

No. 614,379.

Patented Nov. 15, 1898.

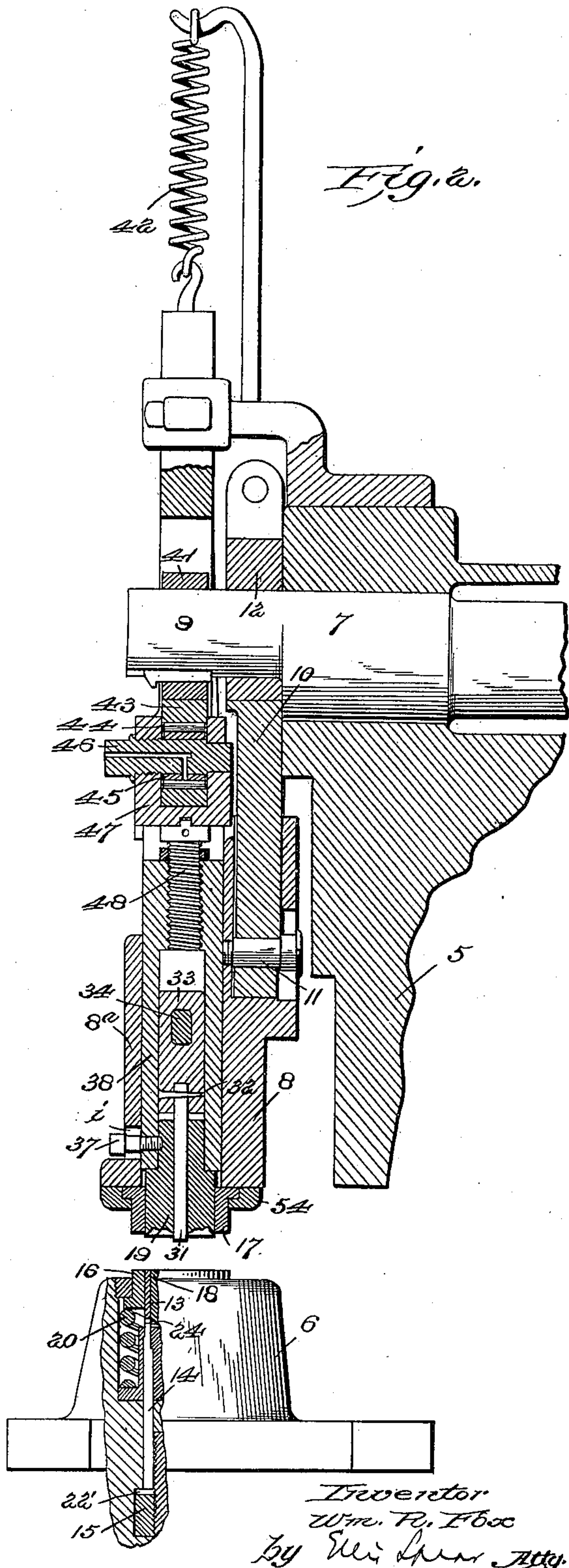
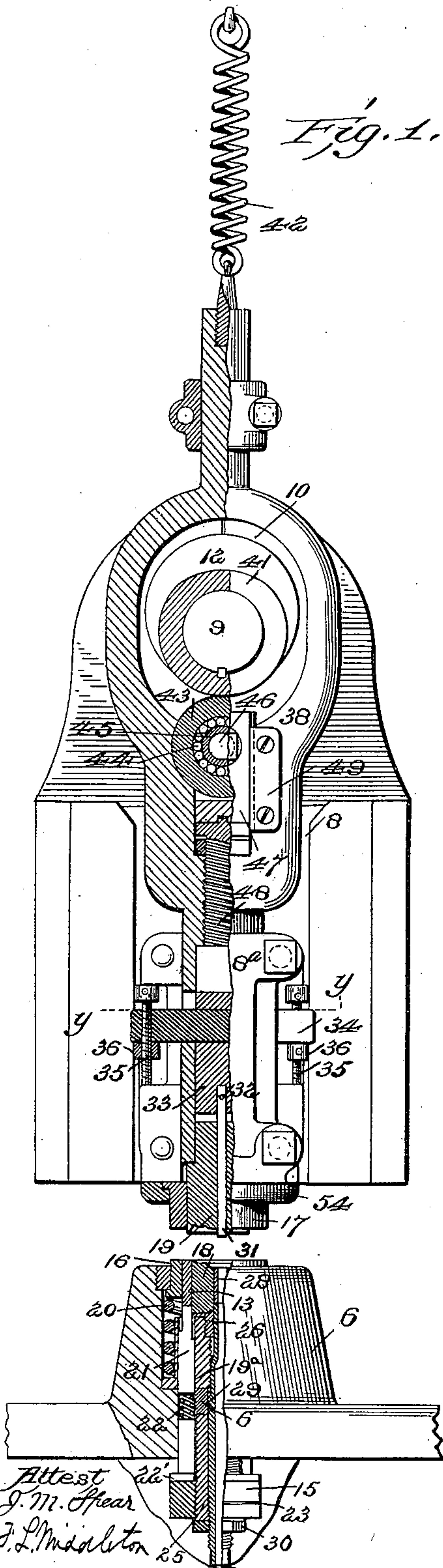
W. R. FOX.

