Dec. 22, 1931. B. W. SUNDE 1,837,689

TONGS

Filed Feb. 17, 1930

Fig. 1.

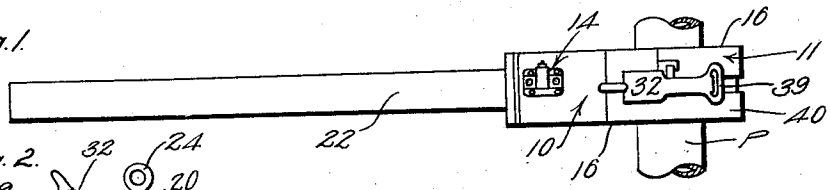


Fig. 2.

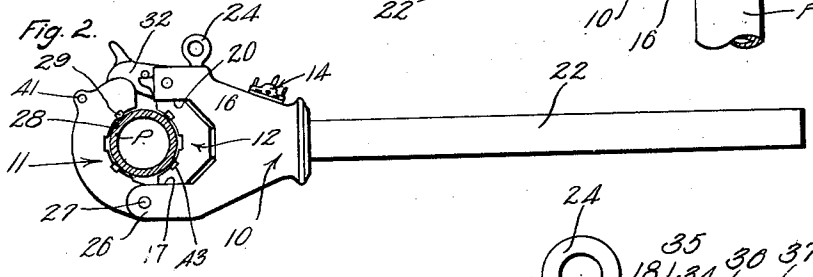


Fig. 3.

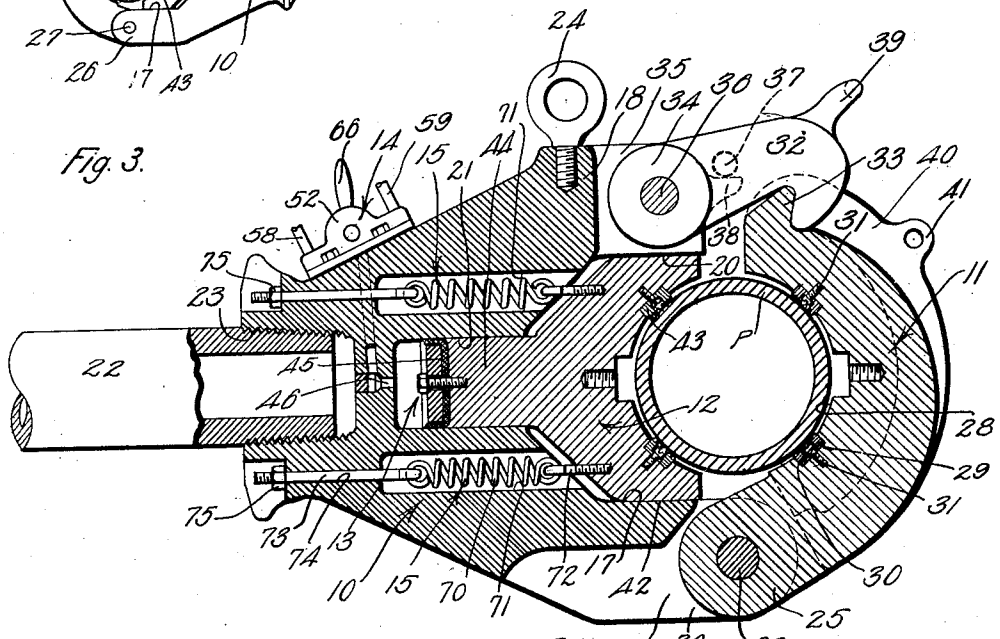


Fig. 5.

