

Feb. 23, 1954

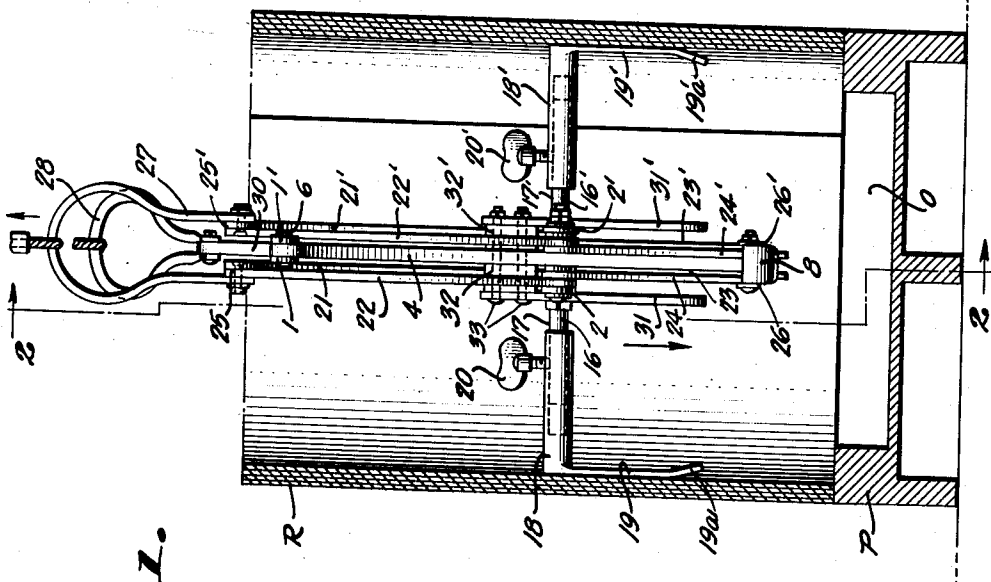
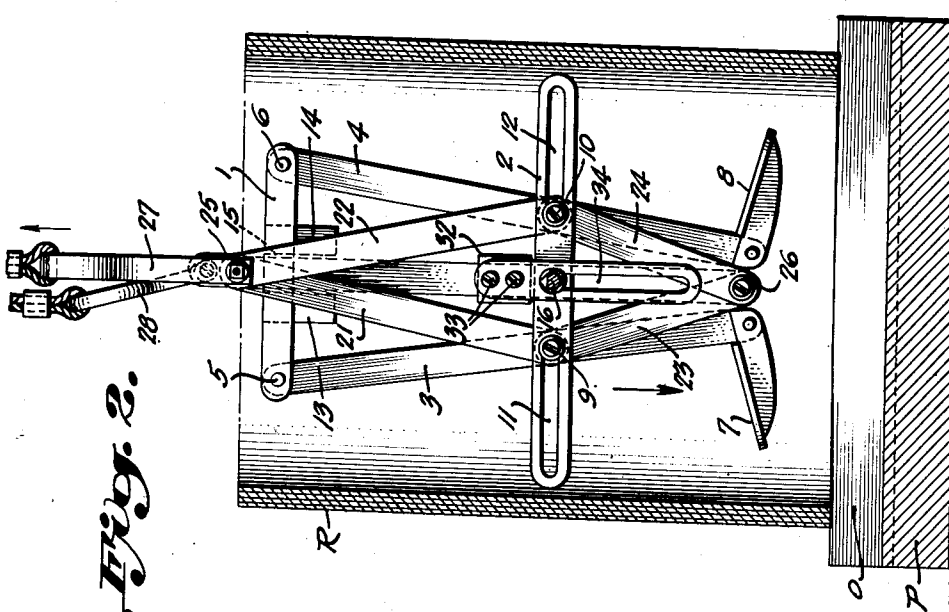
A. BARCHOFF

