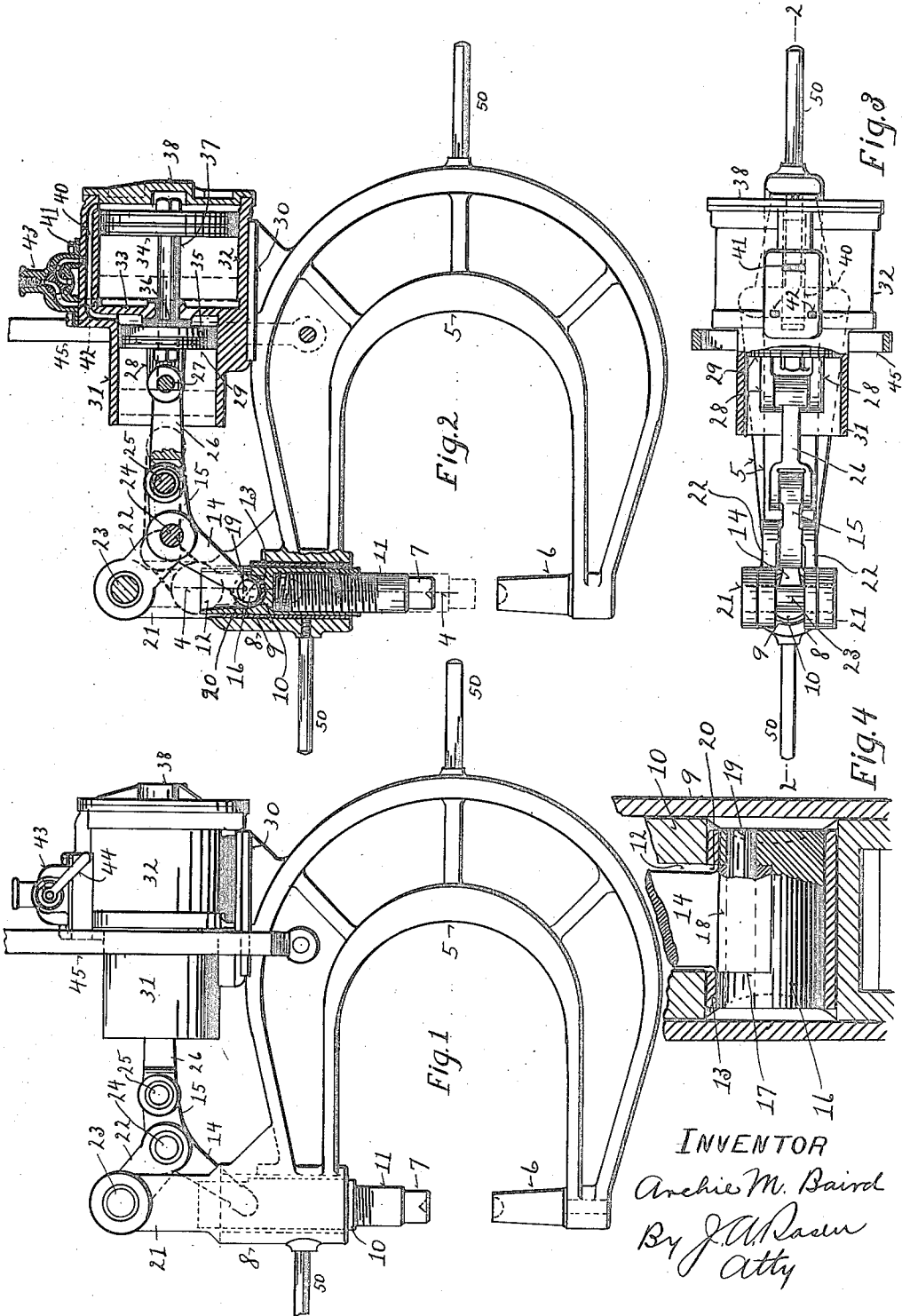


A. M. BAIRD.
RIVETING MACHINE.
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ARCHIE M. BAIRD, OF TOPEKA, KANSAS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ARCHIE M. BAIRD, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Riveting-Machines, of which the following is a specification.