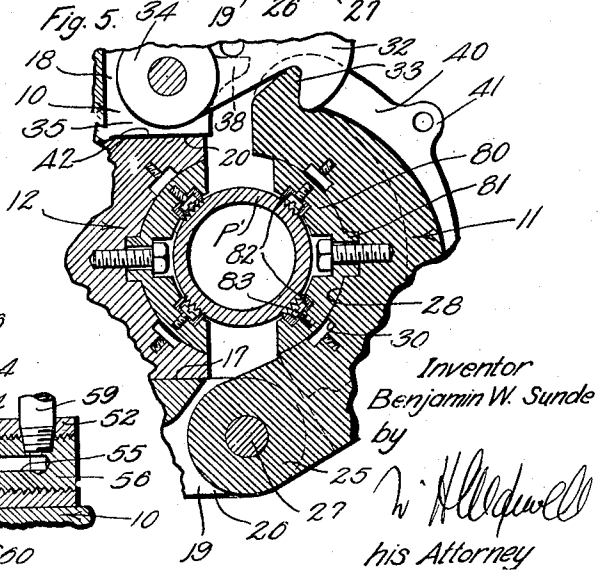
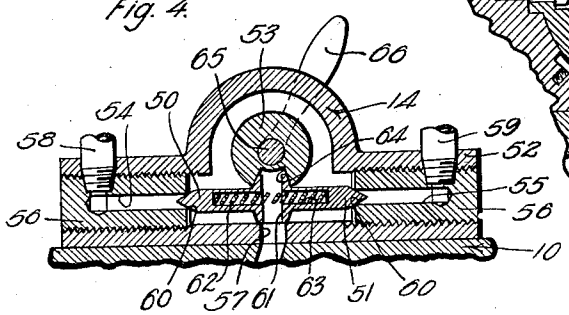


Fig. 4.



Inventor
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by
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1,837,689

UNITED STATES PATENT OFFICE

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TONGS

Application filed February 17, 1930. Serial No. 429,052.

This invention relates to a device for handling pipe and like parts and relates more particularly to tongs for handling or gripping pipe, etc.

It is often necessary to engage or grip pipe, or the like, very securely and with great force. For example, when it is desired to uncouple two lengths of drill pipe which have been employed in well drilling operations on which the joints have become tightly set, it is necessary to grip one length of pipe very securely by tongs or a like tool to hold it against rotation when the other length of pipe is rotated, to break or loosen the joint. The types of tongs commonly employed for the purpose referred to, or for like purposes, are sometimes ineffective in securely gripping a pipe to hold it against rotation.

It is a general object of the invention to provide tongs for handling or gripping pipe, etc., that will grip pipe, or the like, very securely.

An object of the invention is to provide tongs that embody a jaw operable by fluid pressure means to effectively engage or grip a part such as a length of pipe, or the like.

Another object of the invention is to provide tongs of the character mentioned that are adaptable to grip parts of various diameters.

It is another object of the invention to provide tongs of the character mentioned that embody a novel and improved control or valve mechanism for controlling the action of the fluid pressure mechanism for operating the jaws.

A further object of the invention is to provide tongs of the character mentioned that are sturdy and compact in construction and are easily handled.

Other objects and features of my invention will be best and more fully understood from the following detailed description of a typical form and application of the invention, throughout which description reference is had to the accompanying drawings, in which:

Fig. 1 is a top elevation or plan view of the tongs provided by this invention illustrating the device in position on a length of pipe. Fig. 2 is a side elevation of the device. Fig. 3 is an enlarged vertical detailed sectional view of the tongs showing certain parts in elevation. Fig. 4 is an enlarged longitudinal detailed sectional view of the valve mechanism embodied in the present invention. Fig. 5 is a view illustrating inserts arranged on the device to adapt is to grip a pipe of relatively small diameter.

Throughout the following detailed description I will consider the invention as employed to hold or grip pipe or similar tubular parts. The invention, however, may be employed to grip or handle various forms of objects to hold them for rotational movement or to hold them against such movement, therefore the invention is not to be considered as limited to the particular application or embodiment about to be described, but is to be taken as including any features that may fall within the scope of the claims.

The tongs provided by this invention includes, generally, two pivotally connected sections, a body section 10, and a gate section 11 adapted to be arranged around a part such as a length of pipe P, a gripping or pipe-engaging jaw 12 carried by one of the sections, fluid pressure means 13 for operating the jaw 12 into gripping engagement with the pipe P, a control or valve mechanism 14 for controlling the operation of the fluid pressure means 13, and means 15 for returning the jaw 12 to the free or unactuated position after operation.

In the drawings I have shown an embodiment of the invention particularly adapted to be suspended or carried in a position to handle a horizontally arranged part such as the pipe P. Further, the particular form of the invention shown is adapted to be arranged or employed to hold the pipe against rotational movement. It is to be understood, however, that the tongs may be arranged in any manner to handle pipe in various positions and may be constructed and employed to grip objects for rotation.

