A. D. HOEFFLINGER.

POWER TONGS.

APPLICATION FILED APR. 5, 1920.

1,427,469.

Patented Aug. 29, 1922.

2 SHEETS—SHEET 1.

FIG. 1.

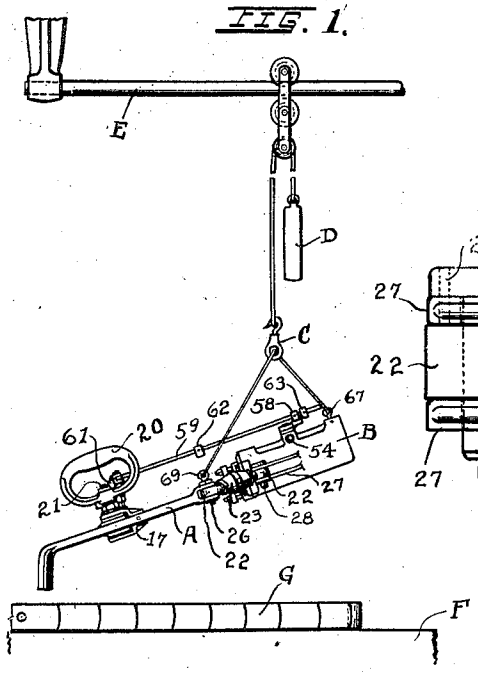


FIG. 6.

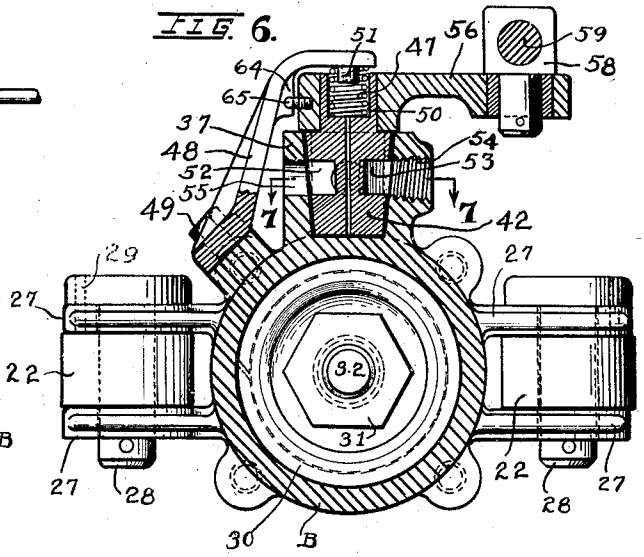


FIG. 2.

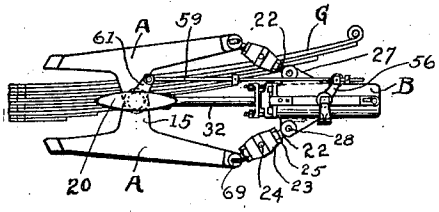
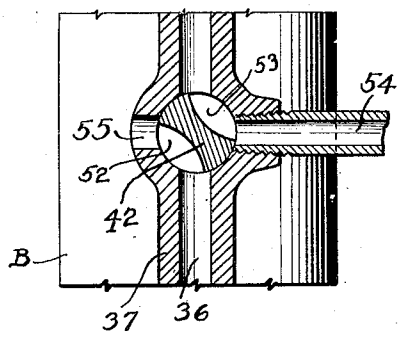


FIG. 7.



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2 SHEETS—SHEET 2.

FIG. 3.