BLANKING, FORMING, AND PIERCING DIE.

(Application filed July 8, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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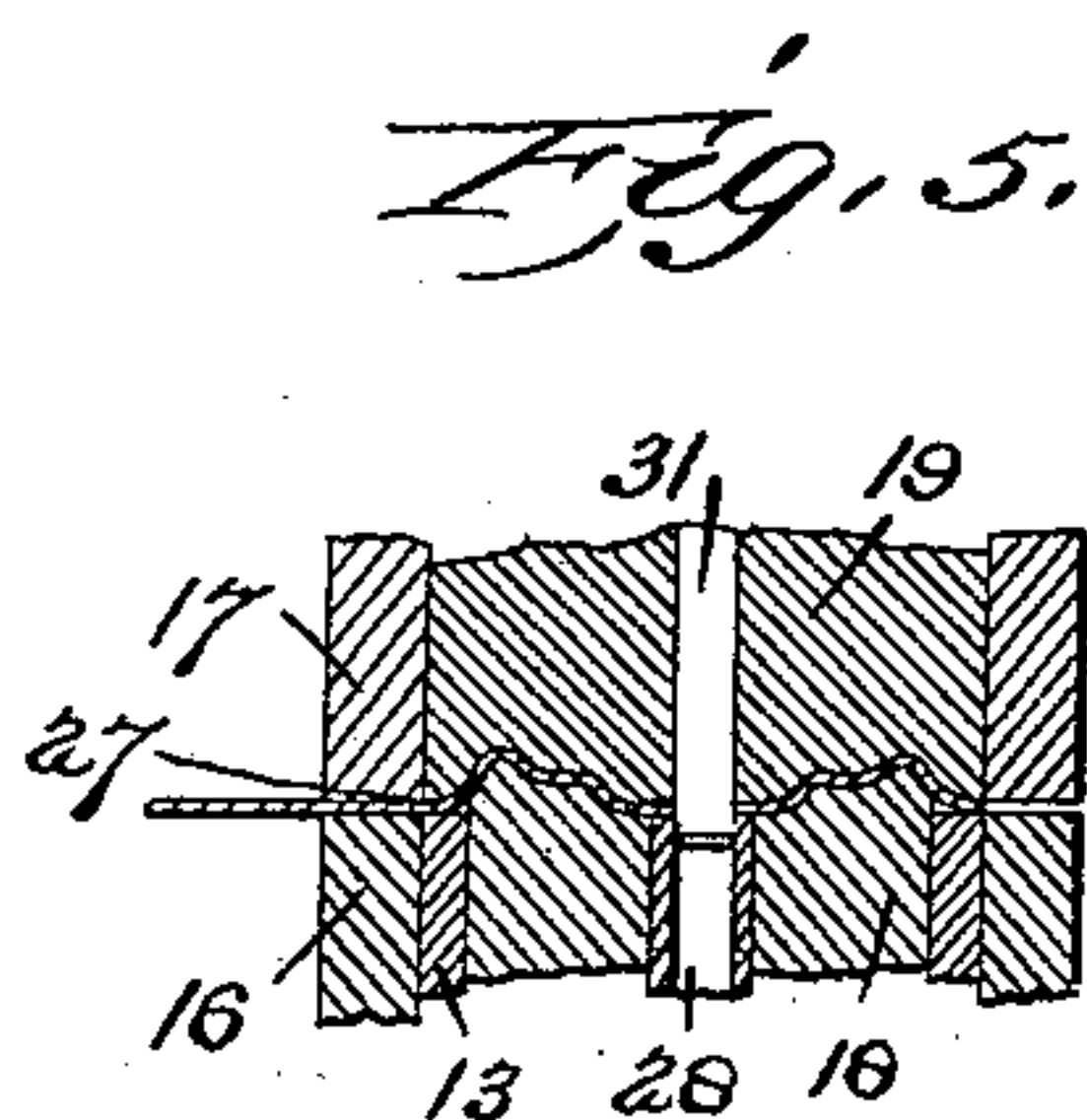
