

Nov. 1, 1932.

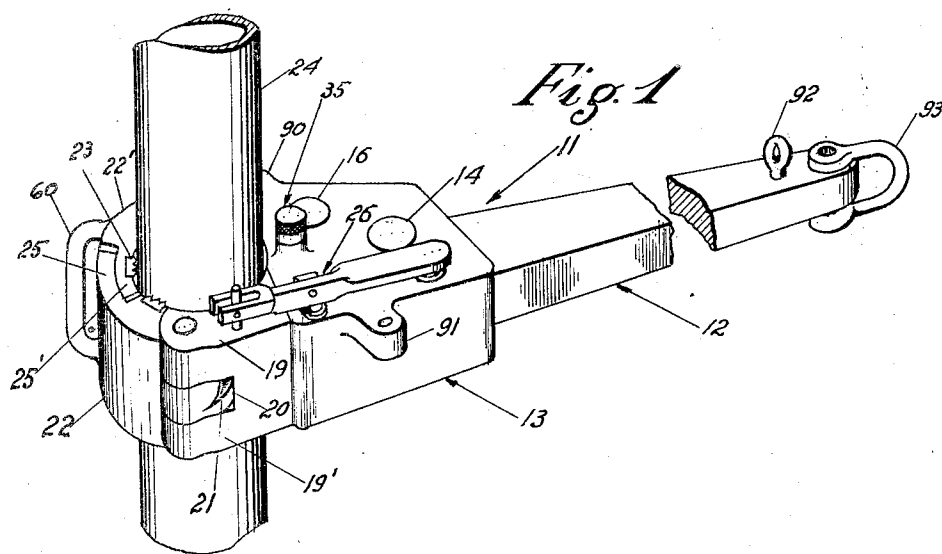
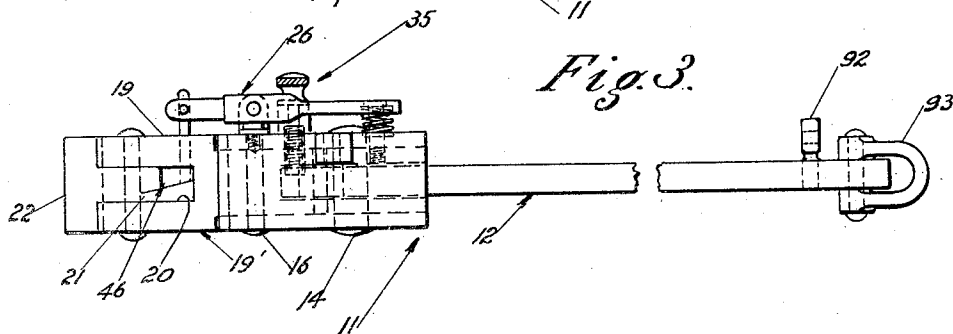
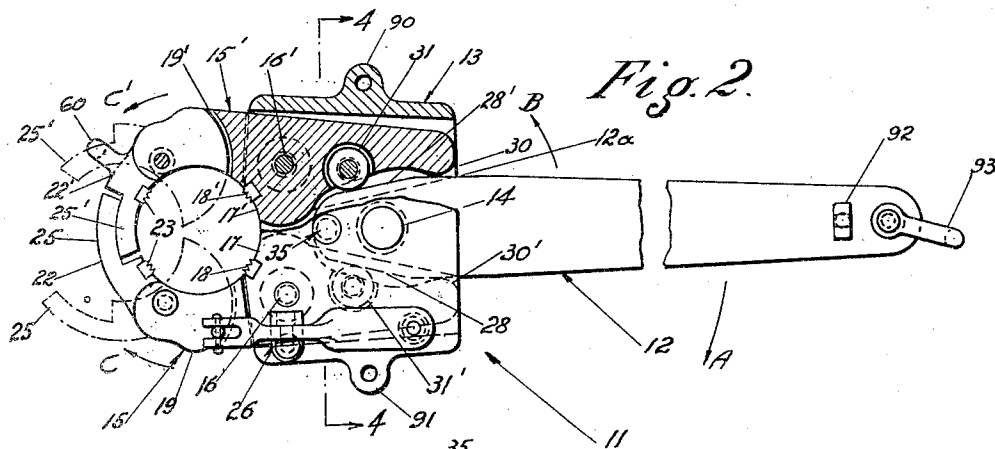
F. J. KIGHTLINGER

