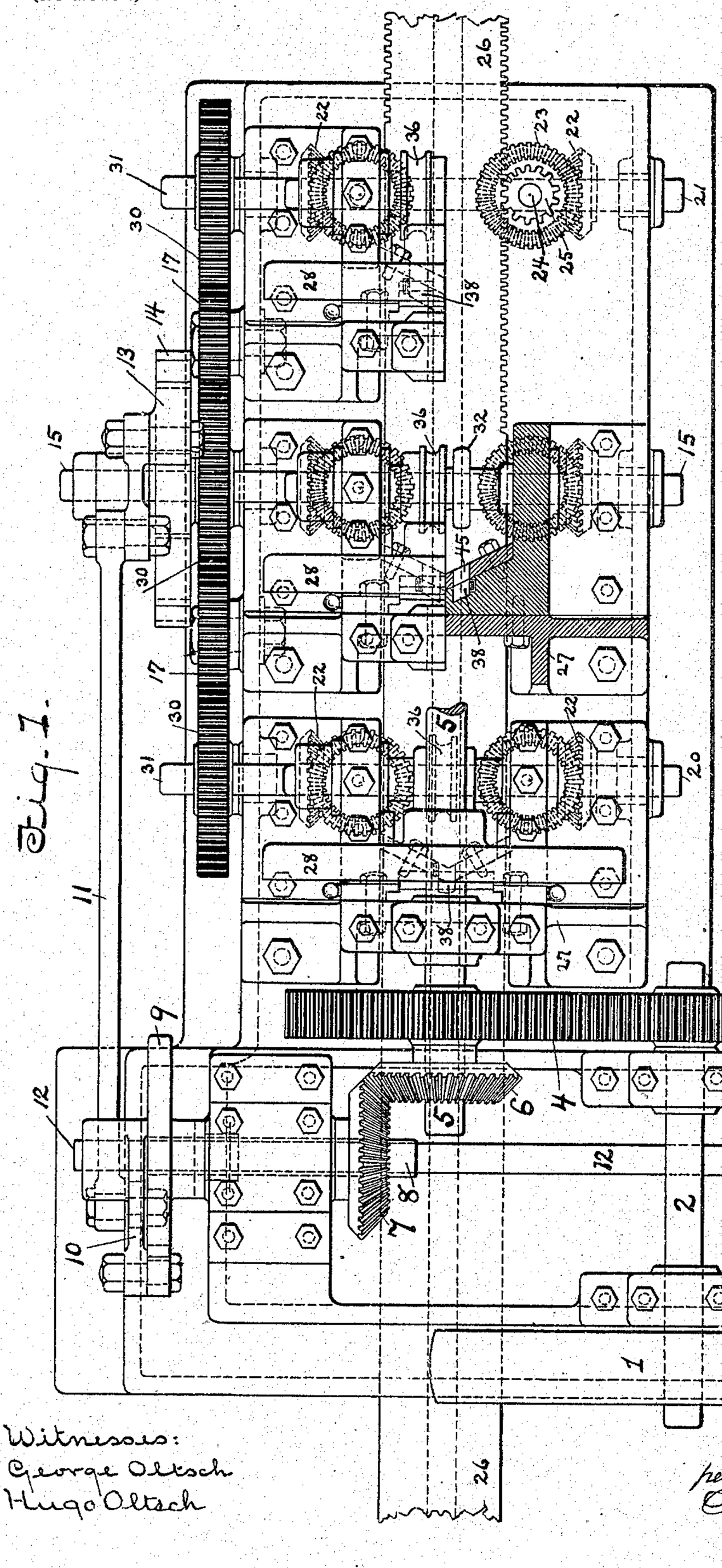
No. 687,761 Patented Dec. 3, 1901.

H. I. LAHR.

MACHINE FOR APPLYING METALLIC PLATES IN THE MANUFACTURE OF PUNCTURE PROOF TIRES.

(Application filed Nov. 13, 1900.)

(No Model.) 5 Sheets—Sheet 1.