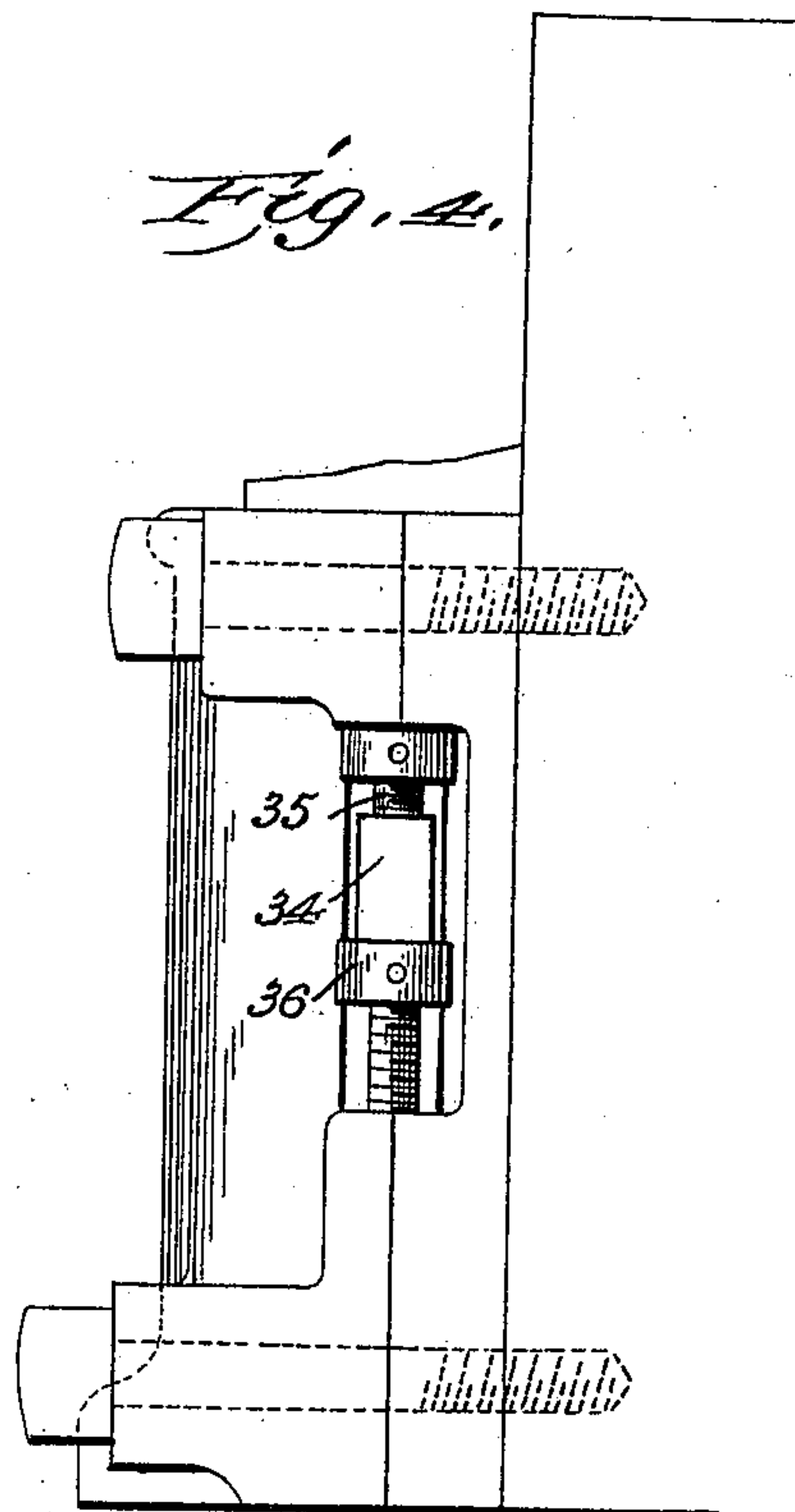
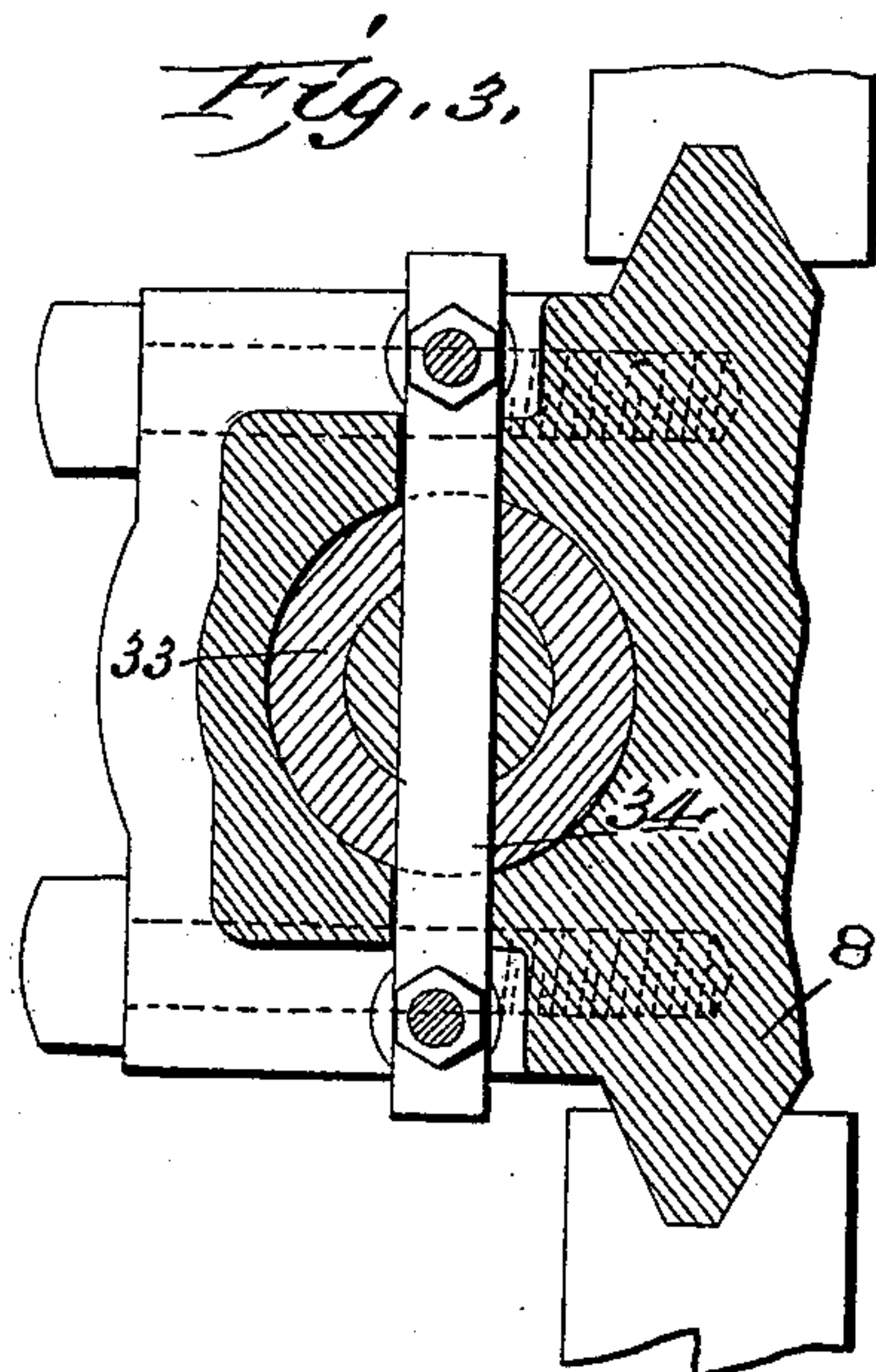
W. R. FOX.