1,885,605

PIPE TONG

Filed Feb. 10, 1930

2 Sheets-Sheet 1



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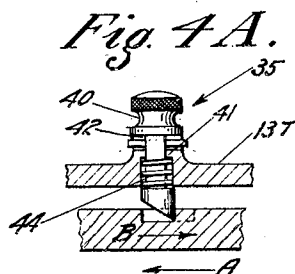
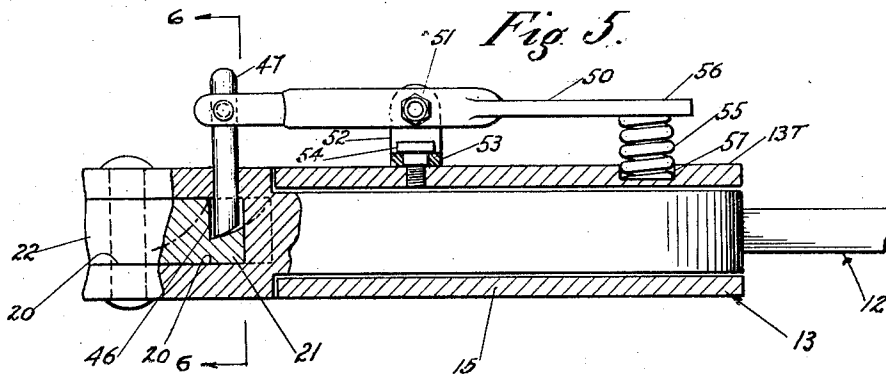
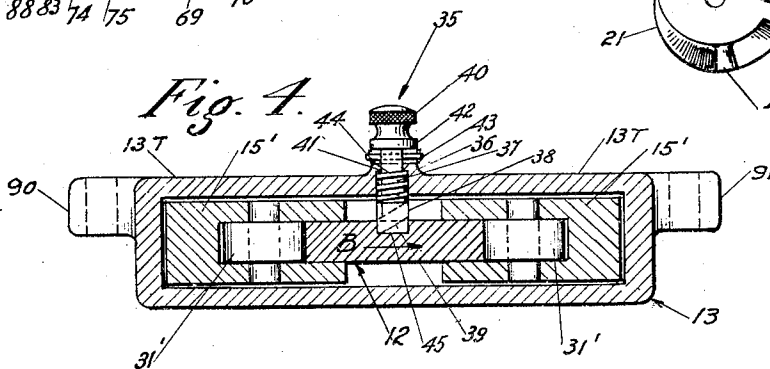
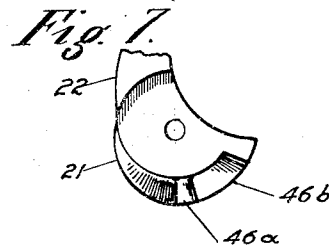
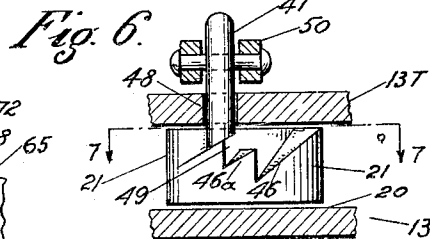
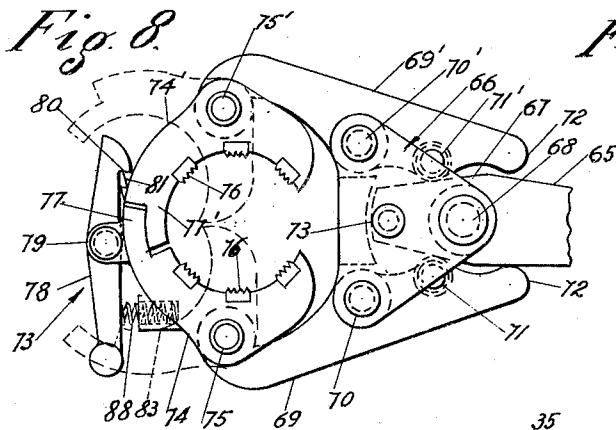
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PIPE TONG

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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PIPE TONG

Application filed February 10, 1930. Serial No. 427,252.

This invention has to do with tongs such as are used in oil well drilling practice for handling drill pipes, casing, and the like. It is well known to those familiar with the art that tongs of the type referred to above are used for the purpose of tightening the drill stem couplings, and in the usual construction such tongs comprise a handle and a set of jaws mounted on one end thereof, such jaws being provided with teeth. The jaws are usually constructed so as to encircle the drill stem or the drill stem collar, and to be forced into pressure engagement with the same when a torque is applied to the handle.