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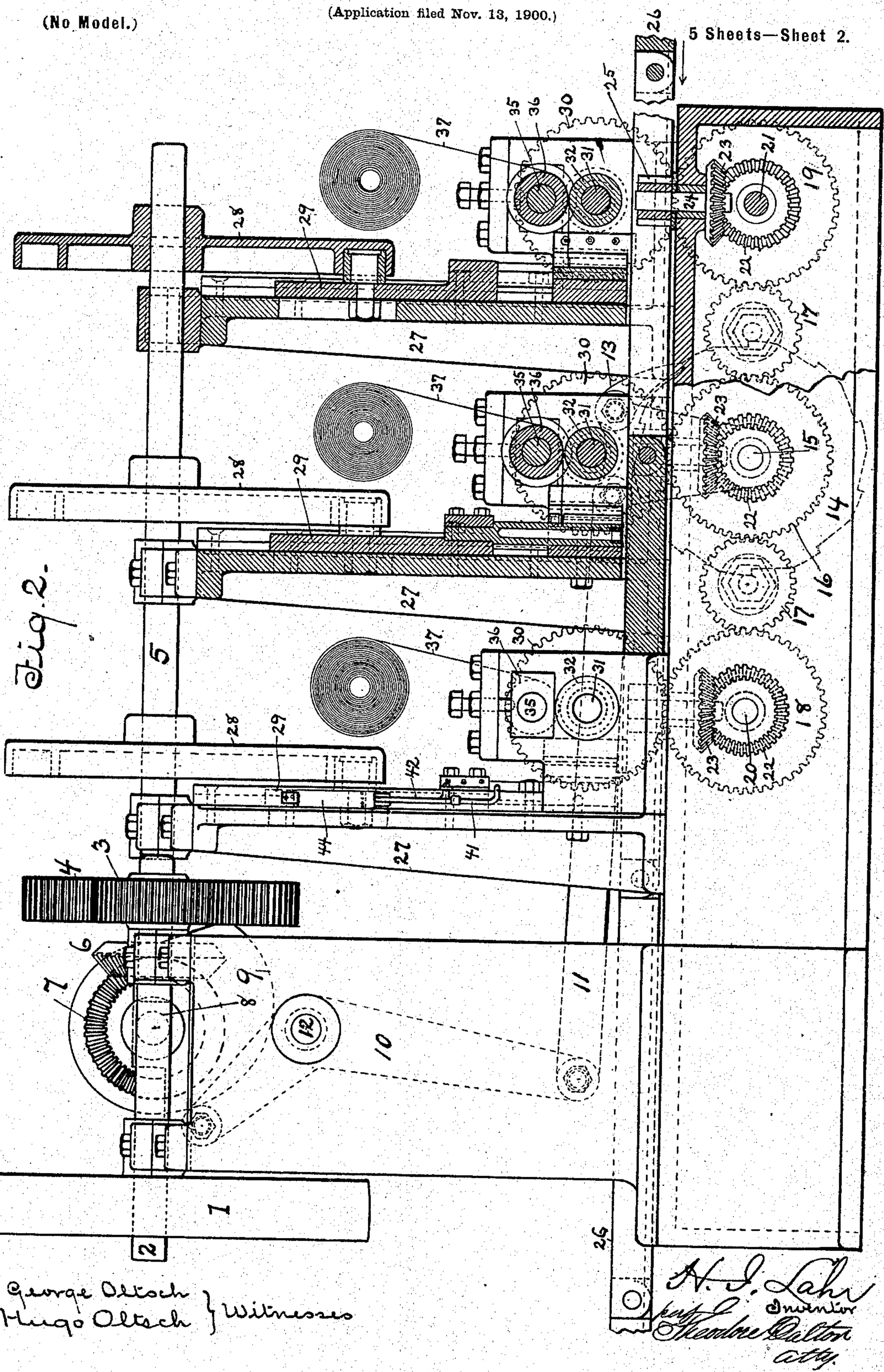
5 Sheets—Sheet 2.



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(No Model.) 5 Sheets—Sheet 3.

Fig. 3.

