

No. 776,345.

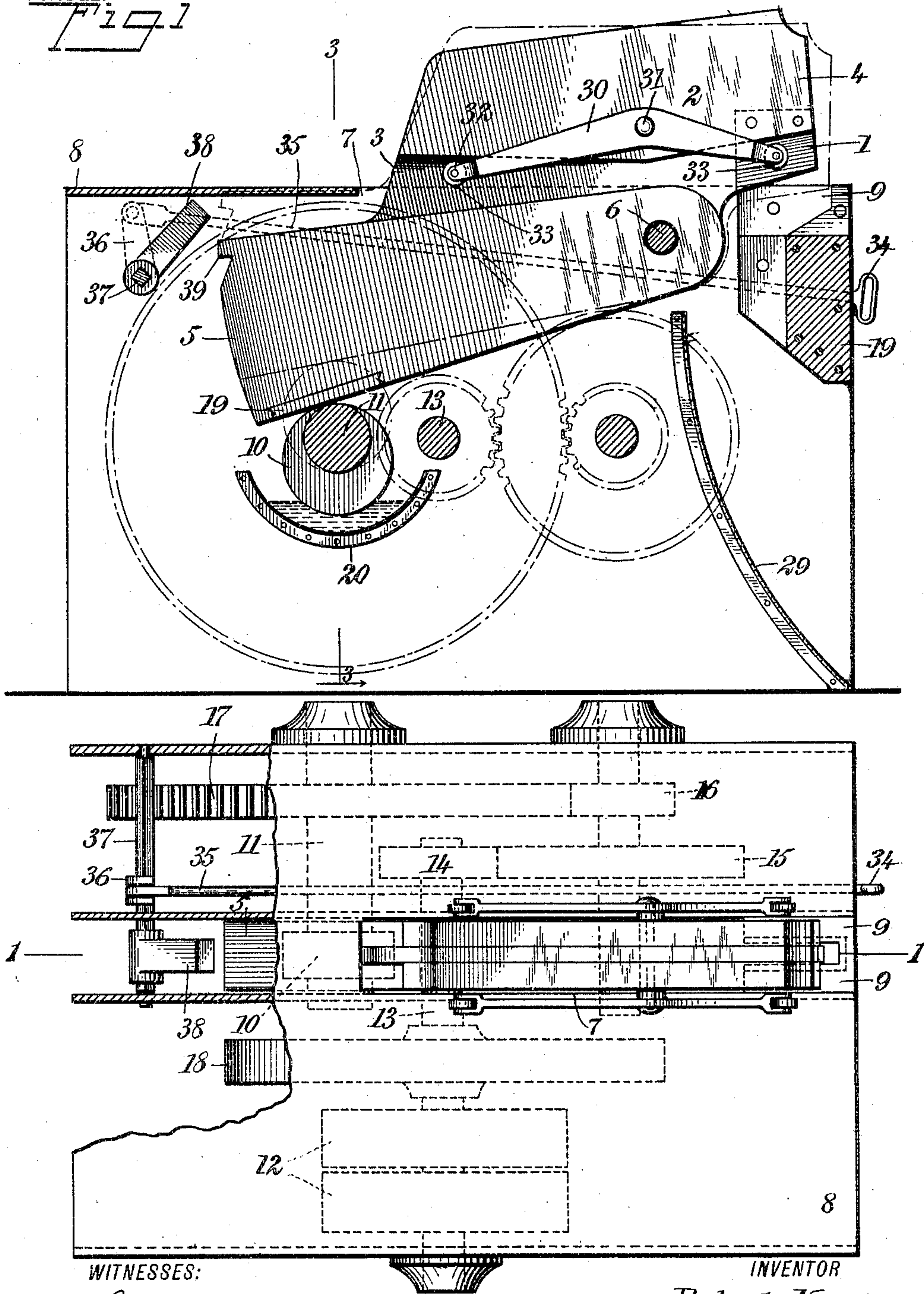
PATENTED NOV. 29, 1904.