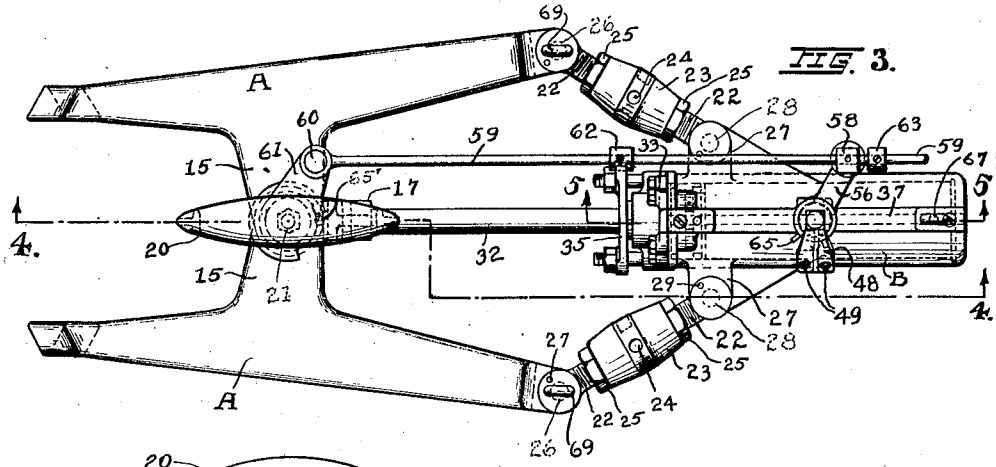


FIG. 4.

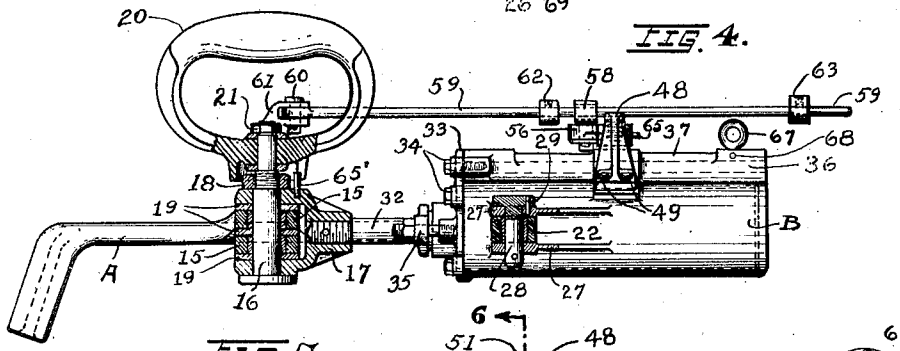
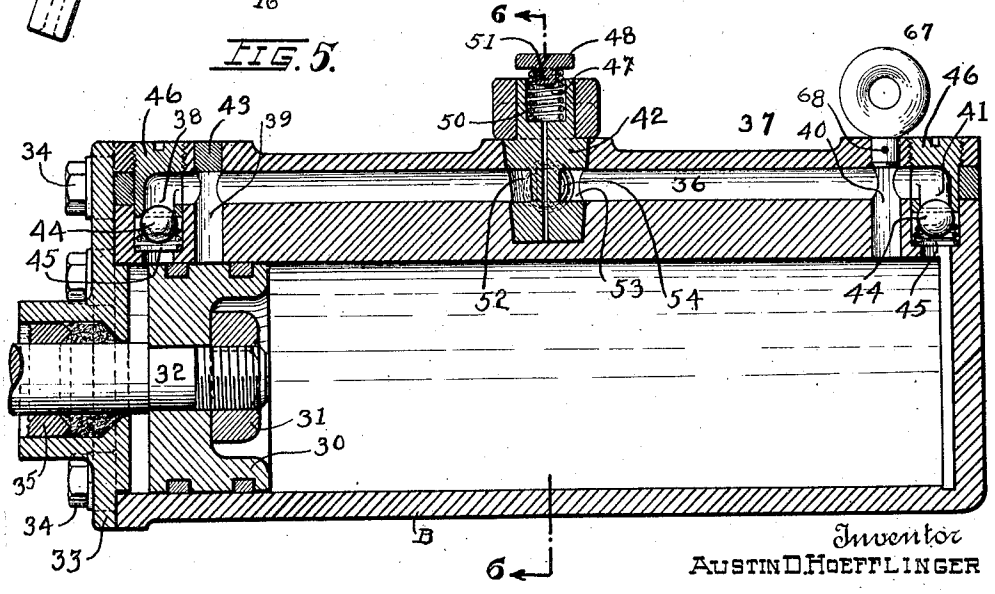


FIG. 5.



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UNITED STATES PATENT OFFICE.

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POWER TONGS.

1,427,469. Specification of Letters Patent. Patented Aug. 29, 1922.

Application filed April 5, 1920. Serial No. 371,412.

To all whom it may concern:

Be it known that I, AUSTIN D. HOEFFLINGER, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Power Tongs, of which the following is a specification.

This invention relates to power tongs, and more especially to power tongs and power mechanism for operating the same which may be suspended over a table and may be readily removed by hand to position, with reference to the work lying on the table.