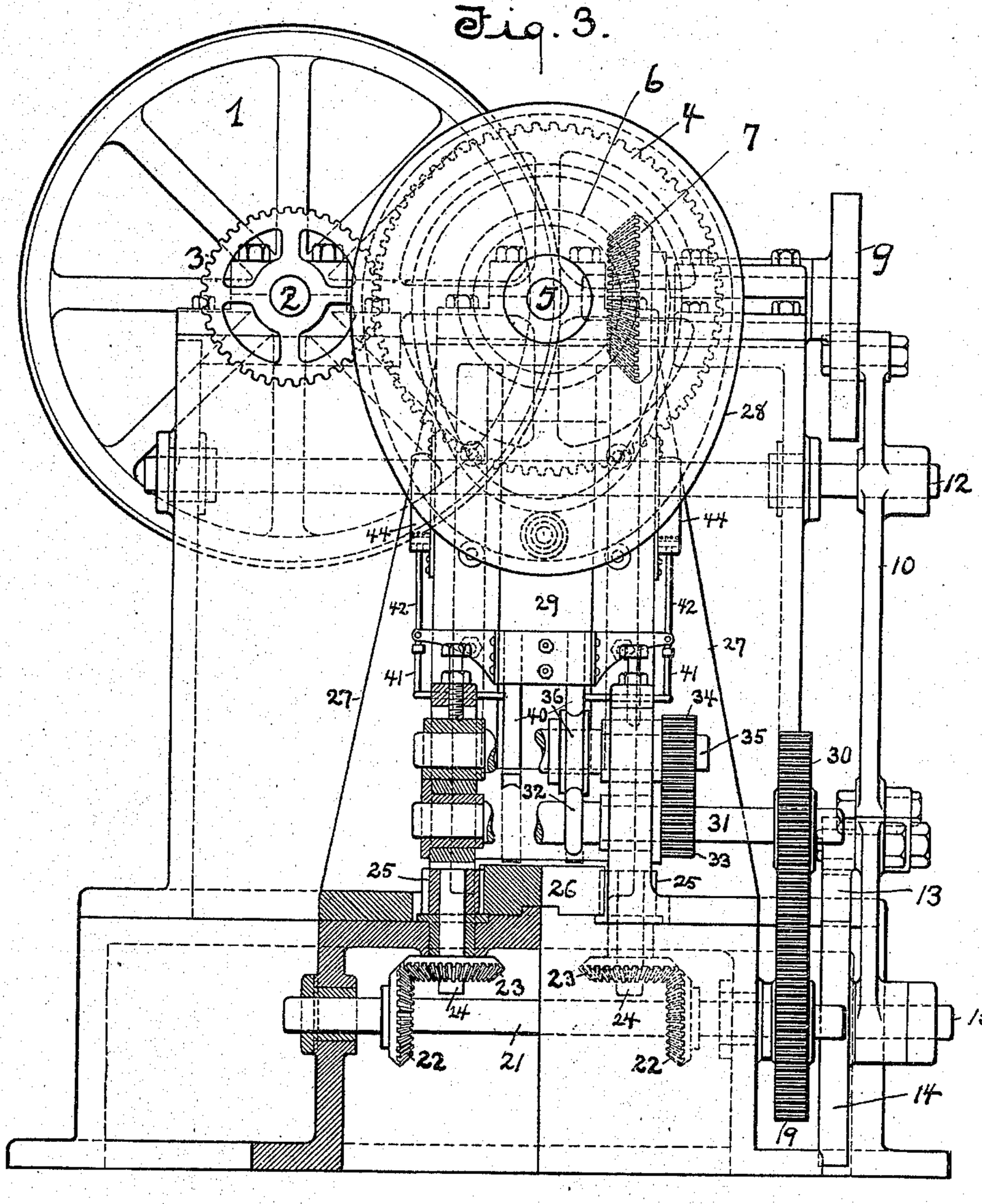

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Fig. 4.