R. NORRIE.  
MACHINE FOR PUNCHING OR SHEARING METAL.

APPLICATION FILED JAN. 29, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

J. P. Proply  
A. C. Davis

Fig. 2

INVENTOR

Robert Norrie

BY *Mumma*

ATTORNEYS

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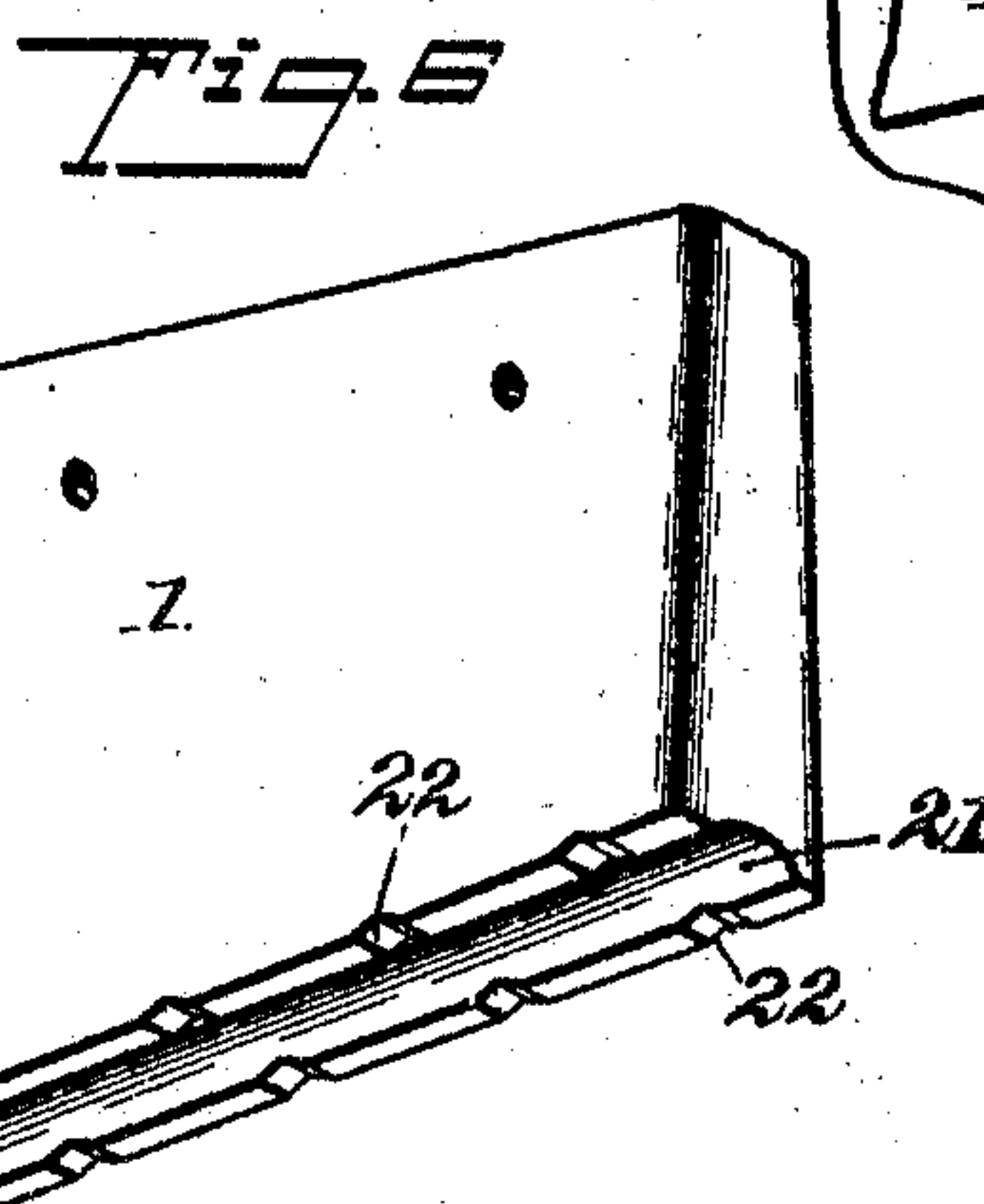
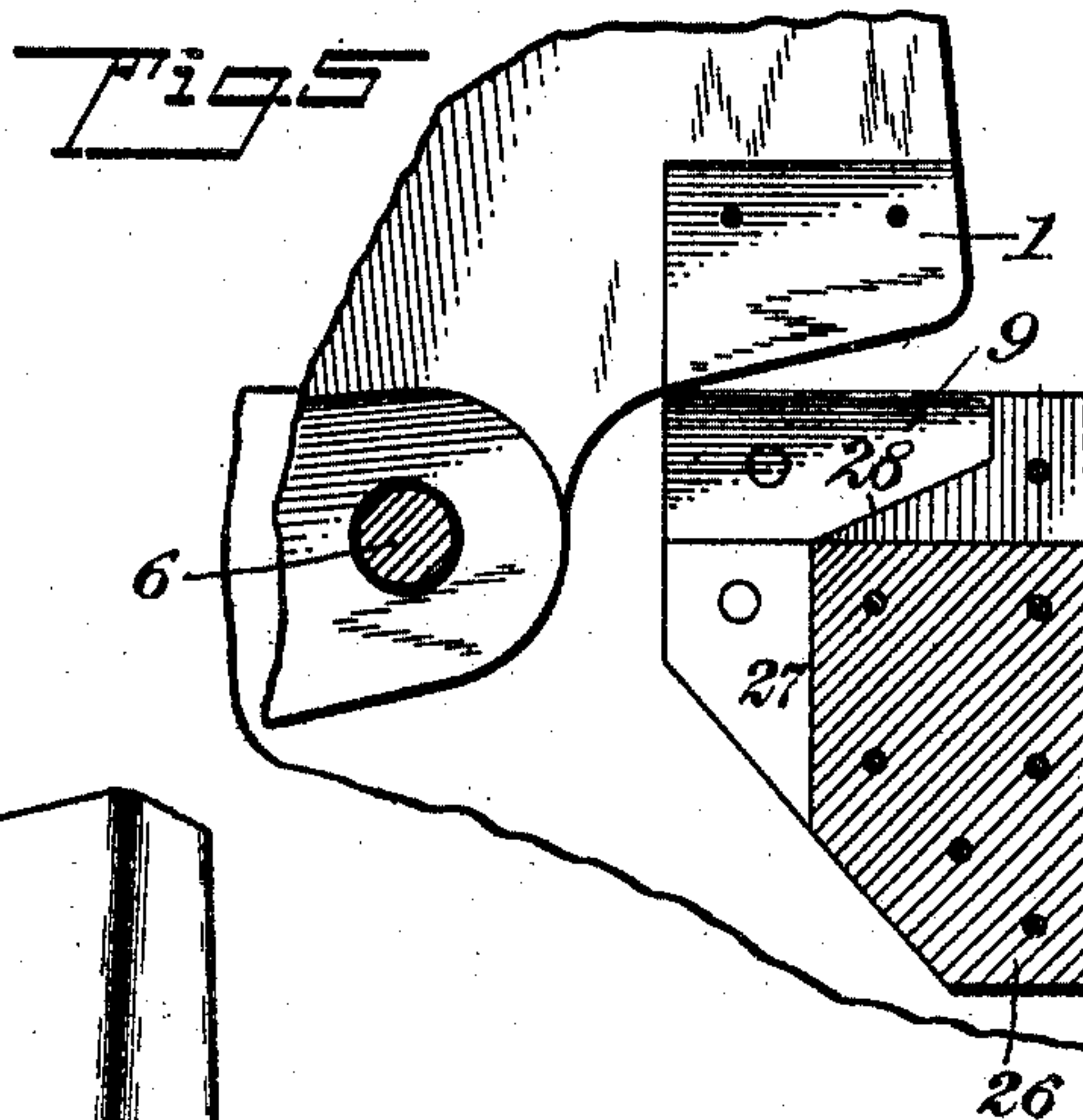