One of the objects of the invention is to provide power operated means for clamping articles together and holding them in clamped position, the invention being illustrated as used to clamp the leaves of a multiple leaf spring together, to permit the mounting of the center bolt which holds the leaves in clamped position. Another object of the invention is to provide a structure of this kind which can be readily suspended over the table on which the work is placed and which will remain in the position to which it is moved, during the operation, to clamping position. Another object of the invention is the provision of such a structure in which the power operating means is controlled by a handle which also serves to position the device relative to the work table, whereby the device may be entirely manipulated by one hand of the operator, and a still further object of the invention is the provision of suitable cushioning means for retarding the motion of the power cylinder relative to its piston. Another useful result obtained is due to the flexible mounting which makes motion of the tongs in any direction possible and renders angular adjustment, with relation to the horizontal, readily made and automatically maintained. This is also true of the vertical translation of the tongs, the counterweight maintaining them in whatever position they are raised.

Other objects of the invention and the features of novelty will be apparent from the following description, when taken in connection with the accompanying drawings, in which:—

Figure 1 is a fragmentary side elevation of a clamping device embodying my invention, showing the manner in which it is suspended for clamping a vehicle spring.

Fig. 2 is a plan view of the clamping device shown in Fig. 1, showing its operative position relative to a spring;

Fig. 3 is an enlarged plan view of the device shown in Fig. 1, showing the tongs in their open position;

Fig. 4 is a side elevation, partly in section, along line 4—4 of Fig. 3, but showing the device in the clamping position;

Fig. 5 is an enlarged longitudinal vertical section on the line 5—5 of Fig. 3;

Fig. 6 is a transverse vertical section on the line 6—6 of Fig. 5; and

Fig. 7 is a horizontal section on the line 7—7 of Fig. 6.

The clamping device, in general, comprises a pair of pivoted tongs A, adapted to be operated to and from their clamping position by a power cylinder B, by means of toggle links which connect the cylinder to the ends of the tongs. As shown in Fig. 1, the whole clamping device may be conveniently suspended from a hook carried by the block C and supported by a counterweight D, the clamping device and counterweight being preferably carried by a shaft or similar means E which is suitably suspended from the ceiling or other rigid structure. The device is shown herein as suitably suspended over a work-table F for use in clamping together the plates of a multiple leaf spring G, but it will be understood that its use is not limited to any particular work and that any suitable means of suspending it may be devised. It will also be understood that while the device is herein described as being operated by air, water, steam or other suitable medium may be used, if desired.

The tongs A are formed with lugs 15 and are pivoted together by a pin 16 which also passes through a yoke 17 which serves as anchor for the piston of the power operating means and has a nut 18 thereon, as shown in Fig. 4, which engages the yoke to hold the parts in place. The lugs 15 are preferably separated from each other and from the yoke 17 by washers 19, and the pin 16 is extended beyond the nut 18 to provide a suitable support for the operating handle

20 which is rotatably mounted thereon and held in place by the nut 21. The forward ends of the tongs A are preferably inclined forwardly and downwardly so that they may be readily engaged with the work.

Toggle links 22 connect the rear ends of the tongs A to the cylinder B, each of these toggle links being preferably formed in two sections connected by a turnbuckle 23 having openings 24 therein to permit the entrance of a tool by which the length of the links may be readily adjusted, and lock nuts 25 may be provided for holding the turnbuckle in adjusted position. The ends of the tongs A are formed with a yoke in which the ends of the toggle links 22 are received, the parts being secured together by a pin 26 which passes through the ends of the toggle links and the arms of the yoke. The other ends of the toggle links are likewise received between spaced lugs 27 which project laterally from the cylinder adjacent its end and are secured thereto by pins 28, the pins 26 and 28 being held against rotation, if desired, by the dowel pins 29.