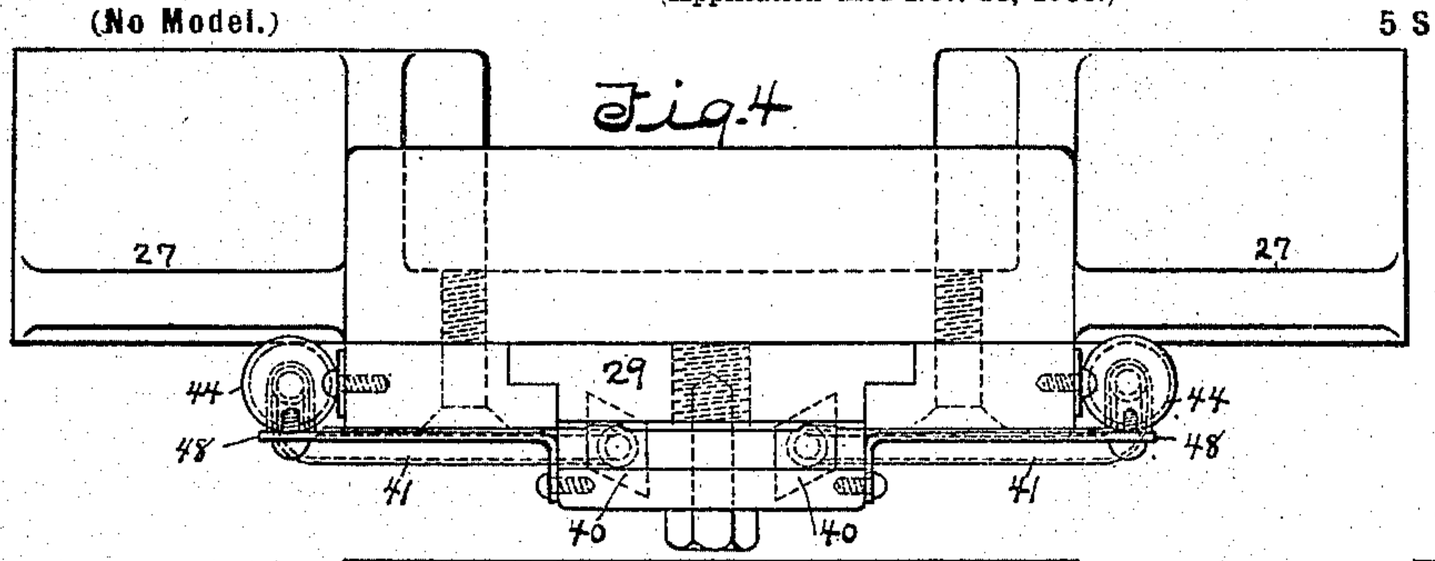

Fig. 5.

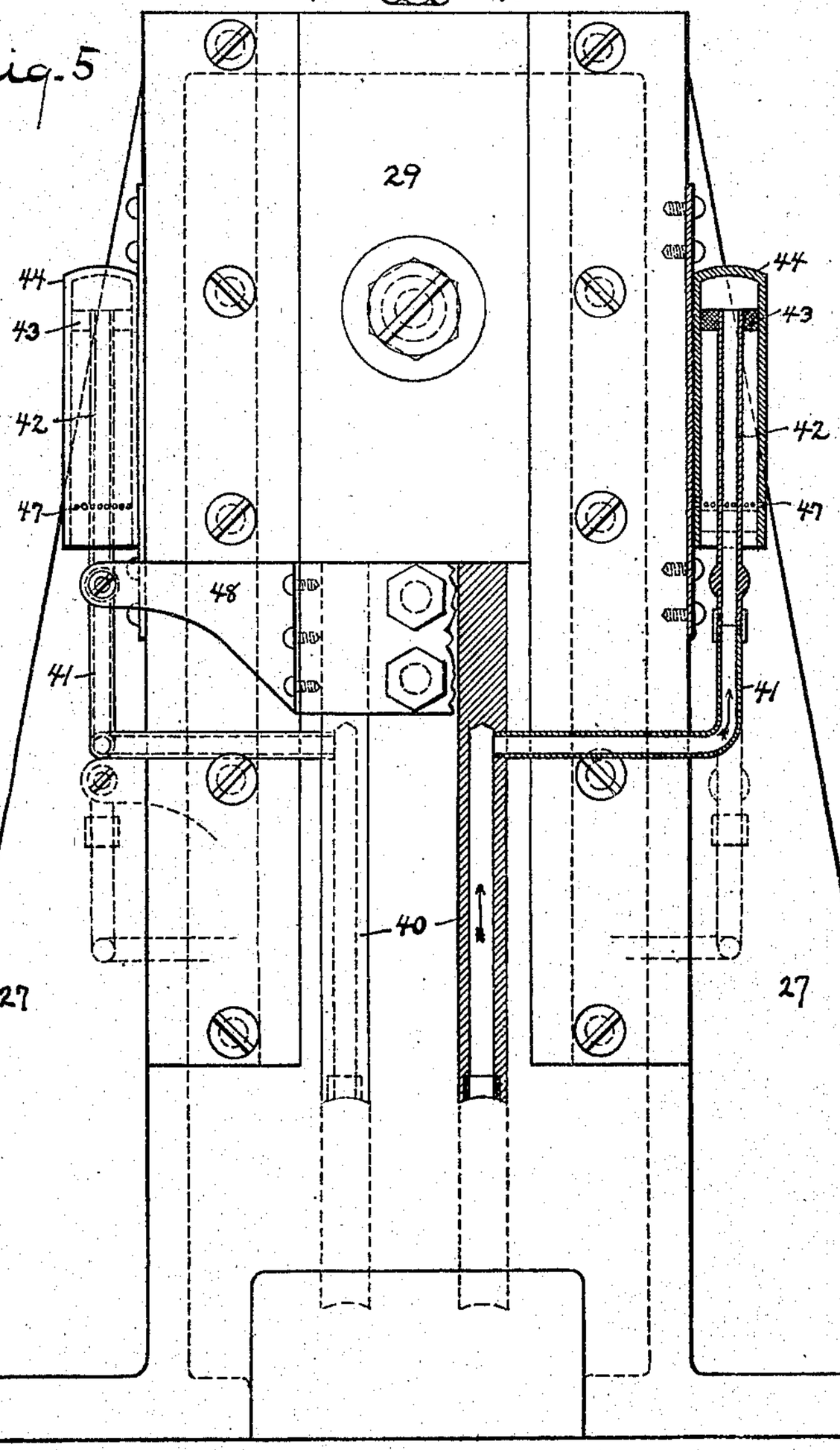

Fig. 6.