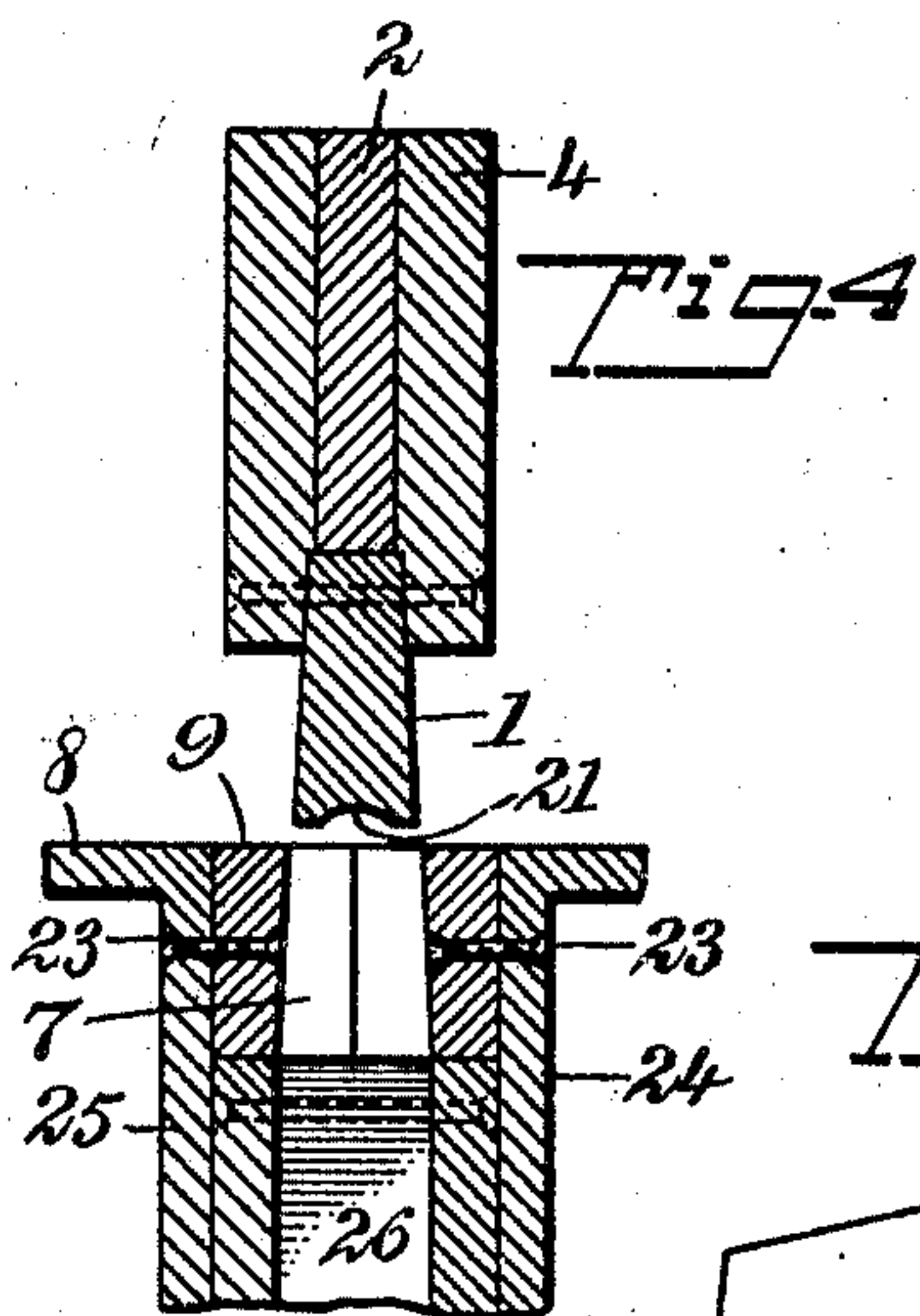
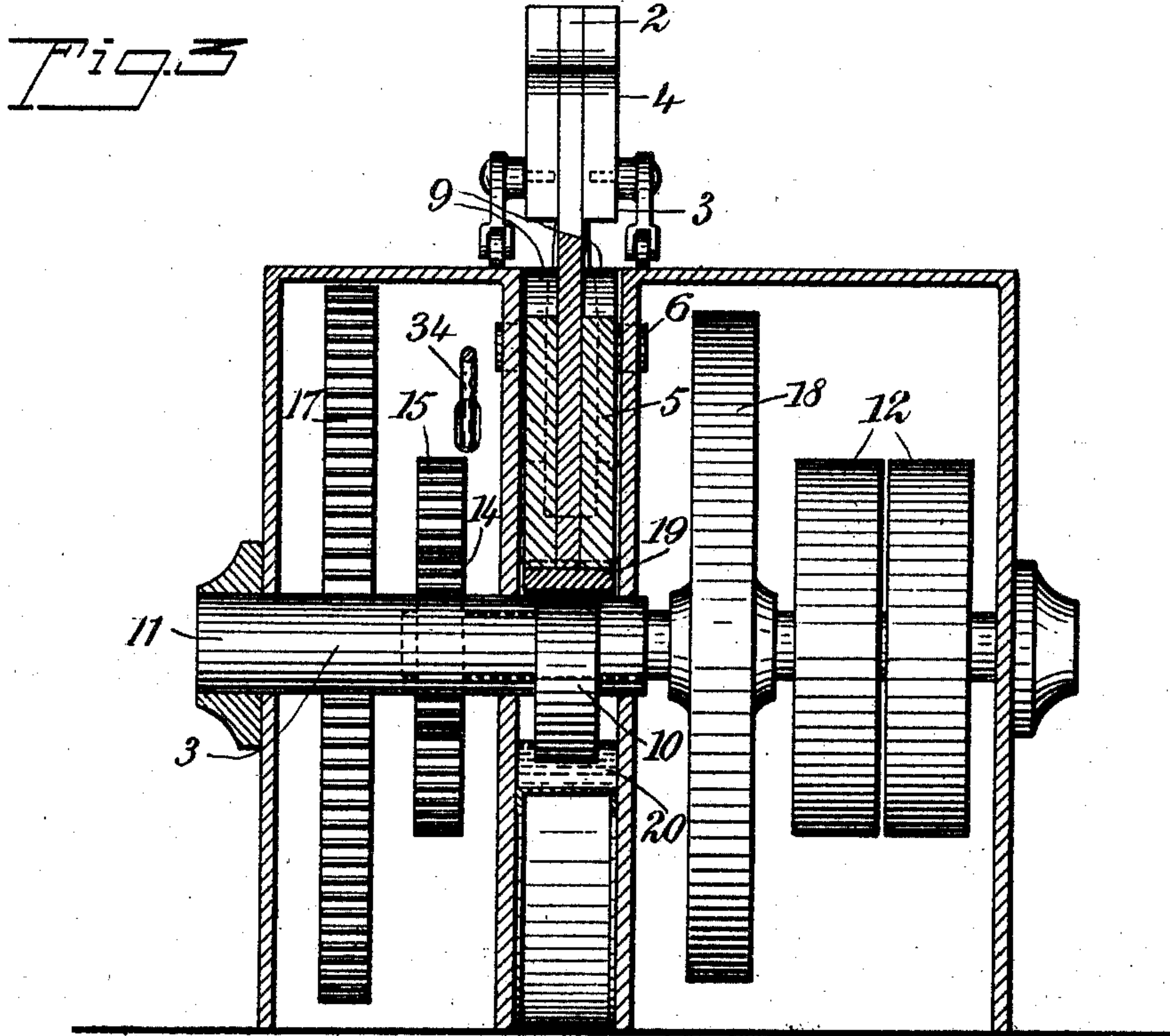
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2 SHEETS—SHEET 2.