2,670,233

LIFTING AND LOWERING TONGS

Filed April 18, 1952

2 Sheets-Sheet 1



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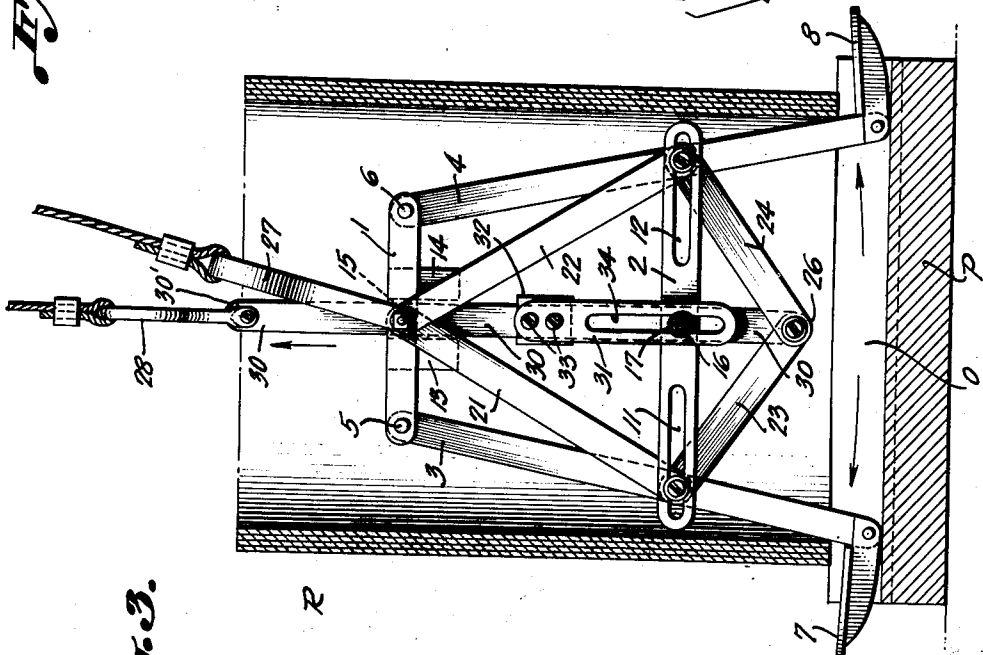
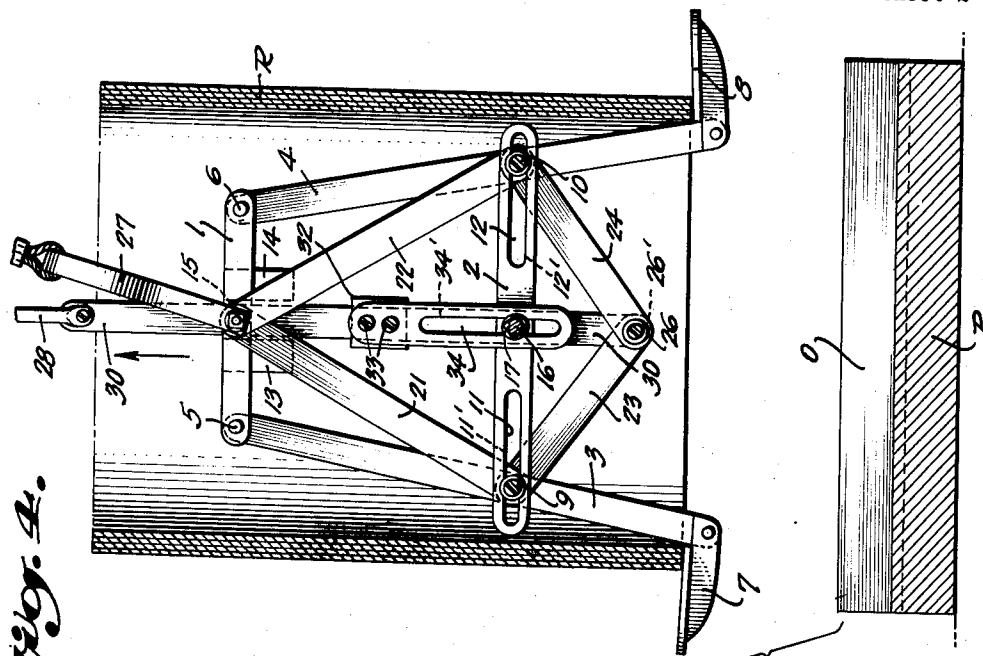
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2,670,233.