The cylinder B is open at one end to receive a piston 30, which is provided with the usual piston rings, and secured by a nut 31 to the end of the piston rod 32, the other end of the rod being secured, as shown in Fig. 4, to the yoke 17. A plate 33 is secured by screws 34 to the end of the cylinder and is provided with a stuffing box through which the piston rod 32 extends, the packing being preferably held in place by a plate 35 which may be secured to the plate 33 in any suitable manner. A longitudinal passage 36 is formed in the ridge 37 at the top of the cylinder B and connects through ports 38, 39, 40 and 41 to conduct the air to the rear side of the piston 30, the flow being directed to one or the other end of the cylnder by the valve 42. The passage 36 and the ports which connect with the cylinder are preferably bored, the openings thus formed in the cylinder walls being closed by blocks 43. Each of the ports 38 and 41 is normally held closed by a ball 44 and a spring 45, which are held in place by a block 46 which is screwed into the cylinder and against which the ball seats. It will be understood that an air cushion will thus be formed in each end of the cylinder which will prevent contact of the piston with the end of the cylinder, but that when the parts are in the position shown in Fig. 5, the air can move the ball in the port 38 and so enter the cylinder back of the piston 30. That is, the balls 44 serve as one-way valves, since the pressure in the passage 36 will move the ball against tension of the spring 45, when pressure is admitted to the portion of passage 36 leading to the ball in port 38.

The valve 42 is conical in shape and is held seated in a conical recess in the ridge 37 by a spring 47 and a bracket 48 which is secured to the cylinder by screws 49, the spring being confined in a recess 50 in the valve and held in place by a lug 51 on the bracket 48. The valve 42 is provided with openings 52 and 53 which, respectively, connect the pipe 54 through which the air is supplied to one end of the cylinder and connect the other end of the cylinder to the exhaust port 55. It will be understood that when the valve is rotated through substantially 45 degrees, the air pressure will be conducted to the other end of the cylinder and the cylinder will move from the position shown in Fig. 3 to that shown in Fig. 4.

An operating lever 56 having a square or other non-circular opening therein is mounted on a similarly formed extension on the valve 42 and carries, at its outer end, a pin 58, which is rotatably mounted in the end of the lever and slidably receives the valve-operating rod 59 which is secured by a pin 60 to an arm 61, which extends laterally from the handle 20. Suitable stops 62 and 63 are held in place on the rod 59 by set screws, or other suitable means, and are adapted to cooperate with the head of the pin 58 to operate the lever 56.

Pins 65 are mounted in the lever 56 in such position as to engage a projection 64 on the bracket 48 and limit the motion of the lever 56 relative to the cylinder. The motion of the handle 20 is similarly limited by a pin 65′ which is mounted in the yoke member 17 and engages with the ends of a skirt formed on the handle 20 and cut away to permit the handle to swing through 45 degrees.

An eye 67 is carried by the ridge 37 adjacent the rear end of the cylinder, being shown as driven into position to close the opening formed in boring the port 40 and held in place by a pin 68. Similar eyes 69 are screwed, or otherwise secured, in the pins 26 which connect the toggle links to the rear ends of the tongs A. As shown in Fig. 1, the whole device may be suspended by wires or similar flexible means, each of which is connected at one end to the eye 67 and at the other end to one of the eyes 69, such wires preferably passing in opposite directions through an opening in the block C. It is obvious that many arrangements, such as a single cable connected at its center in eye 67, passing through the eye on block C and connected at its ends in eyes 69 may be employed. By thus supporting the member, it will be understood that the clamping device may be readily adjusted toward or from horizontal position and will be frictionally held in the position to which it is adjusted.

The operation of the device, in connection with the assembling of leaf springs, is as follows: the leaves to be assembled into a

leaf spring are laid on the work-table face to face, as shown in Figs. 1 and 2, and, the tongs being opened, the jaws are brought opposite the respective faces of the outer leaves. The operator then turns the handle 20 on its pivot, moving the rod 59 and thereby turning the valve to actuate the piston, thus closing the jaws about the spring and tightly clamping the leaves together. While in this position, the bolt is inserted and the nut applied to hold the leaves in clamped position. It will be noticed that, on account of the fact that the handle is positioned at the pivot point of the tong jaws, the tongs do not move longitudinally when fluid pressure is admitted to the cylinder, but the cylinder moves toward and from the tongs.

It will be seen that, on account of the mounting of the valve-operating rod, so as to be operated by the carrying handle and the absolutely flexible support for the tongs, the tongs may be brought into position and the jaws clamped on the work by use of only one hand of the operator, the other hand being free to apply the bolt to the spring, or for any other purpose.

The stops 62 and 63 are so positioned on the rod 59 as to permit slight swinging movement of the handle 20 without operation of the valve 42, and it will be understood that the clamping device may be moved at will by the handle 20 to position it with reference to the work and that when it is properly positioned, a slight twisting movement of the handle 20 will operate the valve 42 to close or open the tongs.