WITNESSES:

J. A. Brophy  
A. C. Davis

INVENTOR

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# UNITED STATES PATENT OFFICE.

ROBERT NORRIE, OF RANGOON, BRITISH BURMAH, INDIA.

## MACHINE FOR PUNCHING OR SHEARING METAL.

SPECIFICATION forming part of Letters Patent No. 776,345, dated November 29, 1904.

Application filed January 29, 1904. Serial No. 191,084. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT NORRIE, boiler-maker, a subject of His Majesty King Edward VII, Emperor of India, residing at Dalla Dock-yard, (care of Irrawaddy Flotilla Co., Ltd.) Rangoon, British Burmah, India, have invented Improvements in Machines for Punching or Shearing Metal, of which the following is a full, clear, and exact specification.

10 This invention relates to improvements in machines for cutting metal, and especially to those in which a cutting-blade is arranged to cut down between two lower stationary blades. In machines of this class at present in use it is usually found necessary to employ inde-  
15 pendent means for securely holding the material being cut, and they have the further defect that they are often constructed in such a way that the working parts are above the level of the lower shear-blades, and so come in the way of the material being cut. In order to obviate these defects, I mount the upper cut-  
20 ting-blade on a pivoted frame or lever, which consists of a sheet of metal about the same thickness as the cutting-blade, which is arranged to extend rearward in a straight line with the cutting-blade, so as to form a con-  
25 tinuation of such blade, being stiffened by suitable cheek-pieces so placed as to allow of the free passage of the material being cut on either side of such pivoted lever to enable any length of cut being made.

My invention further relates to improve-  
35 ments in the construction of the upper cutting-blades and lower stationary cutting-blades to enable the machine to be used to shear out a strip of metal or punch out pieces, as desired.

When shearing or punching metal plates of heavy section, the top blade at times lifts the  
40 plate up with it, preventing the plate from being fed or pushed along for the next stroke. To rectify this, I provide a pair of pivoted bars, one placed on either side of the cutting-blade, the ends of which pivoted bars engage  
45 with the material being cut and keep it from rising with the upper blade.

Means are also provided for stopping the stroke of the cutting-blade without stopping the driving mechanism, consisting of a conven-  
50 iently-placed handle actuating a pawl which

engages with a projection on the rear end of the pivoted lever carrying the cutting-blade when at its highest point and retains such lever in the raised position.

In order that my invention may be readily understood, reference will now be made to the accompanying drawings, illustrating one of the forms my invention may take, in which similar figures of reference designate like parts throughout, and in which—

Figure 1 is a longitudinal section on the line 1 1 of Fig. 2. Fig. 2 is a plan with parts broken away. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is a section of the blades on an enlarged scale. Fig. 5 is an enlarged sectional view of the shearing-jaws. Fig. 6 is a perspective view of the upper jaw.