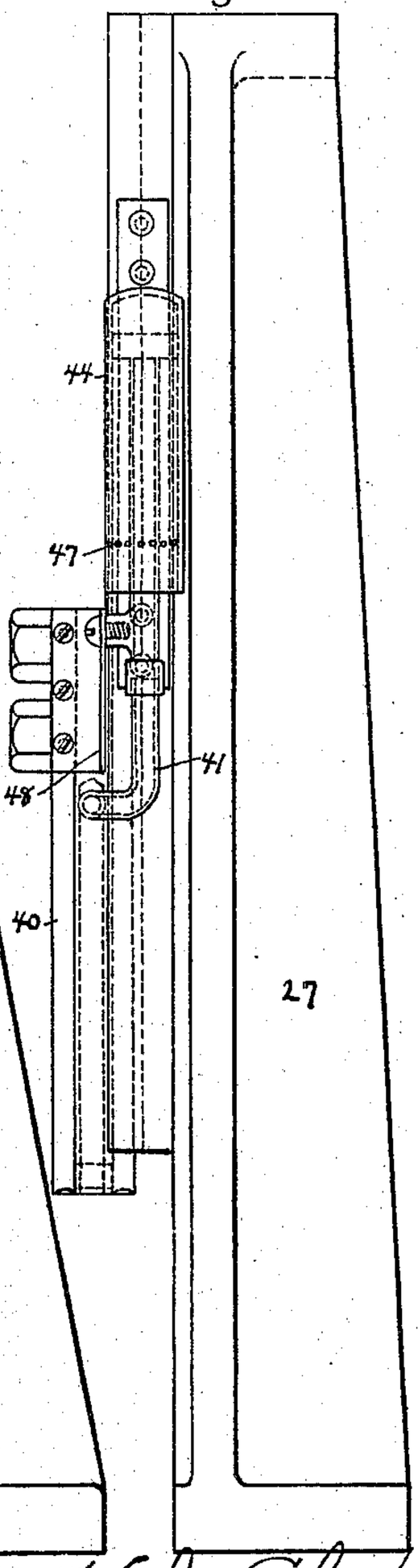

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Fig. 7.