LIFTING AND LOWERING TONGS

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Application April 18, 1952, Serial No. 283,067

8 Claims. (Cl. 294—97)

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This invention relates to lifting and lowering tongs and more particularly to a tong device designed for the engagement of annular objects such as rolls of metal, pipes, wheels and the like.

It is the object of the present invention to provide a rugged and reliable tong device which is adapted to engage an annular object from the interior thereof, and more particularly by lowering the tong into the center of the annular object in a collapsed condition, which may be followed by a distention of the tong when the same is lifted so that a pair of opposed tong supports may engage reliably the bottom of the annular object so that the same may be hauled with a high degree of stability, by crane or otherwise, to any desired location.

It is a further object of the present invention to provide a tong device having a pair of opposed tong levers which may be selectively and quickly collapsed or distended, depending upon the optional engagement of one of two hooks fitted on the tong device.

It is a further object of the invention to provide for an effective guiding of the tong device into the interior of a hollow body by adjustable guide members extending transversely to the plane of the tongs so that the tong levers are centered quickly and accurately within the hollow body preparatory to the distention of the tongs and the engagement of the lower edge of the hollow body thereby. The adjustable guide members also serve as a stabilizing influence for the support of the body while the same is engaged by the tongs, so that the same does not rock or shift on the tong supports while in motion.

It is another object of the invention to provide a tong device of low cost, formed of a plurality of simple levers, many of which are duplicative and congruous with each other so that the parts may be interchanged. The assembly thereof may be made with facility and in view of the simplicity of the assembly, the maintenance requirements to maintain the device in perfect operation are negligible.

The invention proceeds upon the principle of providing a pair of opposed tong levers having the upper ends thereof pivotally suspended from the opposite ends of the bar frame. A pair of rigid feet extend from the lower ends of the tongs for the support and engagement thereby of diametrically opposed points of an annular body such as a roll of metal, a pipe, or the like. Pivot bolts are provided at an intermediate point of said tong levers which bolts are guided in a hori-

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zontal guide bar provided with slots therefor. When the pivot bolts are each disposed nearer the center of the guide bar, the tongs are in a collapsed condition and when the pivot bolts are adjacent the outer limits of the guide bar the tongs are in an extended position. The control of the pivot bolts is exercised by one or more quadrangular frames which are symmetrical to the vertical axis of the tong device. A vertical control lever extends upwardly through the vertical axis of the tong device to raise the lower corner of the quadrangular frame, which effects a separation of the pivot bolts to cause a distention of the tong levers. On the other hand, a raising of the tong device by the upper corner of the quadrangular frame causes a collapse of the frame and the tong levers engaged thereby, so that the tong device assumes a collapsed state.

Guide bolts extending transversely to the plane of the tong levers and operating mechanism, serve to center the tong device as the same is lowered into a hollow body and also center the hollow body on the tong device while the body is in motion. These guide bolts are provided with adjustable members for the purpose of adjusting the device to different internal diameters of the bodies which are designed to be handled by the tong device. The guide bolts also may be used to maintain the lever system in tightly assembled position.

Other objects and purposes will appear from the detailed description of the invention, following hereinafter, taken in conjunction with the accompany drawings, wherein:

Fig. 1 is an end view of the tong device as the same is lowered into a roll of metal disposed on a pallet with the roll of metal shown in section.

Fig. 2 is a vertical sectional view along line 2—2 of Fig. 1;

Fig. 3 is a view corresponding to Fig. 2, showing the parts of the tong in distended position preparatory to the lifting of the hollow body; and

Fig. 4 is a view showing the tong in operative position supporting the hollow body for hauling to some other location.

In the drawings is shown an annular body, which, for the sake of illustration, is shown as a roll of metal, which is supported upon a pallet P of any suitable construction. The upper surface of the pallet is provided with spaced supports for the bottom edge of the body, which define an opening O therebetween to permit the

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movement of the tong levers therebelow, as shown in Fig. 3. Body R may be of any other form, such as pipes or car wheels, and may be of configurations other than cylindrical. It is the aim of the tong device in accordance with the present invention to be lowered into the hollow center of the body rapidly and with certainty by means of a cable chain or the like, and after the tong device reaches its lower limit of travel, the same is spread so that it may engage the bottom edge of the body at opposed points for the purpose of lifting the same and conveying it to some other location.