Referring now to the drawings, the cutting-blade 1 is secured by bolts in a slot formed in the front of a pivoted frame or lever 2, Fig. 1. This frame or lever consists of a plate 3 slightly thinner than the cutting-blade, which extends back in a straight line with the cutting-blade, so as to form a continuation of the same. On the upper and lower ends of this plate 3 are riveted strengthening-cheeks 4 and 5. These strengthening-cheeks may, how-  
70 ever, be made in one piece with the plate 3. It is to the upper of these cheeks 4 that the cutting-blade is secured. The positions in which these cheeks 4 and 5 are fixed or made on the plate 3 and their shape are such as to admit of the metal sheet, cylinder, or other object being cut passing along the cutting-table without coming into contact with either of  
85 the cheeks. The frame or lever 2 is pivoted at 6 and is made to work up and down in a slot 7 in the cutting-table 8, at whose front end and corresponding with the cutting-blade 1 are two cutting-blades 9, set on either side of the slot 7 and between which the blade 1 is made to force the metal being sheared or punched out. The lower edge of the frame or lever 2 and at such a distance from the piv-  
90 otal point as to give the desired mechanical advantage comes in contact with a cam 10, Fig. 1, placed on the shaft 11, the revolution of which causes that end of the frame or lever 2 to be alternately raised and lowered. As that end of the frame rises the cutting-blade 100



1 passes downward between the cutting-blades 9 until when the cam 10 has raised its end of the pivoted frame to its highest point the cutting stroke is complete, and as the frame falls back to its former position under the action of gravity the cutting-blade 1 returns to its original position ready for the next cutting stroke. The extent of the movement is shown by dotted lines in Fig. 1. Motion is conveyed to the shaft 11 and its cam 10 through a series of gear-wheels, reducing the speed of the motive power (which may be applied in any convenient way) to the desired extent; but I make no claim to the arrangement of this gearing, and any convenient form may be used. In the drawings I have shown a series of cog-wheels reducing the speed of the driving-pulley 12 on shaft 13 through gear-wheels 14, 15, 16, and 17 to the desired extent in the shaft 11. A fly-wheel 18 may also be mounted on the driving-shaft. The lower edge of the pivoted lever 2, which comes in contact with the cam 10, is provided with a gun-metal or other suitable block 19, which is dovetailed into the pivoted lever, so that it can be readily renewed, as required. The cam 10 is preferably arranged to revolve in an oil-bath 20, as shown in Fig. 1, to keep it properly lubricated.

The cutting-blade 1 is of special shape. When used as a "punch," it is formed with a square end, the corners being preferably rounded off, as illustrated in Fig. 6. The blade is slightly tapered away from its cutting-surface, making it broader at the bottom than at the top to allow of the blade giving a clean cut. Its cutting-surface is preferably provided with a concave groove 21, running down its length, as shown in Figs. 4 and 6. In order to give the cutting-blade a better grip upon the plate being cut, its cutting edge may be provided with transverse serrations 22, a convenient form of which is illustrated in Fig. 6. It will of course be evident that the cutting edge may, however, be formed in any desired manner.

The lower cutting-blades 9, Figs. 2, 4, and 5, are preferably made so as to come together in front and form a support for the material being punched and prevent its being deformed. The cutting edges of the lower blades will then correspond with the side and end of the cutting edges of the upper punching-blade. These cutting-blades 9 are made so that their sides adjacent to the slot 7 are nearer each other at the top than at the bottom to allow the metal punched out to pass freely down. For simplicity of manufacture they are preferably made separately and bolted together. A flush rivet 23 is also provided toward the back, which secures each jaw to the cheek-plates 24 and 25.

Beneath the cutting-blades 9 and arranged to support them is bolted or otherwise secured a block 26. In order to prevent the

pieces which are punched out from clogging the machine, a groove 27 is provided in the back of this block 26, and the bottom of the recess 28, formed by the jaws 9, is sloped somewhat, as illustrated in Fig. 5.

When the machine is to be used to shear strips of the material at each stroke of the lever 2, the blade 1 is constructed somewhat as illustrated in Fig. 5, its end being rounded off, so that it shears out a long strip. Its cutting edge is preferably similar to that already described, having a longitudinal concave groove, and may, if desired, have transverse serrations, as shown in Fig. 6. The lower cutting-blades, Fig. 5, for the shearing arrangement are the same as used for the above-described punching arrangement, their sides corresponding with the sides of the shearing-blade. The stroke of the shearing-blade will not, however, be so deep as that of the punching-blade. The upper cutting-blades may, if desired, be made interchangeable, so that the machine could be used as a "shearing" or a "punching" machine by simply changing the blade 1. As a metal sheet is being cut through the strip being sheared out is by the action of the blade 1 bent downward, and as the sheet is further fed into the machine this strip first comes in contact with the front of the lower cheek 5 of the pivoted frame, which is suitably curved, and later into contact with a guide 29, by which it is led out of the machine.