Tongs of the type with which I am familiar require the attention of two operators; one to operate the handle, the other to operate the jaws and clamp them upon the pipe. It is a further characteristic of the tongs now in use that such tongs are designed to turn the pipe in one direction only, and it is necessary to invert the tongs when they are used for uncoupling the stands of drill stem as it is withdrawn from the well.

It is a primary object of this invention to produce a device of the class described, which is of simple form and construction, and is more or less automatic in its operation. The device contemplated by this invention is designed to operate in both directions. In other words, the tongs contemplated by my invention can be quickly adjusted for turning the pipe in either direction, simply by changing the position of an adjusting latch, which will hereinafter be referred to as the handle adjusting latch.

The jaws in the tongs contemplated by this invention are designed to automatically close upon a pipe or other member received thereby, and are likewise designed to automatically open after a safety or jaw control latch is released and the tongs are pulled away from the pipe.

It is a noteworthy feature of my invention, that the tongs contemplated by this invention may be readily adjusted for use on different sizes of pipe; further, that the jaws have a uniform gripping surface and that there is no wedge point which tends to crush the pipe,

as is the case in some of the tongs now in use.

Another noteworthy feature of a preferred form of device contemplated by this invention is that all of the moving parts are enclosed in a housing, which adds materially to the safety of the workman handling the tongs. The jaws in the tongs contemplated by this invention are interchangeable; that is, one set of jaws may be used on either the right or left hand side. The automatic operation of the jaws referred to above makes possible the control of the tongs by a single operator, whereas in the usual type of tongs now in use two operators are required.

The details in the construction of a preferred form of my invention, together with other objects attending its production, will be best understood from the following description of the accompanying drawings which are chosen for illustrative purposes only, and in which,

Fig. 1 is a perspective view showing a manner in which the preferred form of tong contemplated by this invention may be used in connection with the drill pipe;

Fig. 2 is a plan view of the tong shown in Fig. 1 and has the housing or jaw supporting head partly broken away to show more clearly the construction of the handle and the jaw supporting means;

Fig. 3 is a side elevation of Fig. 2;

Fig. 4 is an enlarged sectional elevation which may be considered as having been taken in a plane represented by the line 4—4 in Fig. 2;

Fig. 4A is a partial sectional view showing the handle control latch illustrated in Fig. 4 arranged for operating the tongs in a direction opposed to the direction in which the device as arranged in Fig. 4 is to operate;

Fig. 5 is a fragmentary elevational view partly broken away to show a preferred form of jaw control latch;

Fig. 6 is a sectional elevation which may be considered as having been taken in the plane represented by the line 6—6 in Fig. 5;

Fig. 7 is a plan view which may be considered as having been taken in a plane represented by the line 7—7 in Fig. 6; and

Fig. 8 is a plan view of a modified form of jaw head contemplated by this invention.

More particularly describing the invention as herein illustrated, reference numeral 11 indicates a tong unit which consists of a handle 12 having a jaw supporting head 13 pivotally mounted thereon. In this form of my invention, the jaw supporting head 13 is made in the form of a box or housing which is pivoted to the end of the handle by means of the pivot pin 14, and has mounted therein jaw supporting levers 15 and 15', which are mounted on opposite sides of the handle by means of pins 16 and 16'. The jaw supporting levers 15 and 15' have provided on their outer ends rounded gripping surfaces 17 and 17', such surfaces being provided with serrated jaw inserts 18 and 18'.

The outer end portions of the levers 15 and 15' are extended a substantial distance beyond the surfaces 17 and 17', and these extending portions indicated by reference numerals 19 and 19' are provided with slots 20 which receive tongues 21 formed on the inner ends of jaw members 22 and 22'. The construction of these jaw members is best illustrated in Figs. 1 and 2, where it will be noted that they conform with the general contour of the gripping surfaces 17 and 17', and are provided with serrations 23 for engaging a drill pipe 24. The outer ends of the jaws 22 and 22' are notched so as to form overlapping portions 25 and 25' which cooperate with each other and with a latch generally indicated by reference numeral 26 to provide a safety catch for preventing the inadvertent disengagement of the tongs.