The tong device is preferably formed by a horizontal bar frame composed of companion congruous bars 1, 1' which are spaced from each other by rigid spacers 13 and 14 leaving an opening 15 therebetween at the center thereof. Tong lever 3 is pivotally mounted between one end of the bars 1, 1' by means of a rivet or bolt 5. Similarly the opposite tong lever 4 is pivotally mounted between the opposite ends of the bars 1, 1' by means of a rivet or bolt 6. A foot 7 is rigidly mounted at the lower end of tong lever 3 and a companion foot 8 is rigidly mounted at the lower end of tong lever 4. Pivot bolts 9 and 10 may be either fixedly or loosely mounted at corresponding points of the tong levers 3 and 4, respectively, and horizontal guide bars 2, 2' are provided on opposite sides of the frame with slots 11, 11' for the pivot bolt 9, and slots 12, 12' for the pivot bolt 10. The guide bars 2 and 2' maintain their horizontal position and a fixed displacement with respect to the bar frame 1, 1', so that the relative placement of the pivot bolts 9 and 10 within the slots of the guide bars determines the degree of distention and contraction of the tong device.

For the purpose of controlling the positioning of the tong levers, the pivot bolts 9 and 10 form the opposite corners of a pair of quadrangular frames disposed on the opposite sides of the horizontal bar frame 1, 1' and between this bar frame and the respective guide bars 2, 2'.

As shown in Fig. 2, one of the quadrangular frames is formed by upper members 21, 22 and lower members 23, 24 forming the upper corner 25 and the lower corner 26 in addition to the laterally disposed corners formed by the pivot bolts 9 and 10. A companion and congruous frame is formed on the opposite side of bar frame 1, 1' by corresponding members 21', 22', 23', 24' forming the top corner 25' and a bottom corner 26'.

A control lever 30 is joined at its lower end to the common pivotal connection between the bottom corners 26, 26' of the quadrangular frames and this lever extends upwardly through the opening 15 in the bar frame 1 in the same plane occupied by the tong levers 3 and 4.

A hook device 27 has its ends pivotally joined to the upper corners of the quadrangular frames at 25, 25' and another hook device 23, smaller than hook 27, has its ends pivotally connected to the upper extremity of lever 30. The lever 30 is preferably provided at its upper limit with a stop 30' in order to limit the rotary movement of the hook 28 to 90° between its vertical position shown in Fig. 3 and a horizontal position. On the other hand, hook 27 may swing freely so that tong lever 4 acts as a stop in one direction and the enlarged bight of hook 28 acts as a stop in the opposite direction.

The application of a lifting force to either of hooks 27 or 28 determines the position to be as-

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sumed by the tong levers. When the tongs are lowered into position for engagement with the body and it is desired that the same be in a collapsed state, the hook 27 supports the tongs from the upper corners of the quadrangular frames and such frames tend to assume a collapsed position by virtue of the weight of the members so that the tong levers 3 and 4 are drawn inwardly by the contraction of the pivot bolts 9 and 10, as shown in Fig. 2. After the tong is brought to its lowered position, hook 27 is disengaged from the chain and a lifting force is exerted on hook 23. This lifting force on hook 23 serves to raise lever 30 upwardly which carries the lower corner 26 in an upward direction and acts to spread apart pivot bolts 9 and 10 within slots 11, 11' and 12 and 12' of the horizontal guide bars. This positioning of the parts is shown in Fig. 3. The continued lifting of hook 23 serves to position the feet 7 and 8 of the tongs securely against opposed parts of the bottom edge of the body R for the purpose of conveying it by the hoist or chain to any desired location, whereupon the same may be lowered. A lifting force on hook 27 will immediately cause a collapse of the tongs so that the same may be withdrawn from the body R.