The body section 10 of the tongs in the preferred form of the invention carries the jaw 12, the fluid pressure means 13, the valve

mechanism 14, and the means 15. The body 10 may be a simple unitary part having substantially parallel sides 16. The inner or active end of the body 10 is provided with an opening or recess 17 to slidably carry the jaw 12. The opening 17 extends horizontally or transversely between the sides 16 of the body and provides two spaced projecting side parts 18 and 19 on the body section. The opening 17 is formed to carry or guide the jaw 12 and in the preferred form of the invention is provided with two opposite parallel side walls 20 to slidably receive the jaw 12. A cylinder opening 21 extends inwardly in the body from the inner end of the opening 17. In the particular case illustrated the walls of the opening 17 converge inwardly from the opposite parallel parts 20 to the cylinder opening 21. What I will term the upper and lower sides of the body section 10 may taper or converge inwardly from the side parts 18 and 19 toward the rear or outer end of the body. An operating or retaining handle or member 22 may be provided on the outer end of the body section 10. The member 22 may be in the form of a tubular part or pipe screw threaded into an opening 23 in the outer end of the section 10. The member 22 may be employed to hold the device against rotation or may be employed to rotate or operate the device as desired. Means is provided for carrying or suspending the tongs. In the case illustrated an eye bolt 24 projects upwardly from what I have termed the upper side of the body section 10.

The gate section 11 of the tongs is pivotally connected to the section 10 and is adapted to close the open side of the opening 20 to extend around a part such as the pipe P. The gate section 11 may be of any suitable form, for example, it may be constructed of linked or chain sections, or it may be a single rigid part or of any other construction found in tongs for handling pipe. In the particular form of the invention shown in the drawings the section 11 is a single rigid member and is pivotally connected with the side part 19 of the body section 10. The gate section 11 may be pivotally connected with the body section 10 in any suitable manner. In the embodiment of the invention illustrated a tongue 25 is provided on the gate section 11 and extends between spaced yoke parts 26 on the body section 10. A pivot pin or bolt 27 extends through transverse openings in the tongue 25 and the yoke parts 26 to pivotally connect the sections 10 and 11.

The inner side 28 of the gate section 11 is curved to receive or conform to the configuration of the exterior of the pipe P. The outer side or face of the jaw 12 and the inner side 28 of the gate section 11 provide an opening of substantially round cross sectional configuration when the section 11 is in operative position. Gripping parts or dies 29 may be provided on the inner side 28 of the gate section. When the tongs are to be employed to handle pipe of relatively small diameter inserts or dies 80 are mounted on the inner side 28 of the gate section 11 and in the jaw. The dies 29 may be seated in notches or recesses 30 in the side 28 and may be removably secured to the gate section 11 by suitable screws 31. The dies 29 may be provided with gripping parts in the form of teeth to effectively engage the exterior of the pipe P.

In accordance with the invention means is provided for releasably setting or locking the gate section 11 in the closed position around the pipe P. Any suitable form of latch or releasable connection may be provided to latch the gate section 11 in its operative position. In the preferred form of the invention a latch 32 is pivotally mounted on the side part 18 of the body section and is adapted to cooperate with a nose or catch 33 on the gate section 11. The latch 32 may have a tongue 34 arranged between yoke parts 35 on the side part 18. A suitable pivot pin 36 may extend through transverse openings in the parts 35 and the tongue 34 to pivotally mount the latch on the body section 10. The latch 32 is normally retained in position to cooperate with the catch 33 of the gate section 11 by gravity, and the latch 32 and the projection 33 are formed and related so that when the section 11 is swung to the closed position the latch automatically engages the catch 33 to latch the section 11 in its closed position. A laterally projecting stop 37 may be provided on the latch 32 to engage a lug 38 on the side part 18 to limit the downward movement of the latch 32 and retain the latch in the proper position to be engaged by the catch 33. A suitable handle 39 may be provided on the latch 32. Reinforcing or strengthening ribs 40 may be provided on the gate section 11 and lugs 41 having openings may be provided on the ribs 40 to receive suitable means for operating the gate section 11.