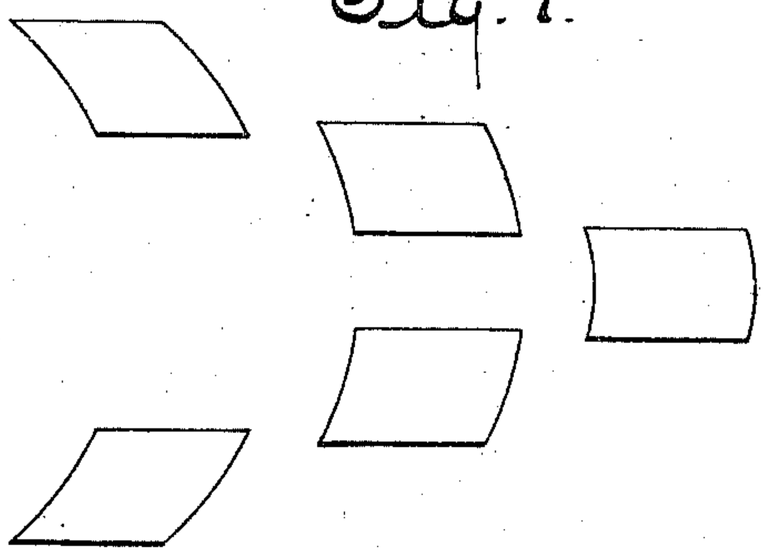


Fig 7a

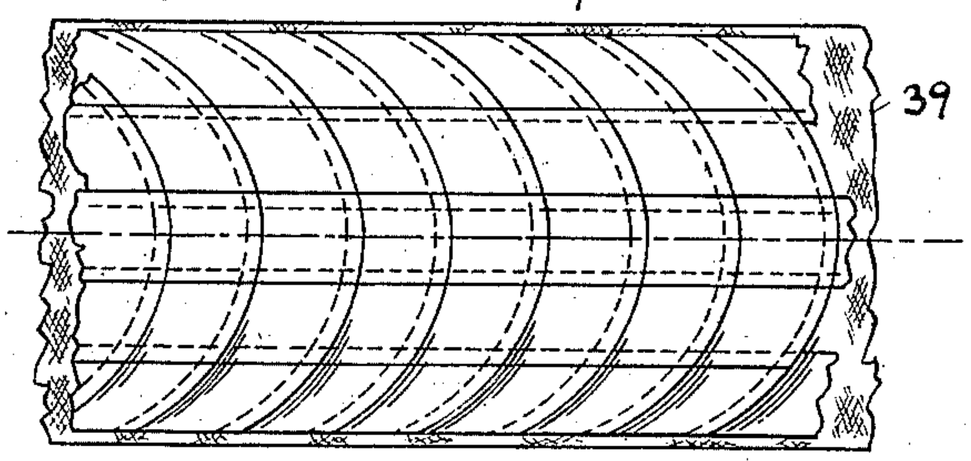


Fig. 8

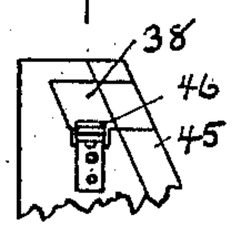


Fig. 9

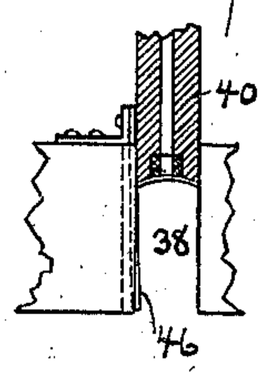
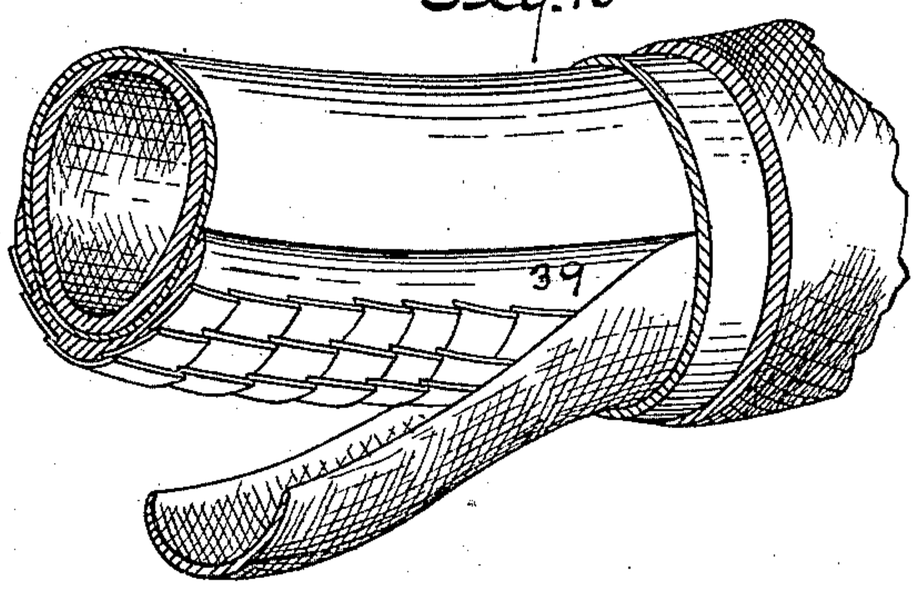


Fig. 10



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UNITED STATES PATENT OFFICE.

HARRY I. LAHR, OF SOUTH BEND, INDIANA, ASSIGNOR TO EDWIN J. PINE, OF MOBILE, ALABAMA.

MACHINE FOR APPLYING METALLIC PLATES IN THE MANUFACTURE OF PUNCTURE-PROOF TIRES.

SPECIFICATION forming part of Letters Patent No. 687,761, dated December 3, 1901.

Application filed November 13, 1900. Serial No. 36,365. (No model.)

To all whom it may concern:

Be it known that I, HARRY I. LAHR, a citizen of the United States, residing at South Bend, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Machines for Applying Metallic Plates in the Manufacture of Puncture-Proof Tires; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in machines for applying metallic plates in the manufacture of puncture-proof tires; and its object is to provide a machine which will cut plates of the desired size from strips of metal and then apply these strips to the inner side of a rubber strip which is to be placed in a bicycle-tire, and thus perform this work rapidly and accurately by machinery.

My invention consists in suitable dies for cutting off the metal plates, suitable hollow punches for forcing the plates down upon the rubber strip, and suction-pumps connected with said punches to cause the metal plates to adhere to the ends of the punches, combined with suitable mechanism for feeding the strip of rubber along, so that the five rows of metal plates will be applied thereto, as will be more fully described hereinafter.

In the accompanying drawings, Figure 1 is a plan view of a machine which embodies my invention, partly in section. Fig. 2 is a side elevation of the same, also partly in section. Fig. 3 is an end view of the machine, partly in section. Figs. 4, 5, and 6 are respectively plan, front, and side views of the vacuum-pump mechanism applied to the punches. Fig. 7 is a plan view showing the relation in which the metal plates are cut off. Fig. 7^a is a plan view of the rubber strip, showing the metal plates applied thereto. Figs. 8 and 9 show the arrangement of spring for preventing the plates from dropping as they are cut off. Fig. 10 is a perspective of a rubber tire, showing the metallic protecting-plates applied thereto, parts of the tire being broken away.