The end 12^a of the handle, which extends into the jaw supporting head 13, is tapered so as to form what I will hereinafter refer to as cam surfaces indicated by reference numerals 28 and 28'. It will be noted from Fig. 2 that the jaw supporting levers 15 and 15' have their outer ends 30 and 30' rounded and curved inwardly toward the handle and are provided at intermediate points with rollers 31 and 31' which are adapted to engage the cam surfaces 28 and 28'. The construction of the handle and the jaw-supporting levers just described is for the purpose of effecting a pipe gripping movement of the jaws when the handle is moved in opposite directions.

It will be noted from Fig. 2 that, as the handle 12 is moved in the direction of the arrow A, the roller 31 in the jaw supporting lever 15 is swung about its pivot in the general direction of the arrow B, and consequently the jaw 22' is pressed into engagement with the pipe in the general direction of the arrow C. At the same time, the opposite side of the handle 12 is brought into engagement with the outer rounded end 30' of the jaw supporting lever 15' and such movement is likewise effective to swing the jaw 22 in the direction of the arrow C, such movement being ef-

fective to bring both jaws into firm pressure engagement with the pipe. This pressure engagement continues at all times during which a torque is applied to the handle in the general direction of the arrow A. Similar action in the opposite direction would of course take place in the event the handle were moved in the direction of the arrow B, and, unless means are provided for preventing such action occurring, the tongs, after being positioned upon a pipe, would move the pipe in opposite directions as the handle was moved back and forth. Since these tongs are usually operated by giving the pipe a partial turn, then moving the handle back to its initial position and then giving it another partial turn, it is important that means be provided for the purpose of holding the jaws against a pipe engaging movement, while the lever is being moved on a return stroke. Means of this character are generally indicated by reference numeral 35, and will hereinafter be referred to as a handle control or a handle control latch.

The details in the construction of the latch 35 are best illustrated in Fig. 4, where it is shown as consisting of an apertured boss or hub 36 formed upon the central portion of the top member in the jaw supporting head 13. A pin 37 extends downwardly through the aperture in the boss 36, and this pin has formed upon its lower end an enlarged head 38, the bottom surface of which is tapered as indicated at 39. The top of the pin 37 is provided with a knob or head 40 and a shoulder 41 is formed in the upper portion of the boss 36. The extreme upper end of the boss 36 is provided with a pair of diametrically opposed notches 42 which receive oppositely extending ends of a pin 43 extending through the main latch pin 37. A spring 44 is interposed between the shoulder 41 in the boss and the shoulder which is formed by the enlarged head portion 38 on the pin 37. The handle 12 is provided with a recess 45 positioned so as to pass immediately beneath the pin 37. In the operation of this latch, the movement of the handle 13 in the direction of the arrow B when the pin is arranged in the position shown in Fig. 4, swings the handle beneath the pin, lifting the same by the tapered surface 39, and permitting the closing movement of the jaws described above. When moving the handle in the opposite direction, the pin 36 drops into the notch 45 and prevents further movement of the handle beyond the neutral position shown in Fig. 4. In the event it is desired to operate the tongs in a reverse direction, as would be required for unscrewing the pipe, the pin is lifted against the action of the spring 44 and is turned to the position shown in Fig. 4A. In this position it will be observed that the handle is permitted to have its extreme movement in the direction of the arrow B, but is stopped in a neutral

position when moved in the direction of the arrow A.

