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Patented Jan. 9, 1900.

F. H. STILLMAN.
HYDRAULIC PUNCH.

(Application filed May 19, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1,

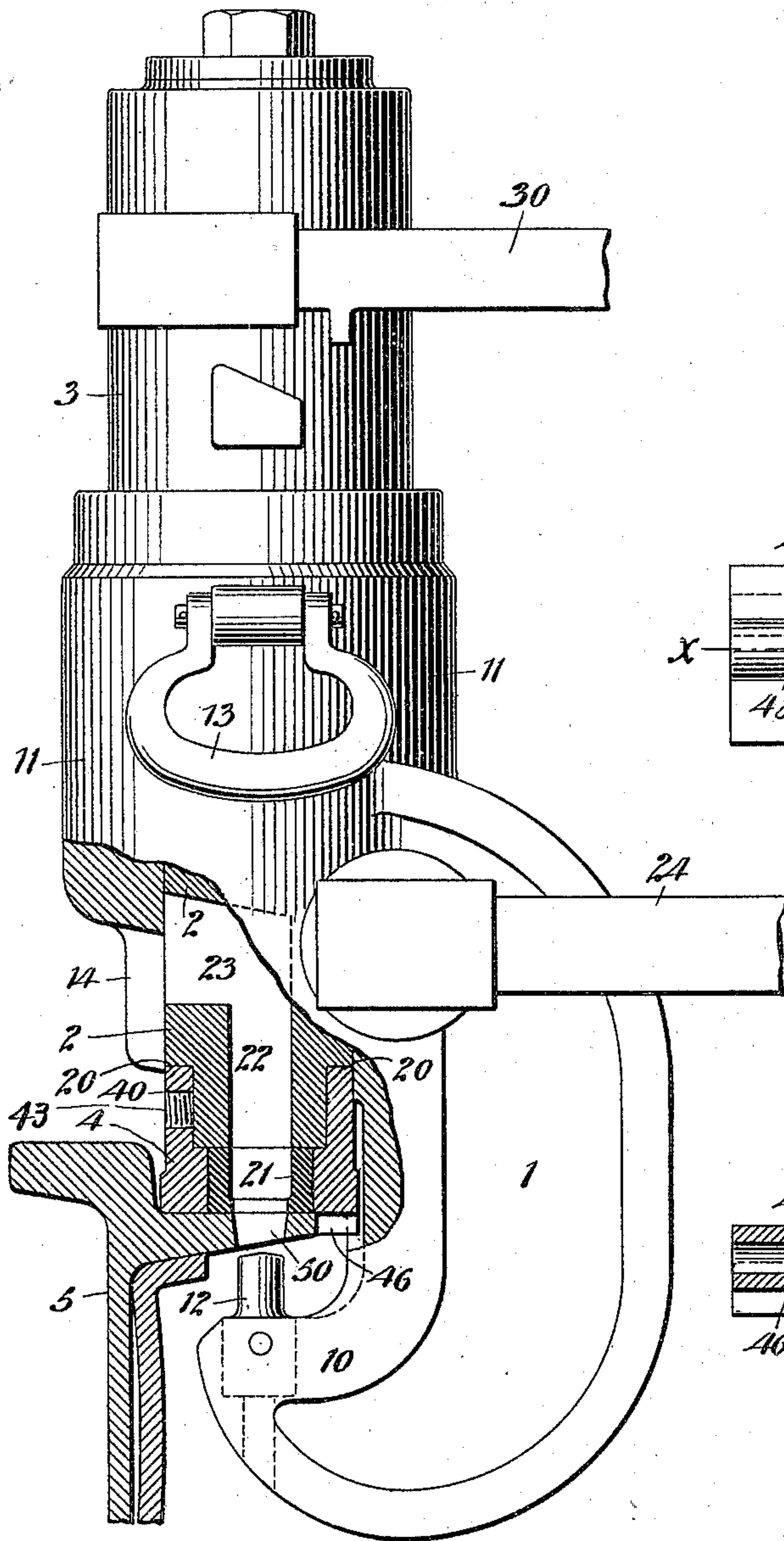