Of course, these tongs are not restricted to use in connection with spring making, but may be used wherever tongs are needed. On account of the flexibility of mounting and ease of actuation, they are also admirably adapted to be used to convey articles from place to place.

Having thus described my invention, what I claim is:

1. In a device of the class described, a power operated tongs comprising pivoted jaws adapted to grip the work, a handle at the pivot point of the jaws, power operated means for imparting angular motion to the jaws, and a valve-controlling member adjacent the handle, adapted to be actuated to control the power operated means.

2. In a device of the class described, a cylinder, a piston and rod for the cylinder, jaws pivoted on said rod, a handle carried by said rod, a valve on the cylinder for directing fluid to either side of the piston, and a member connected to said valve adapted to operate it and cooperating with said handle.

3. In a device of the class described, a cylinder, a piston and piston rod for said cylinder, jaws pivoted on said rod, means whereby motion of the piston actuates said jaws, a handle mounted at the pivot point of said jaws, a valve for directing fluid to either side of the piston, and means connecting said handle and valve whereby the valve may be operated in either direction by motion of the handle.

4. In a device of the class described, a cylinder, a piston and piston rod for said cylinder, jaws pivoted on said rod, means whereby motion of the piston actuates said jaws, a handle pivoted at the pivot point of said jaws, a valve for directing fluid to either side of the piston, and means connecting said handle and valve whereby the valve may be operated by turning of the handle to actuate the jaws in either direction.

5. In a device of the class described, a cylinder, a piston and piston rod for said cylinder, jaws pivoted on said rod, a valve on the cylinder for directing fluid to either side of the piston, and an actuating member adjacent the pivot of said jaws and carrying adjustable stops, adapted to operate said valve on actuation of said member and providing for varying the lost motion between said actuating member and valve.

6. In a device of the class described, a cylinder, a piston and piston rod for said cylinder, jaws pivoted on said rod, means whereby motion of the cylinder actuates the jaws, a handle carried by the pivot of said jaws, a valve for directing fluid to either side of the piston, and a member connected to said valve adapted to operate it and cooperating with said handle.

7. In a device of the class described, a cylinder carrying a piston and piston rod, a valve for admitting fluid to either end of said cylinder, a pivot on said piston rod, jaws mounted on said pivot, an arm also mounted on said pivot, and a member connected to said arm and operatively connected to said valve.

8. In a device of the class described, a power operated tongs comprising a cylinder, a piston and rod for the cylinder, jaws pivoted on said rod, a handle carried by the pivot of said jaws, a valve on the cylinder for directing fluid to either side of the piston, a member connected to said valve adapted to operate it and cooperating with said handle, and flexible suspension means attached to said cylinder and jaws whereby said tongs are readily movable in any direction.

9. In a device of the class described, a a power operated tongs comprising a cylinder, a piston and rod for the cylinder, a jaw pivoted on said rod, a handle carried by the pivot of said jaw, a valve for directing fluid to either side of said piston, a member connected to said valve adapted to operate it and running adjacent to said

handle; and suspension means therefor comprising flexible means connected with said tongs at separate points and a vertically adjustable counterbalanced means having a block carrying an attaching means through which said flexible means pass and providing for angular adjustment of said tongs with the horizontal and whereby said tongs are movable in any direction.

10. In a device of the class described, a power operated tongs and flexible suspension means comprising flexible means connected with said tongs at three separate points, and means by which said flexible means is supported whereby the tongs are adjustable in any direction and angular adjustment relative to the horizontal may be maintained.

11. In a device of the class described, a power operated tongs and suspension means therefor comprising flexible means connected with said tongs at separate points, and a vertically adjustable counterbalanced means having a block carrying an attaching means through which said flexible means pass and providing for angular adjustment of said tongs with the horizontal, and whereby said tongs are movable in any direction.

12. In a device of the class described, a power operated tongs and suspension means therefor comprising flexible means connected with said tongs at separate points, a block having attaching means through which said flexible means pass, another flexible means supporting said block at one end, a trackway, a carriage running thereon, a pulley on said carriage supporting said second-named flexible means between its ends, and a counterweight on the other end of the second-named flexible means, whereby said tongs are movable in any direction and are vertically adjustable and angularly adjustable with relation to the horizontal.

In testimony whereof I affix my signature.

AUSTIN D. HOEFFLINGER.