BLANKING, FORMING, AND PIERCING DIE.

(No Model.)

(Application filed July 8, 1898.)

2 Sheets—Sheet 2.



Attest
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UNITED STATES PATENT OFFICE.

WILLIAM R. FOX, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO THE FOX MACHINE COMPANY, OF SAME PLACE.

BLANKING, FORMING, AND PIERCING DIE.

SPECIFICATION forming part of Letters Patent No. 614,379, dated November 15, 1898.

Application filed July 8, 1898. Serial No. 685,404. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. FOX, a citizen of the United States, residing at Grand Rapids, county of Kent, and State of Michigan, have invented certain new and useful Improvements in Blanking, Forming, and Piercing Dies, of which the following is a specification.

My invention relates to an improved press for blanking, forming, and piercing sash-pulley sections of sheet metal.

The object of the invention is to provide a press in which the pulley-section may be formed up, severed from the blank, and the center pierced for the hub or axle at a single operation of the press, the blank being firmly held, so that the metal will draw evenly with no wrinkling at the edges.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front view partly in section. Fig. 2 is a central vertical section taken transversely to the section-line of Fig. 1. Fig. 3 is a section on line *y y* of Fig. 1. Fig. 4 is a detail view taken at right angles to Fig. 1. Fig. 5 is a detail sectional view of the blanking-die and former, showing the pulley-section in place and the die just on the act of cutting the center from the strip.

In the drawings, 5 represents the press-frame, 6 the bed-plate or die-holder, and 7 the shaft that transmits motion to the slide, these parts being of the ordinary or any desired construction.

8 represents the slide, which is guided vertically in the press-frame and carries a housing 8^a, which forms a cylindrical bearing for the forming-plunger hereinafter more fully described. The slide 8 is connected with the crank 9 by a pitman or connecting-rod 10, one end of the pitman being secured to the slide by a pin 11, while the other end encircles an eccentric 12, the eccentric being adjustably clamped by the pitman, whereby any necessary or desired adjustment of the pitman relative to the crank may be secured. To the lower end of the slide 8 is secured the presser-plate 17 by means of the ring 54, this presser-plate serving also as a blanking-die, as hereinafter described.