Fig. 2,

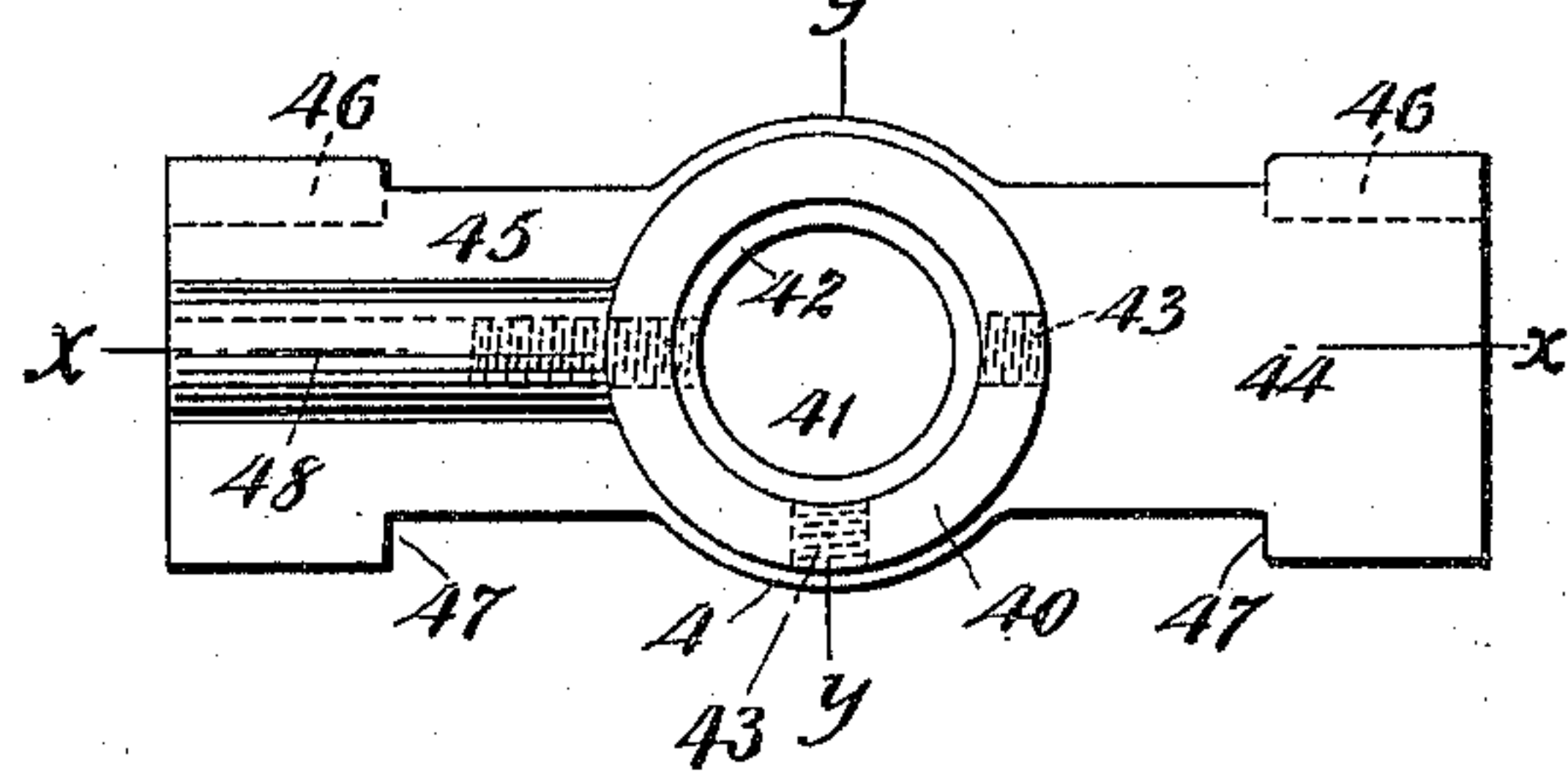
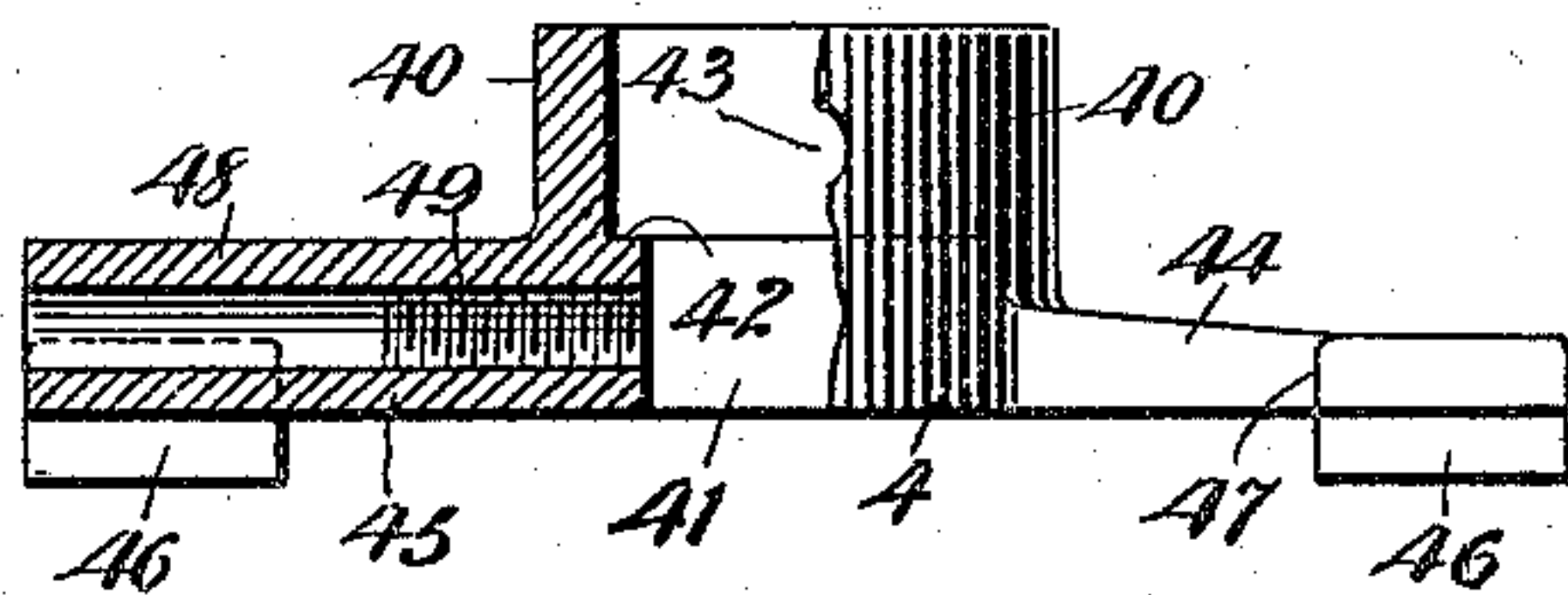


