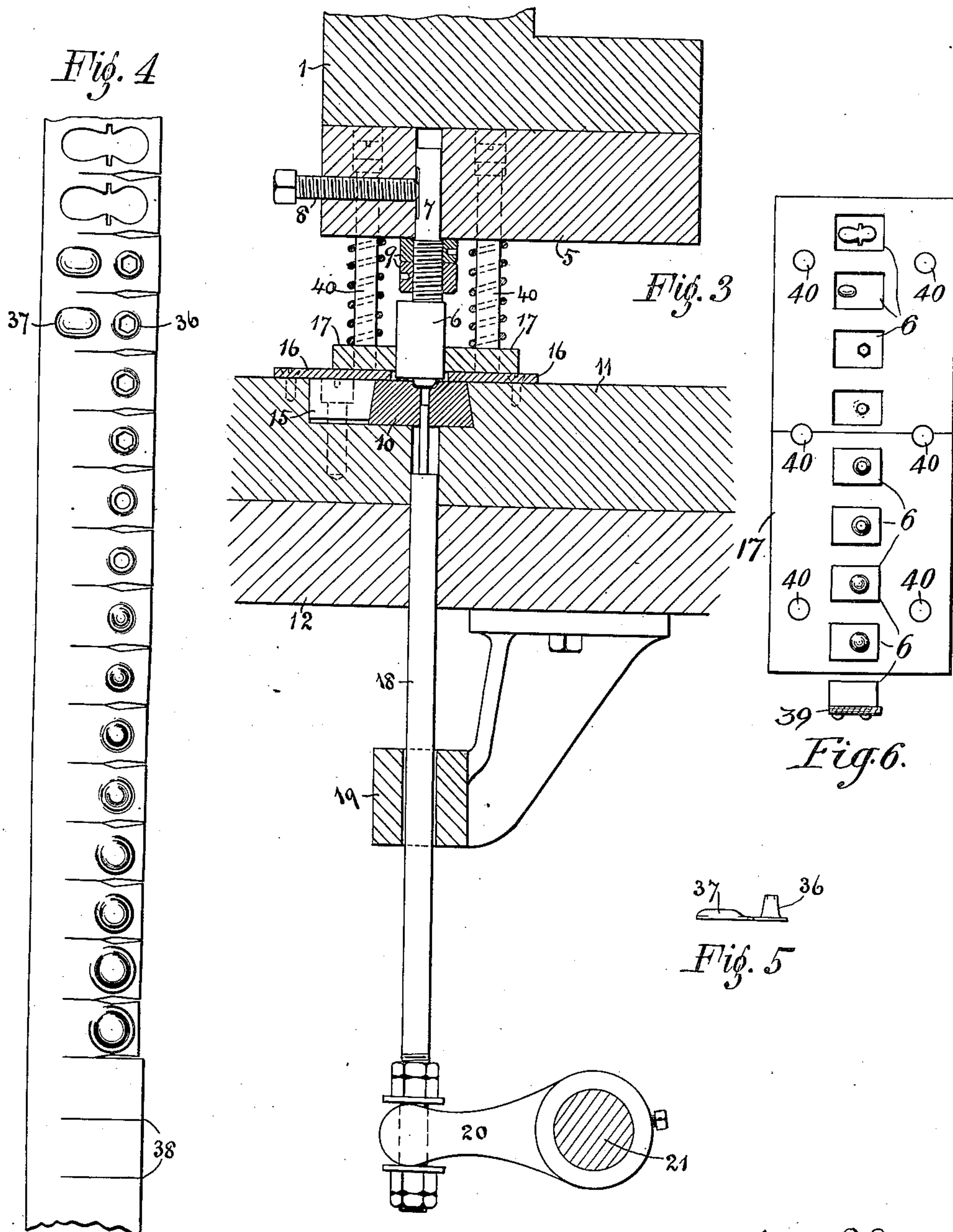
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3 SHEETS—SHEET 3.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES A. EDEN, JR., OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO REES HOOK COMPANY, OF ELMIRA, NEW YORK.

SHEET-METAL-PUNCHING PRESS.

No. 854,706.

Specification of Letters Patent.

Patented May 21, 1907.

Application filed July 27, 1905. Serial No. 271,480.