Within the housing is guided the slide 38,

which is held normally in an elevated position by a spring 42, connecting the upper portion of the slide with a fixed part of the press-frame. A cam 41 is keyed to the crank 9 and operates to depress the slide 38 against the pressure of the spring by bearing on a hardened bearing-wheel 43, carried on a supporting-pin 46. Antifriction-rollers 44 are preferably provided, traveling upon a hardened-steel bushing 45, encircling the pin. In order to obtain adjustment, the supporting-pin 46 is carried in a yoke 47, which is movable vertically of the slide and guided in a slideway 49. An adjusting-screw 48 is provided for varying the elevation of the yoke. The upper forming-die 19 is connected to the lower end of the slide 38 by a set-screw 37, which passes through an elongated opening in the housing. A piercer or punch 31 is provided for punching the hole in the center of the blank which passes through a central opening in the former 19 and has its upper end secured by a pin 32 to the adjustable plunger 33, carried in a recess in the slide 38. An adjusting-bar 34 passes through the plunger 33 and has its ends secured adjustably to the housing 8^a by means of the screws 35 and lock-nuts 36, whereby the punch 31 may be adjusted vertically with relation to the slide 8.

It is to be noted that the severing of the blank from the strip of sheet metal does not take place until the pulley-section is formed. To hold the strip during the forming operation, a lower pressure-ring 16 is provided in line with the upper ring 17, which is supported upon a heavy steel spring 20, serving to hold the ring 16 firmly up against ring 17 when the latter begins to descend, thereby firmly clamping the stock. The lower former 18 rests solidly on the sleeve 19^a, which is firmly supported by the die-block 6.

In order to blank out or sever the pulley-section from the strip after it has been formed, a lower blanking ring or punch 13 is provided encircling the lower former, which is supported on a series of adjustable pins—in the present instance eight in number. Two of these pins, one of which is shown at 21, Fig. 1, the other being diametrically opposite, are kept in contact with the punch by a coiled

spring 22, which causes the ring to act as a stripper or means for forcing the blanked section out of the bottom former. The other six pins rest on the steel washer 22', which is supported by the nut 15, the nut being split at 23, so that it can be securely clamped in any position. These six pins are of such length (see Fig. 2) that there is a space 24 between the bottom of punch 13 and the top of the pin 14, this opening representing the amount of compression of springs 22. As the blanking-ring 13 is ground or worn away it may be adjusted vertically by the nut 15 on screw 25.

The pressure-plate 17 also serves as a blanking-die, the material being sheared between the corner of plate or ring 17 and the corner of plate or ring 13, as indicated at 27.

On account of the reciprocating motion of the punch 13 there is a tendency of the former 18 working up out of the holder, which is overcome by having a sleeve 26 fastened to the bottom of the former 18 and threaded into the sleeve 19^a.

In order that the hole in the center may be punched by the piercer or punch 31 at the same operation, a steel die 28 is provided, which is adjustable on the hollow rod 29. The adjustable rod is threaded into the sleeve 19^a and secured in proper adjustment by lock-nut 30.

Having thus described the various parts, I will briefly describe the operation of the press.

The strip of metal 50 (see Fig. 6) is placed or fed between the formers in any suitable manner, and the crank revolving forces the slide 8 and slide 38 down in unison. As soon as the rings or plates 16 and 17 come in contact with the metal the lower one is depressed and the formers 18 and 19 begin to draw the metal into shape, the edges being in the meantime securely held by the pressure-plates. When the former 19 has reached the limit of its downward stroke and the blank is fully formed, the relative arrangement of the cams operating the slides is such that the slide 8, and with it the presser-plate 17 and punch 31, continues its downward movement. By this time, however, the springs 22 have been compressed until the ring 13 rests solidly on the six pins and the further downward movement of pressure-plate 17, acting against the stationary edge of ring 13, shears off the metal, while at the same time the punch 31 cuts out the central hole. In the continued movement of the crank-shaft as soon as the slide with the ring 17 recedes the pressure-ring 16 is forced upward by the springs 22 and 20 out of the former 18 when the cam 41 has revolved, so that the former 19 will start downward, carrying with it the form-blank and strip, which, being fed along at the same time, should carry the form-blank out from under the tools, delivering it free from them and leaving the strip in readiness for the next operation.