The jaw 12 is slidably mounted in the opening 20 and is operable by the means 13 into gripping or pressure engagement with the pipe P. The jaw 12 is shaped to conform to the configuration of the opening 20 having flat parallel sides 42 to slidably operate on the side walls 20 of the opening. The outer or active side of the jaw 12 is curved to effectively receive the exterior of the pipe P, and dies 43 similar to the dies 29 of the gate section may be removably mounted on the outer side of the jaw.

The fluid pressure means 13 for operating the jaw 12 includes a plunger or piston 44 slidable in the cylinder opening 21. The piston 44 may be formed integral with the jaw 12 projecting from the inner side of the jaw into the cylinder opening 21. A suit-

able cup leather 45 may be provided on the inner end of the piston 44 to seal with the walls of the cylinder 21. Fluid under pressure is supplied to the cylinder 21 to operate the jaw 12 and is exhausted from the cylinder after operation of the jaw 12 through a port 46 communicating with the inner end of the cylinder 21. Suitable fluid, say, oil, is supplied to the port 46 under control of the valve mechanism 14 to operate the jaw 12 outwardly and is exhausted or released from the cylinder 21 under control of the mechanism 14 to permit the jaw 12 to be returned to its normal position by the means 15.

The valve mechanism 14 provided to control the passage of fluid through the port 46 includes two valve members, namely, an inlet valve 50 and an outlet valve 51 slidably mounted in a valve chest or housing 52 and operable by a single operating member 53 to control the passage of fluid through an inlet port 54 and an outlet port 55, respectively. The valve housing 52 may be mounted on the exterior of the body at the outer end of the port 46. In the case illustrated the housing 52 is mounted on what I have termed the upper side of the body section 10 over the end of the port 46. The housing 52 may be in the form of an elongated tubular part closed at its opposite ends by plugs 56. A transverse opening 57 is provided through the wall of the housing 52 to communicate with the port 46. The inlet port 54 is provided in one of the plugs 56 and is supplied by a conduit 58. The outlet port 55 is provided in the other plug 56 and communicates with an exhaust conduit 59. The valves 50 and 51 are slidable longitudinally in the housing 52 to cooperate with seats 60 formed on the plugs 56 around the ports 54 and 55. The valves 50 and 51 may be alike in construction and are oppositely arranged in the housing 52.

The valve members 50 and 51 may be in the form of needle valves having tapered or beveled faces at their outer ends to cooperate with the seats 60. The body or main portions of the valves 50 and 51 are of considerably less diameter than the housing 52. A flange 61 is provided on the inner end of each of the valves 50 and 51 to slidably engage the inner walls of the housing 52. The flanges 61 act to guide the valves within the housing. The valves are formed and positioned so that when they are both in the closed position the flanges 61 are spaced apart and are adjacent the opposite sides of the port or opening 57. A compression spring 62 is arranged between the valves 50 and 51 to normally retain them in sealing engagement with the seats 60. The spring 62 may seat in sockets 63 in the inner ends of the valves 50 and 51. The operating member 53 is mounted in a hollow enlargement on the housing 52 and is in the form of a rotatable segment. The member 53 is rotatable about an axis transverse of the valves 50 and 51. A segmental notch 64 is provided on the lower and inner side of the operating member 53 to receive or engage the flanges 60. The notch 64 is positioned and formed so that it receives both of the flanges 61. A shaft or stud 65 projects outwardly from opposite ends of the member 53 and is rotatable in openings in the enlargement to rotatably mount the member 53. A suitable operating handle 66 may be provided on one end of the stud 65 at the exterior of the housing 52 for operating the member. It will be seen that partial rotation of the member 53 in one direction will unseat the valve 50 without affecting or shifting the valve 51 and that partial rotation of the member 53 in the opposite direction will unseat the valve 51 without affecting the position of the valve 50.

The means 15 for automatically returning the jaw 12 to its normal unactuated position upon the pressure being released from the cylinder 21 may be in the form of spring means. The means 15 may include tension springs 70 arranged in longitudinal openings 71 in the body section 10. The outer ends of the springs 70 are connected with the inner side of the jaw 12 by means of eye bolts 72. The opposite ends of the springs 70 are attached to bolts or rods 73 slidable in reduced openings 74 in the body section 10. Adjusting nuts 75 are screw threaded on the outer ends of the rods 73 to engage the exterior of the body section 10. The nuts 75 may be employed to adjust or vary the tension or action of the springs 70.