To all whom it may concern:

Be it known that I, JAMES A. EDEN, Jr., a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sheet-Metal-Punching Presses, of which the following is a specification.

This invention relates to improvements in power presses for forming and punching out blanks from sheet metal; and the principal object of my improvements is to provide a press of this character which will be capable of forming and cutting out from strips of sheet steel the blanks from which are formed lacing hooks for shoes and the like, and especially the blanks for the hooks shown and described in Letters-Patent obtained by Fred H. Rees, No. 793609, dated June 27, 1905.

A further object is to so construct and arrange the punches and dies that the eyelet and head portions of the hook may be formed and the completed blanks cut from the strip all in the same press.

A still further object is to form the blanks on the strip transversely, thereby economizing material and increasing the number of blanks that can be cut from a single strip; and finally, to provide means for preventing the strip from bending or warping as the metal is drawn in receiving the several consecutive impressions in the dies, thereby enabling me to utilize the strip as a carrier for the blanks from die to die through the machine.

I attain my objects by constructing and arranging the punches and dies in the press in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents a front elevation of a power press, single acting, with automatic double roll feed, embodying my invention; Fig. 2, a vertical sectional front view of the dies, punches and adjacent parts, the punch holder and punches being shown in the down position; Fig. 3, a vertical transverse section on the line 3—3 in Fig. 2; Fig. 4, a bottom view, full size, of the strip from which the blanks are punched, which also shows the shape of the dies; Fig. 5, a side elevation of the finished blank; and Fig. 6, a view of the punches and stripper plate looking at them from the under side with the supplemental plate 34 removed.

Like numerals refer to like parts in the several views.

In carrying out my invention, I make use of a common form of power press, comprising a reciprocating cross-head 1, which slides in vertical guides supported by vertical standards, said cross-head being operated by a pitman 2, coupled to a crank shaft 3, which is driven by a belt pulley 4.

To the bottom of the cross-head is fastened a holder 5, adapted to carry a number of punch blocks 6. These punch blocks are rectangular in form, with cylindrical shanks 7, which are received in corresponding sockets in the holder 5, and are held in their proper adjustment by means of set screws 8 and lock nuts 9, the latter being screwed upon the threaded lower portion of the shanks 7 and adapted to stand the punching pressure, which is transmitted through the punches to the under-face of the holder 5.

To adjust the individual punches to or from the dies, the shank of the punch block is run up into the holder and held in frictional engagement therewith by means of the set screws 8, then by loosening the lock nuts 9 and turning the nut which engages the lower face of the holder, the punch will be drawn down until it is set at the required distance from the die, after which the lock nuts will be set up tight and also the set screw 8.

Upon the table 12 of the press there is rigidly fastened a die holder 11, in which is located a series of dies corresponding in number and shape with the punches. These dies are placed in a horizontal groove in the holder, one side of which is beveled to receive the beveled sides of the dies, the opposite sides of the dies being also beveled and engaged by a wedge block or blocks 15. The dies are held end-wise in the holder by means of the block 13, which is set up against the dies by means of the set screws 14. The individual dies may thus be readily changed or renewed, as occasion requires. Guide plates 16 are positioned over the dies, at a suitable distance apart, to receive between them the strip of metal from which the blanks are to be formed. The lower ends of the punch blocks pass through corresponding holes in a stripper plate 17, actuated by coiled springs surrounding vertical guide rods 40, which have a limited vertical movement in the holder 5, to press below the punch blocks, as

the cross-head rises, to clear the punches from the strip.

In order to positively clear the strip from the dies, and to lift it sufficiently to permit the impressions formed on its under-side to pass over the top of the dies, as the strip is fed through the press, I provide for each die, in which the blank receives a forming impression, a plunger or knock-out 18. These knock-outs reciprocate in the guide bracket 19, and are operated by levers 20 attached to a rock shaft 21, which is actuated to throw the knock-outs upward with each upward stroke of the cross-head. The upper ends of these knock-outs are guided through holes in the table and die holder, and they are reduced at their upper extremities to pass through smaller holes in the dies. The rock shaft is operated by means of an arm 22 at one end coupled to a rod 23 which passes up to the main shaft 3, where it is provided with rollers 24, which engage a cam 25 on said shaft.