Fig. 3,



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Fig. 4

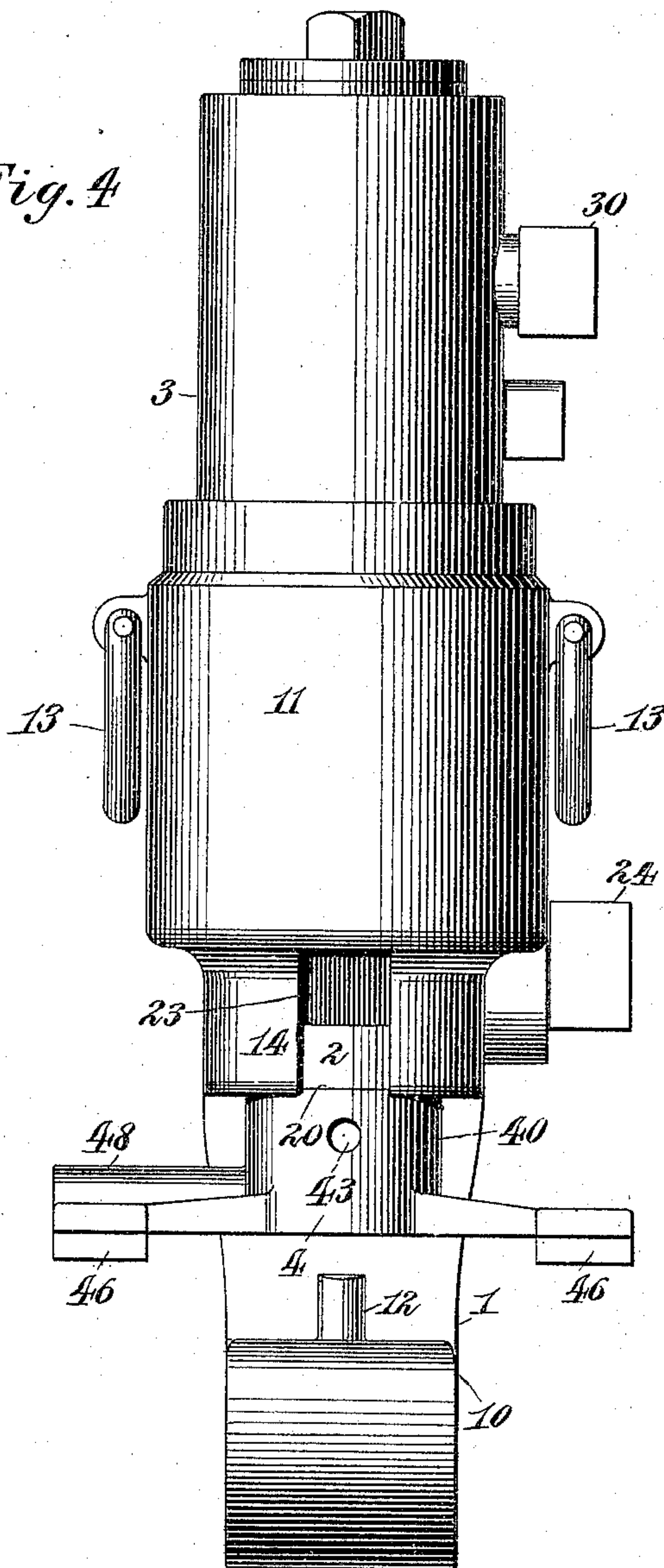
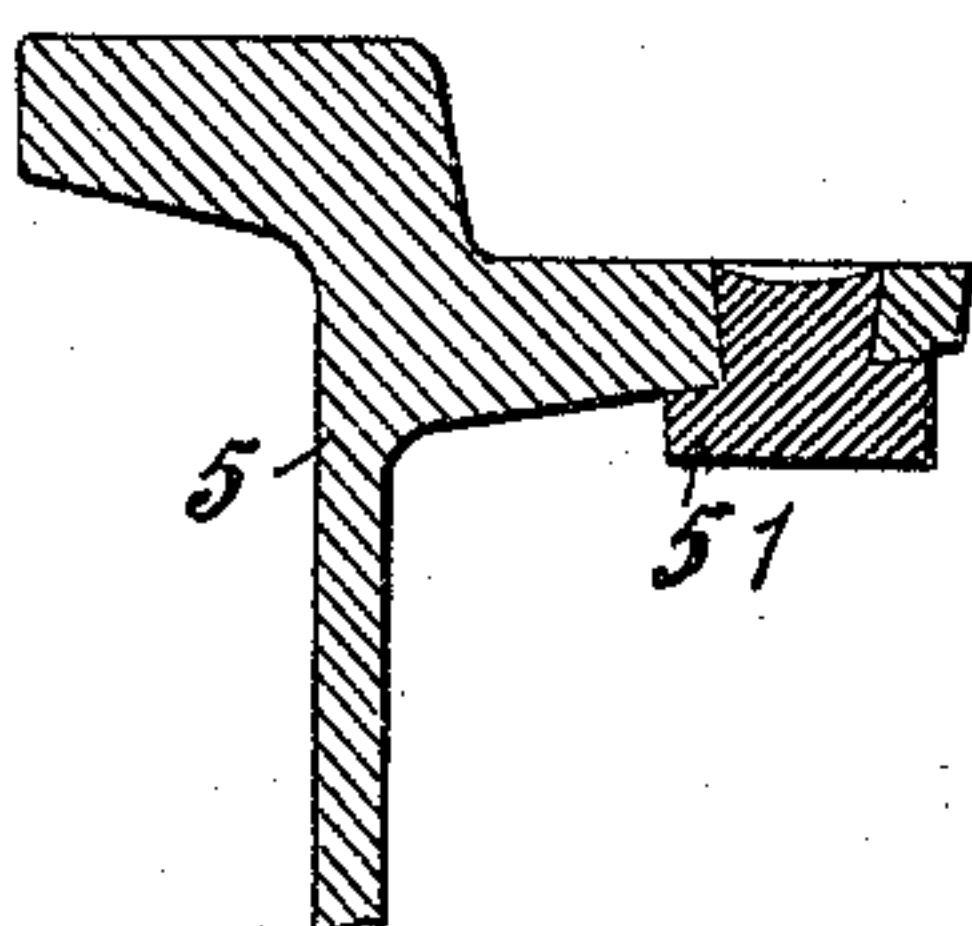