The details in the construction of the jaw control latch are most clearly illustrated in Figs. 5, 6, and 7, where the latch 26 is shown as consisting of a cam notch or a set of cam notches provided in the tongue 21 and generally indicated by reference numeral 46, and a plunger 47 slidably extending through an aperture 48 formed in the top member 13T of the jaw supporting head 13. The plunger 47 has provided on its lower end a sloped or wedge like surface 49 which rides over the cam surfaces comprising parts of the notch 46. In actual construction, I prefer to employ two notches 46^a and 46^b, the former being designed to hold the jaws in position for engagement with a pipe collar or coupling, and the latter being adapted to permit the engagement of the jaws with the pipe proper. In order that the plunger 47 may be held in yieldable engagement with the notched portion of the jaw, and further to facilitate the manipulation of the plunger 47 for the purpose of unlatching the jaws, I employ what may be termed a latch operating mechanism shown as comprising a lever member 50 mounted to swing upon a pin 51 which in turn is mounted between a pair of fingers 52. The fingers 52 extend upwardly from an aperture plate 53 and the plate 53 is secured upon the top plate 13T of the head member 13 by means of a threaded pin 54. The aperture in the plate 53 is preferably elongated somewhat to permit a slight movement of the lever supporting mechanism (52 and 53) with respect to the head 13 during the opening and closing movement of the jaws. For the purpose of always holding the plunger member 47 in yieldable engagement with the cam notches 46, I interpose a spring member 55 between the outer portion 56 of the lever 50 and a recess 57 in the upper plate member 13T of the jaw supporting head. In the operation of this latch it will be seen that the shoulders formed by the cam notches engage the plunger 47 when the jaws tend to swing outwardly, as would be effected in the event a disengaging force were inadvertently applied to the tongs while they were engaged with the pipe. This engagement will, of course, hold the jaw 22 against opening and since the jaw 22 is provided with a lip 25 overlapping the jaw 22', it will be seen that the latch 26 cooperates with the lips on the ends of the jaw members to form a lock which prevents the inadvertent disengagement of the jaws when they are closed. A noteworthy feature of the jaw control latch 26 is that this latch locks the jaws against outward movement only, and permits the free inward movement of the jaws until they are pressed firmly against the pipe or coupling received thereby.

It was previously mentioned as one of the

objects of this invention to produce tongs of the class described wherein a part of the operating or moving elements were enclosed to add to the safety with which the tongs might be operated. This feature is accomplished by making the jaw supporting head 13 in the form of a sleeve or box in the manner illustrated in Figs. 1 to 5 inclusive. It will be noted that the sleeve type of jaw supporting head partially encloses the lever members 15 and 15', thus protecting the cam surfaces on the end of the handle, and the roller members in the ends of the jaw supporting levers, and, at the same time, preventing the operator from injuring his hands during the operation of the tongs.

During the operation of tongs of this character, as is well known to those familiar with the art, the tongs are constantly being closed upon a pipe and disengaged therefrom. Before placing the tongs upon the pipe, the jaws 22 and 22' are made to assume the position shown in dot and dash lines in Fig. 2. In the event the tongs are being removed from the pipe, the jaws are automatically drawn to this position, but if they have been closed for any reason, they may be opened by means of a handle 60 which is provided for that purpose. It will be noted from the dot and dash line position of the jaws in Fig. 2, that the tongues 21 and 21' form what may be termed cam members which are positioned so as to be engaged by the pipe and through such engagement are effective to force the jaws 22 and 22' into a closed position about the pipe. It will be seen, therefore, that a unit of this character is effective to be automatically opened and closed.

Reference numerals 90 and 91 indicate ears formed on the jaw supporting head 13, such ears being adapted to receive supporting rings (not shown) which cooperate with a ring 92 to provide means for attaching a supporting link system to the tongs. The usual type of supporting mechanism consisting of chains or links may be used to support the tongs and the handle 12 is provided with the usual clevis 93 adapted to receive a rope or cable used in handling same.

In the modified form of my invention shown in Fig. 8, I show a tong unit which is somewhat more simple in construction than the one shown in connection with Figs. 1-7 inclusive. This unit consists of a handle member 65 having a jaw supporting head 66 mounted upon its tapered jaw supporting end 67. The head 66 in this form of my invention consists of a pair of oppositely disposed plates which are pivotally attached to the handle by means of a pin 68. The jaw supporting head 66 carries a pair of oppositely disposed jaw supporting levers 69 and 69' which are pivotally supported in the head 66 by means of pins 70 and 70' and are similar in their construction and operation to the

jaw supporting levers described in connection with Figs. 1-7 inclusive, being provided with rollers 71 and 71' adapted to engage cam surfaces on the end of the handle and with additional projecting portions 72 and 72' which are also adapted to engage the end of the handle at such time as it is moved in pivotal relation with respect to the head members 66. This unit is also provided with a handle control safety latch 73 similar to the one shown in Fig. 7, which is used to change the direction of the tongs.

The main distinction between the form of my invention shown in Fig. 8 and the form described in connection with Figs. 1 to 5 inclusive, resides in the fact that the lever members 69 and 69' are not provided with pipe engaging surfaces but the jaws 74 and 74', which are pivotally mounted in the outer ends of the lever members 70 and 70' on pivot pins 75 and 75', are adapted to substantially encircle the pipe and are provided with a plurality of serrated pipe engaging members indicated by reference numeral 76. These jaws, like the ones described above, are provided with overlapping lips, indicated generally by reference numerals 77 and 77' and in this form of my invention I show the latch member as comprising a pawl lever 78 which is pivotally mounted in a bracket 79 formed on the outer surface of the jaw 74. The lever 78 has provided on its engaging end a notch 80 which is adapted to engage suitable shoulders 81 formed upon the outer surface of the jaw member 74'. The lever 78 is yieldably pressed toward a latching position by means of a spring 88 mounted in a suitable recess 83 formed in the jaw member 74.