My invention is a portable pneumatic riveting machine designed for use in boiler and bridge construction and elsewhere in metal construction. The object is to produce a most powerful machine of this character with the greatest possible lightness, compactness, and convenience. The machine comprises a yoke with fixed and movable dies in opposite legs respectively and a pneumatic motor of special design for actuating the movable die, together with specially designed power transmission mechanism between the motor and the die; and it further comprises the particular arrangement and combinations of parts relating thereto as hereinafter pointed out.

In the drawings accompanying and forming part of this specification and in the description of the drawings, I have shown my invention in its preferred form and what I deem to be the best mode of applying the principles thereof; but it is to be understood that, within the scope of the appended claims I contemplate changes in form, proportions and materials, the transposition of parts and the substitution of equivalent members, without departing from the spirit of my invention.

Figure 1 is a side elevation of a riveting machine made in accordance with the principles of my invention, the upper part of the supporting bail being broken away. Fig. 2 is the same with certain portions of the operating mechanism shown in sectional elevation approximately on a plane indicated by the line 2-2 in Fig. 3. Fig. 3 is a plan view, the supporting bail being shown in section, and the valve being removed to disclose the portings. Fig. 4 is an enlarged sectional view, approximately on a line 4-4 in Fig. 2, of the thrust bearing connecting the lower toggle member and the plunger.

Similar reference characters indicate similar or corresponding parts throughout the several views.

On one leg of the yoke 5 is the fixed die 6 and on the other is the movable die 7. 55 The leg carrying the movable die is formed with a sleeve 8 with a bronze bearing 9 in which is mounted a plunger 10 which is hollowed and internally screw-threaded to receive the member 11 to which the movable 60 die is secured. The upper end of the plunger is hollowed, as indicated at 12 and receives a transversely disposed bronze thrust bearing 13 for the lower end of the toggle member 14-15. The thrust end is of a 65 separate piece 16 fitting in said bronze thrust bearing and partly cut away, as shown at 17 to receive the lower end of the toggle member, which is made of drop forging and to which it is secured by means 70 of a pin 19. The thrust bearing is also cut away, as shown at 20, to permit the proper action of the toggle member. The upper end of the sleeve is formed into two up-rights 21, 21, to each of which is pivoted 75 one end of a link 22, the two links constituting the other toggle member, and the lower ends of this member are pivoted, at 24, to the lower toggle member intermediate its ends. The end 15 of the lower toggle 80 member extends at an angle of approximately forty-five degrees from the line from the center of the socket 16 to the pivot 24, extended, and is pivoted to a link 26 at 25, said link being pivoted at 27 to the brackets 85 28, 28 on the piston 29.

Secured to the upper leg of the yoke is a supporting plate 30 on which is secured a cylinder casing formed with two cylinder bores 31 and 32 in tandem relation to each 90 other and separated from each other by a wall or head 33. One of the bores has a head 38 and the other is open at the end opposite the partition or wall. The closed bore is relatively larger than the open-end- 95 ed bore, the open-ended bore faces the toggle members, and the bores are alined with said toggle-joint to actuate the same as hereinafter explained. The piston 29, which is in the smaller bore is rigidly con- 100 nected with the piston 34 in the larger bore by the piston rod 37. It is provided with a leather packing ring or cup 35 in addition to the usual packing rings, and the piston rod is surrounded by a similar packing ring 105 36 on the small-bore side of the partition in

order to make a perfect seal for the working side of the small-bore piston. A passage 40 leads from the port 41 to the rear end of each bore, and the two ports 42 lead to the front end of the larger bore; and the flow of the motive fluid to and from the bores through the ports and passages is controlled by the four-way valve 43 provided with an operating handle 44.

The machine is suspended by a bale 45 and guided by handles 50, 50.