1 represents the driving-wheel, which is secured to one end of the driving-shaft 2, journaled in suitable bearings upon a suitable supporting-frame, and which shaft has the pinion 3 secured to its inner end. This pinion 3 meshes with the large gear-wheel 4, secured near one end of the shaft 5, which extends longitudinally in suitable bearings over the top of the machine, and to the same end of this shaft 5 to which the gear 4 is secured is a beveled gear 6, which meshes with the gear 7 upon the shaft 8, which extends at right angles to the shaft 2. Upon the end of the shaft 8, at one side of the machine, is secured the cam 9, which operates the bent lever 10 in one direction. This lever 10 is returned to position when left free to move by means of a suitable spring, which is not here shown. This lever is pivoted upon the rod or shaft 12, and the shorter end of the lever bears against the outer edge of the cam, as shown in Fig. 2. To the lower end of the longer part of the lever 10 is secured the rod 11, and to the forward end of the rod 11 is secured a suitable pawl 13, which meshes with the ratchet-wheel 14, and through which ratchet-wheel movement is imparted to the operating parts of the machine. This ratchet-wheel is secured to the shaft 15, and upon this shaft 15 is secured the gear-wheel 16, which meshes with an intermediate gear 17 upon each side, and which intermediate gears in turn operate the gear-wheels 18 and 19, secured to the shafts 20 and 21, which shafts 20 and 21 extend across the lower portion of the machine and each one carries two beveled gears 22, placed in reverse positions, and which beveled gears 22 in turn operate the beveled gears 23, placed upon the lower ends of vertical shafts 24, which have secured to their upper ends the pinions 25, which mesh with the two edges of the endless band or carrier 26, which passes horizontally through the machine and upon which the rubber strip is placed to have the metallic plates applied thereto. This endless band or carrier 26 is composed of a series of links which are pivoted together, as shown in Fig. 2, and which band or carrier moves through the machine, extending outward a suitable distance at each end, and returns over suitable rollers provided for it at the ends of the machine, and which rollers are not here shown.

Meshing with the wheels 16, 18, and 19 are the wheels 30, which are placed upon shafts 31, which extend horizontally across the top of the endless band or strip, and to each shaft is secured a convex roller 32, the convexity of which corresponds to the convexity of the rubber tire. Also secured to each shaft 31 is a gear 33, and this gear meshes with a gear 34, placed upon the short shaft 35, which carries a concave roller 36, and which roller 36 engages with the roller 32. These shafts 31 and 35 are journaled in suitable bearings provided for them, as shown in Figs. 2 and 3, and as they are made to revolve the rollers 32 and 36 draw the metallic strips 37 from their reels, give them the required shape, and then the ends of these strips, which have been made concavo-convex, are fed to the cutters on the ends of the punches, where the ends of the strips have short metal plates cut from them by the punches 40, as shown in Fig. 7, these plates being given the shape to correspond to the portion of the tire to which they are to be applied, as shown in Fig. 7ª. The two outside rows of strips are composed of plates which are diamond-shaped, while the two strips upon each side of the center are elongated and only slightly diamond-shaped, while the central row consists of elongated plates nearly right angular in shape. As these plates are cut from the strips or sheets 37 they are deposited in the passages 38, ready to be dropped upon the rubber strip 39, which is soft and sticky upon its upper side, so as to retain the plates in position.