It is to be understood that while I have shown in Fig. 8 a modified form of jaw supporting head and a modified form of latch, that the same type of supporting head shown in Figs. 1-7 inclusive, in which the lever members are partially enclosed, may be advantageously used in connection with this jaw and lever organization. It will also be apparent that a latch similar to the one shown in Fig. 5 may be substituted for the latch shown in Fig. 8.

The ratchet action in the jaws shown in Fig. 8 is similar to that described in connection with the preferred form of my invention. The latch member 73 is identical with the latch member 35 shown in Fig. 7 and it will be understood that this latch member holds the lever from moving the jaws into a pipe gripping position while it is swung on a "return stroke" in the event several rotative movements are required to properly tighten the coupling.

It is to be understood that while I have herein described and illustrated one preferred form of my invention and indicated certain modifications which may be made therein, that the invention is not limited to the precise con-

struction set forth but includes within its scope whatever changes fairly come within the spirit of the appended claims.

I claim as my invention:

1. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head pivotally mounted on said handle; jaw members pivotally mounted in said head; and latch means for controlling the pivotal movement of said head relative to said handle to effect a gripping action in one direction only, said latch comprising a bevel pointed spring pressed plunger mounted in said jaw supporting head and a square shouldered recess in said handle adapted to receive said plunger and engage the same when said handle is swung in one direction only.

2. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head pivotally mounted on said handle; jaw members pivotally mounted in said head; and latch means for controlling the pivotal movement of said head relative to said handle to effect a gripping action in one direction only, said handle having a square shouldered recess in the end portion supporting said head, and said latch comprising a rotatable spring pressed plunger situated so as to be received by said recess when the handle and the head are in relative alignment, the lower end portion of said plunger being tapered to stop relative movement between said head and said handle in one direction, and means for locking said plunger against rotation.

3. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head pivotally mounted on said handle; jaw members pivotally mounted in said head; and latch means for controlling the pivotal movement of said head relative to said handle to effect a gripping action in one direction only, said handle having a square shouldered recess in the end portion associated with said head, and said latch comprising a rotatable spring pressed plunger situated so as to be received by said recess when the handle and the head are in relative alignment, the lower end portion of said plunger being tapered, and means for locking said plunger against rotation, in a position such that the tapered lower end thereof stops the pivotal movement of said handle in said head in only one direction.

4. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head mounted on said handle; jaw members pivotally mounted in said head, one of said jaw members being provided with a latch notch; and a latch for locking said jaw member against pivotal movement in said head comprising a plunger mounted in said head and adapted to be received in said latch notch; yieldable means for pressing said plunger into said notch and means for lifting said plunger against the action of said yieldable

means, said last mentioned means including a lever arm pivoted intermediate its ends with one of its ends pivotally connected to said plunger.

5 5. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head pivotally mounted on said handle; and jaw members pivotally mounted in said head, said head being made in the form of a sleeve which
10 encloses parts of said jaw members.

6. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head pivotally mounted on one end portion of said handle; jaw supporting levers pivotally
15 mounted in said head; and jaws pivotally mounted on said levers, said head being made in the form of a sleeve which encloses parts of said jaw supporting levers.

7. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head pivotally mounted on one end of said handle; jaw supporting levers pivotally mounted in
20 said head; jaws pivotally mounted on said levers; and latch means for permitting unidirectional movement of said handle relative to said jaw supporting levers to operate said
25 tongs in one direction only.

8. For use in handling pipe, a tong unit embodying: a handle; a jaw supporting head pivotally mounted on one end of said handle; jaw supporting levers pivotally mounted in
30 said head; jaws pivotally mounted on said levers; and latch means for permitting unidirectional movement of said handle relative to said jaw supporting levers to operate said
35 tongs in one direction only, said latch means being operable to reverse the unidirectional movement between said handle and said jaw supporting levers to operate said tongs in
40 the opposite direction.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 29th day of January, 1930.

FRANK J. KIGHTLINGER.

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