Fig. 5.



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HYDRAULIC PUNCH.

SPECIFICATION forming part of Letters Patent No. 641,163, dated January 9, 1900.

Application filed May 19, 1899. Serial No. 717,440. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. STILLMAN, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Hydraulic Punches, of which the following is a full, clear, and exact description, reference being made to the accompanying drawings, forming part of this specification.

This invention relates to improvements in hydraulic punches by which holes are punched in the rails of electric railways preparatory to bonding the rails; and the object of the invention is to provide a tool fit to punch the holes required to receive the bond-rivets in the flanges of girder-rails either after or before the rails have been permanently laid.

On the accompanying sheets of drawings, Figure 1 is a side and partly-sectional elevation of this punching-tool and a cross-section of a fragment of a rail and illustrates the relation of the tool to the rail when the tool is in use; Fig. 2, a plan of a particular part of the tool; Fig. 3, a front and partly-sectional view of the same part; Fig. 4, a front elevation of the tool; and Fig. 5, a cross-section of a fragment of a rail, showing a bond-rivet upset in the flange.

Similar reference-numerals designate like parts in the different views.

The work of bonding a line of girder-rails is done more conveniently with this punching-tool and a riveting-tool, which is described in another application for a patent, than it is by the common practice, and the rails are bonded with these tools more effectively and durably than they commonly are when the bonds are secured to the webs of the rails. The holes required to receive the bond-rivets are tapering holes, which are smaller at the bottom, where they conform closely to the stems of the rivets, than they are at the top.

The body of this punching-tool is a steel casting and is composed of the frame 1, whose lower branch forms a fixed jaw 10, and of the cylinder 11 on the upper branch of the frame 1. On the jaw 10 is the punch 12, whose diameter is the same as that of the stems of the bond-rivets. The cylinder 11 contains the

ram 2, excepting that part next to its lower end which projects from the cylinder; and on this cylinder is the head 3, which is screwed into the top of the cylinder. The head contains the pump by which the ram is actuated and with which the pump-handle 30 is connected. Handles 13, by which the tool may be lifted and carried, are attached to the sides of the ram-cylinder. To the lower end of the ram 2 a base 4 is affixed. This base is an oblong steel casting, which has midway between its ends a collar 40, and a hole 41, extending from the collar through the base, the diameter of the hole being less than that of the interior of the collar, at the bottom of which is the shoulder 42. The collar has in it two screw-threaded holes 43. The bottom of the base is flat, except at the back and next to the ends of the arms 44 and 45, where there are two projections 46. The front faces of these projections are parallel to the plane xx , Fig. 2, containing the axis of the hole 41 and cutting the ends of the base at right angles, and they are both at the same distance from that plane as the axes of the holes which are to be punched in the rails to receive the bond-rivets are to be from the edges of the flanges of the rails. The surfaces 47 on the front of the base are parallel to the plane yy , Fig. 2, which cuts the plane xx at right angles and on the axis of the hole 41, and the distance of each of these surfaces from the plane yy is equal to one-half the distance between the axes of the rivets of a rail-bond. The arm 45 of the base has on it a rib 48, in which is a screw-threaded hole 49, which extends from the outer end of the arm to the hole 41. The lower part of the ram conforms to the interior and top of the collar 40 of the base 4, and when the base is affixed to the ram the shoulder 20 on the ram rests on the collar and the bottom or face of the ram rests on the shoulder 42 within the collar, while the axis of the ram coincides with that of the interior of the collar and with the prolonged axis of the hole 41. The exterior diameter of the collar is the same as that of the ram above and adjacent to the shoulder 20, and the position of the base on the ram is shown by Fig. 4, and Fig. 1 in which the base is shown in cross-section in the plane yy , Fig. 2. The base is fastened on the ram by set-screws in the holes 43 in