The strip is fed through from one side to the other of the press intermittently by means of a roll feed, comprising pairs of rolls 26 positioned at each end of the guide 16, the lower rolls of each pair being rotated by ratchet gears 27, operated by a rod 28 coupled to a crank pin 29 on the end of the main shaft, motion being transmitted from one ratchet gear to the other by means of a connecting rod 30. The strip is held in frictional engagement between the rolls by means of springs acting upon the upper rolls, said upper rolls being thrown out of engagement with the strip during the period of receiving impressions from the punches, by means of lever arms 31, actuated by pins 32 carried by the cross-bar 33 attached to the cross-head; said pins 32 being adjustable in the ends of said cross bar, in order that the lifting of the top rolls may be properly timed to release the strip before it is engaged by the punches. The releasing of the strip from the grip of the feed rolls permits the strip to so adjust itself that the impressions will properly register with the dies. This automatic feed is old and I do not claim it as a part of my invention.

As it is desirable to make the lacing hooks, above referred to, of steel in order to give them the necessary strength and rigidity, a special construction of the punches and dies is rendered necessary, in order to properly press the steel strip, from which the blanks are to be cut, into shape to form the eyelet and head of the hook. In the first place the strip must be partially cut through between each blank in order to make allowance for the drawing of the metal in forming the eyelets 36, see Figs. 4 and 5; otherwise the strip would be bent and twisted so that it would not pass straight through the press between the guides. To perform this preliminary cutting of the strip I provide the first punch block 6 with a knife blade 39, so set as to par-

tially cut through the strip from the rear toward the front, as the strip is fed through the press, as shown at 38 in Fig. 4. The uncut portion of the strip acts as a carrier to convey the blanks from die to die through the press. A spring pin 35 lifts the strip as the knife rises, so that the depressed lip formed by the cut will pass over the edge of the die as the strip is fed forward. When the strip reaches the second die it is given a preliminary impression for the eyelet by the second punch, in the portion lying between cuts. In the third, fourth and fifth dies the cap portion of this impression is still further drawn down by the punches in succession until the full depth of the eyelet is reached. At the same time the base of the eyelet is drawn in and reduced in diameter in these succeeding dies. In the sixth die a small plunger on the punch passes completely through the eyelet, cutting the cap portion therefrom, which drops through the hole provided therefor below the die, there being no knock-out for this die. In the seventh die a hexagonal plunger on the punch passes through the eyelet, cutting or nicking the walls thereof at the lower extremity, to provide for the upsetting of the eyelet when the completed hook is riveted to a shoe in a riveting machine. In the next to the last die the blank receives the impression 37 for the head of the hook, and in the last die the completed blank is cut from the strip, and drops from the machine in the form shown in Fig. 5. For the purpose of showing these last two dies and their corresponding punches the section line in Fig. 2 is brought forward sufficiently to cut through said dies at the point where the head of the hook is formed. The finished blank will be passed to an assembling machine, where the head will be bent over above the eyelet and the spring attached.

It will be noted that the punch blocks 6 are set slightly forward out of center with their shanks 7. This is done in order that the forming heads, or plungers, carried by the punch-blocks, and by which the eyelet portion of the hooks is formed, shall be positioned directly in line with the shanks of the punches, to the end that the heavy punching pressure shall be transmitted directly through the shanks to the punch holder. This arrangement of the punch blocks also provides a flat under face thereon of a width slightly less than that of the strip, whereby the strip will be pressed upon and maintained in perfectly flat condition while passing through the eyelet forming dies. The only punch-blocks, which have their forming heads, or plungers set off center, are the one for the head of the hook, namely, the next to the last punch, and the last punch, which cuts out the completed blank. The knock-outs 18 are also in axial alinement with the punch shanks, where they are needed to

raise the eyelet cones out from the dies: At 34 the stripped plate 17 is provided with a supplementary plate, through which the small eyelet perforating and nicking plungers on the sixth and seventh punch-blocks pass, as do also the head forming and cutting out plungers on the last two punch blocks. This auxiliary plate forms a guide for these punch plungers, and also engages the metal strip in close proximity to these plungers, as they are withdrawn, to supplement the stripping action of the main stripper plate 17.