It has been found that when shearing or punching metal plates of heavy section the top blade at times lifts the plate up with it, and so prevents the plate from being fed or pushed along for the next stroke. In order to obviate this, I provide a pair of pivoted bars 30, Fig. 1, one placed on either side of the upper cheek-piece 4, their pivotal points 31 being somewhat nearer the front of the bars, so that their rear ends 32 are heavier and rest normally on the table 8. As the plate being cut moves along it passes between these bars 30 and the top of the table 8 and is prevented from rising by such bars. The portions of these bars which come in contact with the metal being cut may be rounded off or, if desired, provided with rollers 33 to reduce friction. These pivoted bars 30 are preferably arranged so that they may be removed at will.

Means are also provided for stopping the stroke of the pivoted lever 2 without stopping the cam mechanism, consisting of a handle 34, Figs. 1, 2, and 3, which operates, through the connecting-rod 35, a crank 36 on the spindle 37, on which is mounted a pawl 38, which engages with the projection 39 on the rear end of the pivoted lever when at its highest point and retains such lever in the raised position. At each revolution of the cam 10 the lever will be raised just sufficiently to admit of the pawl 38 being disengaged from the projection 39 to put the machine into action again. The



position of the handle 34 may of course be altered, as found convenient.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a machine for shearing metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, such cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations, and stationary cutting edges mounted on the frame adjacent to the path of travel of the first-mentioned cutting-blade.

2. A machine for shearing metal or the like, comprising a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, such cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations on both sides of such groove, stationary cutting edges mounted on the frame adjacent to the path of travel of the first-mentioned cutting-blade, and a cam mechanism for actuating the cutter.

3. A machine for punching metal or the like, comprising a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, said cutting-blade having a square end with rounded cutting-corners, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched.

4. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, said cutting-blade having a square end with rounded cutting-corners, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched, and a cam mechanism for actuating the cutter.

5. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, the cutting-blade hav-

ing a longitudinal concave groove along its cutting-surface and having a square end with rounded cutting-corners, and stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched.

6. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, the cutting-blade having a longitudinal concave groove along its cutting-surface and having a square end with rounded cutting-corners, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched, and a cam mechanism for actuating the cutter.

7. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners, and stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched.

8. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched, and a cam mechanism for actuating the cutter.

9. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners,



such cutting-blade being tapered upward from its cutting-surface, and stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched.

10. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners, such cutting-blade being tapered upward from its cutting-surface, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched, and a cam mechanism for actuating the cutter.

11. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners, such cutting-blade being tapered upward from its cutting-surface, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched, a cam mechanism for actuating the cutter, and a block supporting said cutting edges having a groove therein for the removal of the material punched out.

12. A machine for punching or shearing metal, comprising a pivoted lever having a projection on its rear end, a blade on said lever, and a pawl mechanism engaging with said projection to retain the lever in raised position.

13. A machine for punching or shearing metal or the like, comprising a cutting-blade having a longitudinal concave groove along its cutting-surface, and a plurality of transverse serrations on each side of said groove.

14. A machine of the class described, comprising a cutting-blade having a longitudinal concave groove along its cutting-surface, and transverse serrations on both sides of said groove, the exterior surface thereof tapering away from said cutting-surface.

15. In a machine for punching or shearing metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces

and being formed with a longitudinal groove or slot therein, an interchangeable cutting-blade secured in the slotted portion of the pivoted frame having a longitudinal concave groove along its cutting-surface with transverse serrations, and stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned interchangeable cutting-blade to enable the material to be either punched or sheared as desired.

16. In a machine for punching or shearing metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, an interchangeable cutting-blade secured in the slotted portion of the pivoted frame having a longitudinal concave groove along its cutting-surface with transverse serrations, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned interchangeable cutting-blade to enable the material to be either punched or sheared as desired, and a cam mechanism for actuating the cutter.

17. In a machine for punching or shearing metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, an interchangeable cutting-blade secured in the slotted portion of the pivoted frame having a longitudinal concave groove along its cutting-surface with transverse serrations and being tapered upward from its cutting-surface, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned interchangeable cutting-blade to enable the material to be either punched or sheared as desired, a cam mechanism for actuating the cutter and a guide for the material severed by the blades.

18. In a machine for punching or shearing metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, an interchangeable cutting-blade secured in the slotted portion of the pivoted frame having a longitudinal concave groove along its cutting-surface with transverse serrations and being tapered upward from its cutting-surface, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned interchangeable cutting-blade to enable the material to be either punched or sheared as desired, a cam mechanism for actuating the cutter, a block supporting the said stationary cutting edges having a groove for the removal of the material punched out and a guide for the material severed by the blades.

19. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame,



such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece and having a square end with rounded corners, and stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched.

20. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece and having a square end with rounded corners, stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched, and a cam mechanism for actuating the cutter.

21. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece, the cutting-blade having a longitudinal concave groove along its cutting-surface and having a square end with rounded corners, and stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched.

22. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece, the cutting-blade having a longitudinal concave groove along its cutting-surface and having a square end with rounded corners, stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched, and a cam mechanism for actuating the cutter.

23. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening

ing cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners, and stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched.

24. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners, stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched, and a cam mechanism for actuating the cutter.

25. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece, the cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and having a square end with rounded corners, stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched, a cam mechanism for actuating the cutter, and a block supporting said cutting edges having a groove therein for the removal of the material punched out.

26. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece, and stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired.

27. The combination of a main frame, a cut-



ter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece, stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired, and a cam mechanism for actuating the cutter.

28. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece and having a longitudinal concave groove along its cutting-surface, and stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired.

29. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece and having a longitudinal concave groove along its cutting-surface, stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired, and a cam mechanism for actuating the cutter.

30. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece and having a longitudinal concave groove along its cutting-surface with transverse serrations, and stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired.

31. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece and having a longitudinal concave groove along its cutting-surface with transverse serrations, stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired, and a cam mechanism for actuating the cutter.

32. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece having a longitudinal concave groove along its cutting-surface with transverse serrations and being tapered upward from its cutting-surface, stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired, a cam mechanism for actuating the cutter, and a guide for the material severed by the blades.

33. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece, said interchangeable cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations and being tapered upward from its cutting-surface, stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired, a cam mechanism for actuating the cutter, a block supporting the said stationary cutting edges having a groove for the removal of the material punched out, and a guide for the material severed by the blades.

34. In a machine for shearing metal or the like the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being



formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, such cutting-blade having a longitudinal concave groove along its cutting-surface with transverse serrations, stationary cutting edges mounted on the frame adjacent to the path of travel of the first-mentioned cutting-blade, and means for preventing the rising of the plate being operated, consisting of a pivoted bar placed on each side of the first-mentioned cutting-blade.

35. In a machine for punching metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, a cutting-blade secured in the slotted portion of the frame, said cutting-blade having a square end with rounded corners, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned cutting-blade, said cutting edges coming together in front to form a support for the material being punched, and means for preventing the rising of the plate being operated, consisting of a pivoted bar placed on each side of the first-mentioned cutting-blade.

36. In a machine for punching or shearing metal or the like, the combination of a main frame, a frame or lever pivoted in said main frame, said pivoted frame having cheek-pieces and being formed with a longitudinal groove or slot therein, an interchangeable cutting-blade secured in the slotted portion of the pivoted frame, stationary cutting edges mounted on the main frame adjacent to the path of travel of the first-mentioned interchangeable cutting-blade to enable the material to be either punched or sheared as desired, and means for preventing the rising of the plate being operated, consisting of a pivoted bar placed on each side of the first-mentioned interchangeable cutting-blade.

37. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, a cutting-blade bolted in the pivoted frame,

such pivoted frame comprising a plate slightly thinner than the cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the cutting-blade being secured to the uppermost cheek-piece and having a square end with rounded corners, stationary cutting edges mounted below the cutting-blade of the pivoted frame, said cutting edges coming together in front to form a support for the material being punched, and means for preventing the rising of the plate being operated, consisting of a pivoted bar placed on each side of the first-mentioned cutting-blade.

38. The combination of a main frame, a cutter-carrying frame or lever pivoted thereto, an interchangeable cutting-blade bolted in the pivoted frame, such pivoted frame comprising a plate slightly thinner than the said interchangeable cutting-blade and extending rearward in a straight line therewith, strengthening cheek-pieces riveted to the upper and lower end of said plate, the interchangeable cutting-blade being secured to the uppermost cheek-piece, stationary cutting edges mounted below the said interchangeable cutting-blade of the pivoted frame to enable the material to be either punched or sheared as desired, and means for preventing the rising of the plate being operated, consisting of a pivoted bar placed on each side of the first-mentioned interchangeable cutting-blade.

39. In a machine for shearing or punching metal, having an upper cutting-blade operating downward between two stationary cutting edges, said upper cutting-blade having a longitudinal concave groove along its cutting-surface with a plurality of transverse serrations and tapering away from such surface.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ROBERT NORRIE.

Witnesses:

SORABYE CURSETJI SOOKHIA,  
MURRAY GORING.