the collar screwed against the ram. The die 21 is fastened in the hole 41 in the base 4 by a set-screw in the hole 49, screwed against the die, the face of the die being flush with the bottom of the base around the hole 41, and the top of the die being in contact with the face of the ram. The interior diameter of the die is greater than the diameter of the punch. The ram contains a hole whose lower part 22 is on the axis of the ram and forms a prolongation of the interior of the die and whose upper part 23 extends from the part 22 to the front of the ram above the collar 40, and in the front of the cylinder 11 and at its lower end is a slot 14, the hole 22 23 and the slot 14 each being of the proper size to allow the slugs which are to be punched out of the rails to pass freely through it. The ram is connected by a rack and pinion in the ram-cylinder with the lever 24, the rack being on the ram and the lever being attached to the shaft on which the pinion is fixed and adapted to turn the pinion. The rack, pinion, and lever are the same as the means commonly used to raise the rams of hydraulic tools.

When the holes intended to receive the rivets of a bond are to be punched with this tool in the flanges of abutting rails, the tool is set on the rails so that the base 4 stands on the flanges of the rails and supports the rest of the tool, and the tool is so adjusted that the projections 46 on the back of the base are in contact with the edges of the flanges of the rails, and that one of the surfaces 47 of the base is in the plane in which the abutting ends of the rails meet or in the plane which is midway between the ends of the rails if the rails do not touch each other. Then, as will be seen from the foregoing description, the axis of the punch and die is at the proper distance from the edge of the flange and from the end of the rail in which the hole is to be punched. The tool is actuated by pumping water from the head into the ram-cylinder. The ram being supported on the rails, the water moves the head and body of the tool instead of the ram and they are forced upward on the ram, which remains stationary, until the punch is driven through the flange of the rail 5. The slug flies upward and out of the ram and ram-cylinder through the passage 22, 23, and 14. The hole 50 made in the rail is tapering, its diameter at the top being the same as the interior diameter of the die, and its diameter at the bottom the same as the diameter of the punch. The body and head of the tool, which are usually held up by the punch in the hole in the rail, are forced down by the handle 24. The adjustment of the tool to prepare for punching the hole in the other rail is effected by moving the tool along the rails and arranging it thereon with the projections 46 in contact with the edges of the flanges and with the other surface 47 at the abutting ends of the rails. The tool then being operated again, the second hole is punched at the proper distances from the edge of the

flange, the end of the rail, and the hole in the other rail. The base 4, it will be observed, not only supports the tool and maintains it in its working position, but also serves as a guide, which facilitates the proper adjustment of the tool on the rails.

The rivets of the bonds are inserted in the holes made by this punch in the flanges of the rails, all parts of the bonds except the stems of the rivets being underneath the flanges, where they do not interfere with the fish-plates or other rail-fastenings and where they are practically safe from injury, and the bonds are secured to the rails with the riveting-tool, which crushes and spreads the rivets within the holes, so that each upset rivet 51 conforms perfectly from its head upward to the shape of the hole and is tightly fastened therein. This not only renders secure the attachment of the bond to the rail, but it effects a superior contact between the rivet and the rail, the surfaces of contact being more than commonly large and the contact being very tight throughout the whole extent of those surfaces. The upper end of the rivet is depressed slightly below the top of the flange of the rail to prevent the rivet from being subjected to any pressure or blow which might tend to loosen it.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A hydraulic punching-tool having its body composed of a frame and a ram-cylinder, firmly united, the frame having the fixed jaw 10 under the ram-cylinder, and the tool comprising the combination with the body of: a punch on the jaw 10; a ram in the ram-cylinder; a die on the face of the ram; a pump connected with the ram-cylinder; and a tool-supporting base extending on opposite sides of the prolonged axis of the ram-cylinder, below the ram-cylinder and above the jaw 10; the ram containing a slug-passage extending from the die to the exterior of the ram; substantially as described.