Since there must be a cut 38 at each side of the portion of the strip in which each eyelet is formed, to allow for the drawing of the metal at each side of the eyelet, the strip for each reciprocation of the press will be advanced only the distance between these cuts: and to allow for this periodic movement, pockets are cut between the dies to receive the portions of the blank which have been formed in preceding dies, these intermediate pockets being shown in Fig. 2.

It will be noted that the strip receives two impressions from each punch before it reaches the next succeeding punch. This permits the punches and dies to be spaced apart sufficiently to give them the necessary body strength and also to allow for the adjusting nuts on each of the punch shanks. The intermediate pockets also act to adjust the strip and to rectify any deviation in spacing and alinement due to the drawing action of the punches. This arrangement of the punches and dies gives to them the necessary strength to adapt the press for use in forming articles of this nature from sheet steel, where a powerful action is required to draw the metal in forming it into the proper shapes. Moreover, by adopting the step by step process of drawing the metal in forming deep impressions such as the eyelet herein shown, I provide for drawing the metal a little at a time and in sectional parts, thereby avoiding the tearing of the metal and also the straining of the dies. I have provided for four impressions in drawing down the eyelet in the present instance. I may, however, accomplish this with a less number of impressions; and, where the impressions are to be made of greater depth, I may employ more of the successive formative punches to accomplish the final result.

While I have shown the lacing hook blank cut out with side projecting ears, by which the spring described in the Letters-Patent to Rees, aforesaid, is attached to the hook, these ears may be omitted from the hook in the cutting out punch, thereby producing a lacing hook adapted to be used without the spring feature.

Finally, while I have described my improvements in metal punching presses as being adapted for cutting out blanks for lacing

hooks particularly, I do not limit myself to this sole use of the invention, as my improvements may be applied to presses for cutting out other articles, where the requirements are substantially the same.

What I claim, therefore, as my invention and desire to secure by Letters-Patent is:

1. In a metal punching press, the combination, with one or more forming punches and dies, of means for partially severing a metal strip transversely between the impression receiving portions whereby distortion of the strip by reason of the drawing of the metal in the dies as the strip is fed through the press is prevented, the uncut portion of the strip acting as a carrier for the blanks as they pass through the press.

2. In a metal punching press, the combination, with a reciprocating cross-head of one or more forming punches carried thereby, a shearing blade also carried by the cross-head in advance of the punches and adapted to partially sever a metal strip transversely between the impression receiving portions as the strip is fed through the press whereby distortion of the strip by reason of the drawing of the metal in the dies is prevented, and dies to receive said blade and punches, the uncut portion of the strip acting as a carrier for the blanks as they pass through the press.

3. In a metal punching press, the combination, with a reciprocating cross-head, of a punch-holder secured thereto and carrying a shearing blade, one or more eyelet forming punches, an eyelet perforating punch, a head forming punch out of line with the eyelet forming punches, and a cutting out punch, corresponding dies to receive said shearing blade and punches, and means for intermittently feeding a metal strip first to the shearing blade, whereby it is partially severed between the eyelet portion of the blanks, the unsevered portion of the strip acting to carry said blanks onward between the several forming punches and dies.

4. In a metal punching press, the combination, with a reciprocating cross-head, of a punch holder secured thereto, a plurality of punches mounted in said holder and spaced apart on centers twice the distance between the centers of the blanks to be formed thereby, a plurality of stationary dies to receive the punches, pockets between dies to receive the blanks where they rest between dies, and means for feeding a metal strip through the press with periodic movements equal to one-half the distance between punch centers.

5. In a metal punching press, the combination, with a reciprocating cross-head, of a plurality of punch blocks carried thereby, a spring actuated stripper plate having slots through which the punch blocks pass, forming heads or plungers projecting from the under side of the punch blocks, a supplementary

plate on the stripper plate provided with
guide-ways through which certain of the
longer forming heads or plungers pass, a plu-
rality of fixed dies adapted to receive said
5 forming heads or plungers, and means for
feeding and guiding a metal strip between the
dies.

In testimony whereof I have affixed my
signature, in presence of two witnesses.

JAMES A. EDEN, JR.

Witnesses:

ARTHUR KERN,

CHAS. J. ELLSWORTH.