In Fig. 5 of the drawings I have shown inserts 80 arranged on the inner side of the gate section 11 and the outer or active side of the jaw 12. The inserts 80 may be employed to adapt the device to handle pipe (P′) of relatively small diameter. The inserts 80 may have projecting lugs 81 seated in notches in the jaw 12 and the gate section 11. The inserts 80 may be removably secured to the jaw and the gate section by means of screws extending through the lugs 81 and screw threaded into the jaw 12 and gate section. The outer or active sides of the inserts 80 may be provided with gripping dies 82. The dies 82 may be set in notches in the inserts 80 and may be secured to the inserts by screws 83. It will be obvious that inserts 80 of various sizes may be mounted on the gate section 11 and the jaw 12 to adapt the device for gripping pipe or like parts of various diameters.

It is believed that the operation of the tong provided by this invention will be apparent from the foregoing detailed description. The invention provides a compact construction including the fluid pressure means for operating the jaw and the means 15 for re-

turning the jaw in the single unitary body section 10. The valve mechanism 14 is simple and easily operated so that it is particularly suited for use in connection with a device of this character. The valves 50 and 51 are controlled by the operation of the member 53 so that when the member 53 is partially rotated to unseat the valve 50 the spring 62 is compressed to cause the valve member 51 to be more tightly seated on the seat 60 of the outlet port 55. The action of the spring 62 is reversed when the valve 51 is unseated by the member 53 so that it acts to securely or positively seat the valve on the valve seat 60 of the port 54. The springs 70 of the means 15 act to return the jaw 12 to its normal position after operation or after the valve 51 has been opened and acts to force fluid from the cylinder 21 when the valve 51 is opened. The means 15 and the springs 70 also act to prevent possible displacement of the jaw 12 from the body section 10. It is to be noted that when the particular embodiment of the invention illustrated in the drawings is to be employed in the horizontal position that the latch 32 is always in position to be engaged by the catch 33 to retain the gate section 11 in closed position.

Having described only a typical preferred form of my invention, I do not wish to limit myself to the specific details set forth but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. Tongs including a body adapted to receive an object, a gate pivotally connected with the body, a handle projecting from the body, a gripping jaw slidable in the body, and fluid pressure means for operating the jaw including a piston on the jaw operable in a cylinder in the body, the cylinder having a central longitudinal axis coincident with the longitudinal axis of movement of the jaw and of the guiding means for the jaw.

2. Tongs including a body adapted to receive an object, a gate pivotally connected with the body, a handle projecting from the body, a gripping jaw slidable in the body, and fluid pressure means for operating the jaw including an integral piston on the jaw slidable in a cylinder in the body, the cylinder having a central longitudinal axis coincident with the central longitudinal axis of movement of the jaw and of the guiding means for the jaw.

3. Tongs including a body, a gate pivoted to the body, there being recesses in the body and gate forming a work receiving opening when the gate is in the closed position, a jaw slidable radially in the body relative to the said opening, and fluid pressure means for operating the jaw including a piston on the jaw slidable in a cylinder opening in the body, the cylinder opening being radial relative to the said opening.

4. Tongs including a body, a gate pivotally connected to the body there being recesses in the body and gate forming a work receiving opening, latch means for the gate, a gripping jaw slidable in an opening in the body for movement radial relative to the work opening, fluid pressure means for operating the jaw including a piston on the jaw slidable in a cylinder in the body the cylinder having a longitudinal axis radial relative to the work opening, a handle on the body, and spring means in the body for automatically returning the jaw after actuation.

5. Tongs including a body adapted to receive an object, a gate pivotally connected with the body, a handle projecting from the body, a gripping jaw slidable in the body, means guiding the jaw for radial movement relative to the object, and fluid pressure means for operating the jaw including a piston on the jaw operable in a cylinder in the body, the cylinder having a central longitudinal axis coincident with the longitudinal axis of the guiding means for the jaw, and valve means for controlling the admission and discharge of fluid from the cylinder.

In witness that I claim the foregoing I have hereunto subscribed my name this 17th day of January, 1930.

BENJAMIN W. SUNDE.