The shaft 5 is supported upon suitable standards 27, and secured to this shaft in advance of each standard is a grooved cam-wheel 28, which operates vertically the slides 29, placed in suitable guides upon the fronts of the standards. Secured to the lower end of each slide is a punch or punches 40, and which punches are made hollow and connected at their upper ends with the pipes 41. These pipes 41 are connected by any suitable couplings to the hollow piston-rods 42, and these piston-rods are connected to the perforated pistons 43, placed in the cylinders 44. As the slides 29 and punches 40 are moved vertically by the grooved cams 28 these pipes 41, piston-rods 42, and pistons 43 are moved vertically at the same time and a suction is exerted through the punches 40, so as to attract the short plates cut from the strips 37 and hold them in contact with the ends of the punches 40 until the plates are ready to be delivered in position. Two of the slides have two punches 40 connected to them, while the third slide has but a single punch. The first two slides have two punches. Each is placed in advance of the slide having but a single punch, and the first two slides are provided with cutters which cut off two strips, while the third one is provided with a single cutter and a single punch. The die-plates 45 are shown in section in Fig. 1, and extending from these die-plates are the channels or grooves 38, into which the plates are dropped as they are cut off, and into the upper ends of which grooves or channels the lower ends of the punches 40 descend. In order to prevent the plates from dropping down the grooves or channels 38 as they are cut off by the punches 40, each channel is grooved upon one side, as shown in Figs. 8 and 9, and a spring-plate 46 is arranged upon the bed-plate above the top of the channel so as to project downwardly into the channel, and these springs secure the plates against opposite walls of the channel, and thus hold the plates against the bottom of the punches 40 in their downward strokes. Before the punches reach their full downward stroke and about the time that the springs for holding the plates are no longer effective the vacuum-pumps heretofore described cause the plates to adhere to the end of each punch by suction. The vacuum-pumps are for the purpose of holding the cut-off plates against the ends of the punches while they are going down the grooves or channels and before being placed on the rubber-tire strip. The pistons 43 of the pumps travel up and down with the punches 40, which are fastened to the slide by means of the brackets 48. The pump-cylinders 44 are stationary and are fastened to the uprights, which form supports for them. In Fig. 5 the punches and piston-rods are shown in their raised positions in solid lines and in their down position in dotted ones. The piston-rods move with the punches, and when the punches and piston-rods start on their downward travel the pumps exhaust air in the direction shown by the arrows, and after a plate is cut off it is held firmly by suction against the end of the punch until it is carried down the slot or channel 38 and pressed upon the strip of rubber gum. When the piston is in its extreme down position, it has just passed the air-holes 47 in the pump-cylinders. This allows the air to rush into the cylinders, which equalizes the pressure and allows the plate to free itself from the punch before the punch starts on its upstroke, leaving the plate on the rubber-gum strip.

The successive steps of the machine are as follows: The cam-wheel 9 by means of the rocking lever 10 operates the rod 11, the pawl 13, the ratchet-wheel 14, and the series of miter-gears upon the shafts 15, 20, and 21, and imparts motion to the endless band or carrier 26 and the feed-rolls 32 and 36. When the cam 9 reaches the perfect circle of its periphery, having moved the ratchet one notch and fed the brass strips into the dies, this part of the machinery stops and the rock arm or lever 10 is returned after another stroke by a spring connected thereto, but which is not here shown. At this stage the cams 28 force the punches down, cut off the required plates, carry them on down, and press upon the crude rubber strip upon the endless band or carrier 26, which at this time

is stationary. As the punches rise the cam 9 again comes into action and the same movement is repeated. With the exception of Figs. 4, 5, and 6 the punches are all shown in their extreme down positions. After the metal plates shown in Fig. 7 have been applied to the rubber strip 39, as shown in Fig. 7ª, this strip 39 is applied to the tread of a bicycle-tire, as shown in Fig. 10, for the purpose of making the tread puncture-proof.

Having thus described my invention, I claim—

1. In a machine of the nature described, rollers for forming and feeding the strips of metal, and punches for cutting off and forcing the plates downward, combined with means for holding the plates in contact with the ends of the punches, and an endless band or carrier for holding and moving along the rubber strip to which the metal plates are to be applied, substantially as shown.

2. In a machine of the character described, suitable actuating means, rollers for forming and feeding the strips forward, punches for cutting off plates from the ends of the strips, and for forcing the plates downward, and automatic means for holding the plates against the ends of the punches until the plates are ready to be delivered in position, combined with an endless band or carrier upon which the rubber strip is placed, and means for moving the endless band forward as the punches are being raised, substantially as described.

3. In a machine of the nature described, suitable actuating means, a shaft carrying a series of cams, slides operated by said cams, and rollers for feeding the metal strips to the carriers, combined with hollow punches for cutting off the ends of said strips secured to the slides, channels or grooves through which the cut-off plates are forced, automatically-acting air-pumps connected to the punches, and an endless band or carrier carrying the rubber strip to which the plates are to be applied by the punches, substantially as set forth.

4. In a machine of the nature described, a suitable operating mechanism, a cam connected thereto, an operating-lever operated by said cam, a rod carrying a pawl, operated by said lever, and a ratchet-wheel operated by said pawl, combined with means operated from the shaft to which the ratchet is secured for operating the rolls, the feed-rolls, punches for cutting off the ends of the strips and for forcing down the plates cut off from the ends of the strips, slides to which the said punches are secured, means for operating said slides, grooves or channels into which the cut-off plates are fed, and springs placed in the sides of the grooves or channels for preventing the plates from dropping, and automatic means for causing the cut-off plates to adhere to the ends of the hollow punches until the end of their stroke is reached, substantially as specified.

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

HARRY I. LAHR.

Witnesses:

GEORGE OLTSCH,

HUGO OLTSCH.