2. A hydraulic punching-tool having its body composed of a frame and a ram-cylinder, firmly united, the frame having the fixed jaw 10, and the tool comprising the combination with the body of: a punch on the jaw 10; a ram in the ram-cylinder; a die on the face of the ram; a pump connected with the ram-cylinder; and a tool-supporting base on the ram, extending in opposite directions from the die; the ram containing a slug-passage extending from the die to the exterior of the ram; substantially as described.

3. A hydraulic punching-tool having its body composed of a frame and a ram-cylinder, firmly united, the frame having the fixed jaw 10, and the tool comprising the combination with the body of: a punch on the jaw 10; a ram in the ram-cylinder; a die on the face of the ram; a pump connected with the ram-cylinder; and a tool-supporting base on the ram, fashioned to fit on the rails of a railway on opposite sides of the body of the tool; the

ram containing a slug-passage extending from the die to the exterior of the ram; substantially as described.

4. A hydraulic punching-tool comprising the combination of: a jaw and punch on the lower part of the body; a ram-cylinder containing a ram, on the upper part of the body; a die on the face of the ram; a pump connected with the ram-cylinder; and a tool-supporting base on the ram, extending on opposite sides of the die, and fashioned to fit on the flanges of the rails of a railway, and having on its under side, at the back, projections 46, and on the front, surfaces 47; the ram containing a slug-passage extending from the die to the exterior of the ram; substantially as described.

5. A hydraulic punching-tool having its body composed of a frame and a ram-cylinder, firmly united, the frame having the fixed jaw 10 under the ram-cylinder, and the tool comprising the combination with the body of: a punch on the jaw 10; a ram in the ram-cylinder; a die on the face of the ram; a pump connected with the ram-cylinder; and a device extending on opposite sides of the prolonged axis of the ram-cylinder, below the ram-cylinder and above the jaw 10, and fashioned as a guide to facilitate the adjustment of the tool on the rails; the ram containing a slug-passage extending from the die to the exterior of the ram; substantially as described.

6. A hydraulic punching-tool comprising the combination of: a jaw and punch on the lower part of the body; a ram-cylinder containing a ram, on the upper part of the body; a pump connected with the ram-cylinder; a tool-supporting base comprising a collar 40 and having in it a hole 41, the base being held on the ram by the collar surrounding the lower end of the ram; and a die secured in the hole 41; the ram containing a slug-passage ex-

tending from the die to the exterior of the ram above the collar; substantially as described. 45

7. A hydraulic punching-tool having its body composed of a frame and a ram-cylinder, firmly united, the frame having the fixed jaw 10, and the tool comprising the combination with the body of: a punch on the jaw 10; a ram in the ram-cylinder; a die on the face of the ram; and a pump connected with the ram-cylinder; the ram containing a slug-passage extending from the die to the exterior of the ram; substantially as described. 50

8. A hydraulic punching-tool having its body composed of the frame 1 and cylinder 11, firmly united, the frame having the fixed jaw 10, and the cylinder having the opening 14 in its front at the lower end, and the tool comprising the combination with the body of: a punch on the jaw 10; the ram 2 in the cylinder; a die on the face of the ram; and a pump connected with the cylinder; the slug-passage 22, 23 in the ram connecting the interior of the die with the opening 14 in the ram-cylinder when the punch and die are brought together; substantially as described. 55

9. A hydraulic punching-tool having its body composed of the frame 1 and cylinder 11, the frame having on it the jaw 10, and the cylinder having the opening 14 in its front at the lower end, and the tool comprising the combination with the body of: the punch 12 on the jaw 10; the ram 2 in the cylinder; the head 3 on the cylinder; the base 4 on the ram; and the die on the face of the ram in the base 4; the slug-passage 22, 23 in the ram connecting the interior of the die with the opening 14 in the ram-cylinder when the punch and die are brought together; substantially as described. 60

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In presence of—

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