The valve is shown in the drawings in position for returning the pistons to the rear ends of the cylinder bores with the dies in open position. By means of the screw member 11 the dies are adjusted to the work, running that member down for thinner work and screwing it up for thicker work. The handle of the valve is turned ninety degrees to the left (viewed in Fig. 1), so as to open the front end of the larger cylinder bore to the exhaust and the rear ends of both cylinders to the inlet motive fluid, which drives the pistons toward the left and toward the toggle member which is caused to straighten so as to bring the three pivots thereof into alinement. The upper pivot being stationary, the movement drives the lower pivot downwardly, thus driving the plunger and connected parts, including the movable die, onto the work, with great force. It will be noted, by observing the dotted outlines in Fig. 2, that notwithstanding the downward drive of the plunger and the downward travel of the middle pivot of the toggle members, the travel of the pivot 25 is almost in a straight line alined with the piston rod; and hence there is but little side thrust on the piston. By reason of this arrangement, I am able to use the smaller piston as a guide, guarding against leakage by means of the leather packing cups notwithstanding any possible wear of the piston or bore. The particular advantage is that instead of a single cylinder and guide which would otherwise be necessary, I am able to dispense with the guide and substitute therefor another cylinder and piston, with but little additional weight or length, and with an increase in power determined by the relation of the smaller piston to the larger one. And furthermore, the increased area of the pistons and the arrangement of the toggle members, the extension 15, and the link or pitman 26, enables me to use a shorter working stroke of the pistons in attaining the ultimate working pressure on the dies, with the consequent use of less air.

Having thus described my invention, what I claim is:

1. The combination of a yoke, a fixed die on one leg thereof, a plunger movably mounted on the other leg opposite the fixed die, a movable die carried by the plunger

opposite the fixed die, a toggle-jointed element comprising two links pivoted together, one of said links being pivoted to the yoke and the other to the plunger and the last-named link being extended beyond the common pivot; a cylinder casing mounted on the yoke and formed with a relatively large cylinder bore closed at both ends and a relatively small cylinder bore arranged in tandem relation with the first-named bore and closed at the end adjacent thereto and open at the other end, said casing being also formed with ports leading to both ends of the larger bore and to the closed end of the smaller bore, pistons in each bore, a piston rod rigidly connecting the two pistons, the piston in the smaller bore being formed with pivot lugs, a link pivoted at one end to said pivot lugs and at the other end to the extension of the second-named toggle-joint member, and a valve mounted on the casing and controlling the flow of the motive fluid through said ports.

2. The combination of a yoke, a fixed die on one leg thereof, a plunger movably mounted on the other leg opposite said die, a movable die carried by said plunger opposite the fixed die, a toggle-jointed element comprising two links pivoted together, one of said links being pivoted to the yoke and the other to the plunger and formed with an extension beyond the common pivot; a cylinder casing mounted on the yoke and formed with two cylinder bores in tandem relation one of said bores being closed at both ends and the other only at one end, and said casing being also formed with ports leading to said closed ends, pistons in the respective bores, a piston rod rigidly connecting the pistons, a link pivoted at one end to the piston in the open-ended bore and at the other end to said extension, and a valve for controlling the flow of the motive fluid through said ports.

3. The combination of a yoke formed for supporting a fixed die on its lower leg and with a sleeve in its upper leg, a plunger reciprocally mounted in said sleeve and formed for supporting a riveting die opposed to the first-mentioned die; a toggle-joint transmission comprising an upper member pivoted at its upper end to said sleeve and a lower member pivoted at its lower end to said plunger, said upper member being pivoted at its lower end to said lower member intermediate its ends and the lower member being formed with an angular extension beyond said intermediate pivot and inclined away from the first two named pivots, a cylinder casing mounted on the yoke, a piston in the casing, and a link connecting said extension with said piston.

4. In a pneumatic riveting machine comprising a yoke, a plunger, and a toggle-

jointed element for operating said plunger,
of a cylinder casing mounted on the yoke
and formed with two alined cylinder bores,
one of said bores being closed at both ends
5 and the other being open at the end opposite
the other bore, pistons in the respective
cylinder bores, a piston rod rigidly connect-

ing the two pistons, and a link connecting
the piston in the open-ended bore with said
toggle-jointed element.

In testimony whereof I have hereunto af-
fixed my signature.

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ARCHIE M. BAIRD.