For convenience in getting out the parts

the housing 8^a is preferably made with a detachable front cap 53 54, bolted to the main portion.

Having thus described my invention, what I claim is—

1. A forming-press comprising a stationary and a movable former, a blanking-ring, encircling the stationary former and adapted to yield to a limited degree under pressure thereof, a yielding pressure-ring encircling the blanking-ring, and a movable pressure-ring in line with said yielding pressure-ring, and means for operating said movable former and pressure-ring, substantially as described.

2. A forming-press comprising a stationary and a movable former, a blanking-ring encircling the stationary former and adapted to yield to a limited degree, a yielding pressure-ring encircling the blanking-ring, a reciprocating pressure-ring in line with the yielding pressure-ring, a piercer located in an opening centrally of the movable former, and means for imparting movement to said piercer, former and pressure-ring, substantially as described.

3. In combination, the reciprocating former, the reciprocating pressure-ring encircling the same, the stationary former, the spring-pressed blanking-ring encircling the same, stops to limit the movement of said blanking-ring, and the spring-pressed pressure-ring encircling the blanking-ring, substantially as described.

4. In combination, the reciprocating former, the reciprocating pressure-ring, the stationary former, the yielding blanking-ring encircling the stationary former, the series of pins forming stops for said blanking-ring, means for adjusting said pins toward or from the blanking-ring, and a yielding pressure-ring surrounding the blanking-ring, substantially as described.

5. In combination, the reciprocating former, the reciprocating piercer extending through an opening in said former, the reciprocating pressure-plate encircling the former, the stationary former, the piercer-die extending through an opening in the stationary former, the yielding blanking-ring encircling the stationary former, stops for limiting the movement of the blanking-ring, and the yielding pressure-plate encircling the blanking-ring, substantially as described.

6. In combination, the die-block, the stationary former seated thereon, the piercing-die located centrally of said former with means for adjusting the same, the yielding blanking-die encircling the former, adjustable stops for said blanking-die, the yielding pressure-plate encircling the blanking-die and the reciprocating piercer, former and pressure-ring cooperating with said parts, substantially as described.

7. The combination with a stationary former, piercing-die and yielding pressure-plate, of a reciprocating slide carrying a housing, a second slide guided in said housing, a

former carried by said second slide, a pressure-ring carried by said first-named slide, and a piercer guided in an opening through the former and operatively connected with the
5 said first-named slide, substantially as described.

8. The combination with a stationary former, piercing-die, blanking-ring, and pressure-plate, of a reciprocating slide carrying a
10 housing, a pressure-ring carried by said slide, a channeled slide guided in said housing, a former adjustably carried by said second slide, a third slide guided in the channel of the second slide and carrying a piercer projecting through an opening in the former,
15 arms projecting laterally from said third slide, and adjusting-screws adjustably connecting said arms with the first slide, substantially as described.

20 9. The combination with the stationary

former, of the reciprocating slide carrying a former, the yoke adjustably connected with said slide, the pin carried by said yoke, the bearing-wheel journaled on said pin on anti-friction-rollers, the operating-shaft carrying
25 a cam bearing on said bearing-wheel, and the spring for keeping the slide pressed upward, substantially as described.

10. The combination with the stationary former and pressure-ring, of the reciprocating slide, the removable front for said slide
30 forming a housing, and the second slide reciprocating in said housing and carrying a former, substantially as described.

In testimony whereof I affix my signature
35 in presence of two witnesses.

WILLIAM R. FOX.

Witnesses:

GEORGE S. MILLER,
GEO. K. McMULLEN.