In order to obtain a rapid and effective centering and guiding of the tongs within the hollow body, guide bolt means are provided which extend transversely to the plane of the tongs. As shown in the drawing, guide bolt 15 extends transversely from the midpoint of horizontal guide bar 2 and another bolt 16' extends transversely from the median point of horizontal guide bar 2'. An adjustable sleeve 18 is mounted on the former and is provided with a depending finger 19 having an inwardly turned extremity 19a. The guide bolt 16 has a flattened edge 17 in order to receive the end of a thumb-screw 20 so that the sleeve 18 may be adjustably fastened to the bolt 16 at any point of its length. A similar adjustable sleeve assembly is provided for bolt 16' by sleeve 18' carrying depending finger 19' having an inturned end 19a'. An adjustable thumb-screw 20', acting on the flattened edge 17' of bolt 16' serves to set the transverse guiding members 19, 19' in place.

In order to stabilize the assembly of quadrangular frames on the opposite sides of the bar frame 1, lever 31 is fixedly attached to one side of control lever 30 by means of spacing block 32 and another lever 31' is connected to the opposite side of lever 30 by means of spacing block 32'. The thickness of the spacing blocks 31 and 31' each corresponds to three thicknesses of the frame bars, assuming they are uniform. These correspond to two bars of the quadrangular frame and one thickness of the horizontal guide bar. Bolt and nut assemblies 33 serve to keep levers 31 and 31', in place, which confine the horizontal guide bars 2 and 2' and the quadrangular frames between them and the horizontal bar frame 1, 1'. In order not to interfere with the vertical movements of control lever 30, levers 31 and 31' are provided with slots 34, 34' which permit relative movement of these levers with respect to the horizontal guide bars 2, 2' and the bolts 16 and 16' extending therefrom. The bolts 16 and 16' may be made hollow to threadedly engage stud bolts extending from the midpoints of guide bars, 2, 2' through the slots 34 and 34'. A tightening of the bolts 16 and 16' would then have the effect of pressing the levers

31 and 31' against the guide bars 2 and 2', respectively.

If desired, a continuous bolt 16 may be extended through the horizontal guide bars 2 and 2', which, of course, would necessitate a longitudinal slot in control lever 30 in order to permit this lever to execute its movements relative to the horizontal guide bars 2 and 2' in the course of raising the lower corners 26, 26' of the quadrangular frames. In such a modification the lever restraints 31 and 31' could be omitted.

In the operation of the tong device the sleeves 18 and 18' are adjusted so that their combined length is slightly less than the internal diameter of the annular body to be handled. The tong device is lowered by hook 27 as shown in Figs. 1 and 2 until the same strikes the bottom of the pallet with the feet of the tongs in line with the openings below the edge of the body. Hook 27 is disengaged from the crane and hook 28 is engaged therewith. As soon as the tong device is raised, the tong levers are spread and support the body R at diametrically opposed points. The body does not tilt or rock on the tong lever supports by virtue of the stabilizing influence afforded by the opposed centering fingers 19 and 19' acting in a plane perpendicular to the plane of the tong supports. The annular body is hauled to a new location and placed on a pallet. The tongs may be collapsed and withdrawn by disengaging hook 28 and lifting hook 27, whereupon the operation may be repeated.

While I have described my invention as embodied in a specific form and as operating in a specific manner for purposes of illustration, it should be understood that I do not limit my invention thereto, since various modifications will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

I claim:

1. A tong device comprising a horizontal bar frame, a pair of tong levers having the upper ends thereof pivotally connected to the opposite ends of said bar frame, a pivot bolt at an intermediate point of each of said tong levers, a quadrangular frame comprising four pivotally connected arms having two opposite corners thereof mounted on said pivot bolts and the junction line of the other two corners thereof parallel to the vertical axis of said tong device, a horizontal guide bar below said bar frame having slots therein for receiving said pivot bolts and for guiding said tong levers in their to-and-fro movements about their pivotal axes on said horizontal bar frame, a vertical control lever having its lower end connected to the bottom corner of said quadrangular frame and its upper end extending through said bar frame, hook means connected to the upper end of said lever for raising the lower corner of said quadrangular frame to effect a spreading of said pivot bolts and a consequent distention of said tongs, and a second hook means connected to the upper corner of said quadrangular frame for effecting a collapse of the tong levers by the weight of said tong device.

2. A tong device comprising a horizontal bar frame, a pair of tong levers having the upper ends thereof pivotally connected to the opposite ends of said bar frame, a pivot bolt at an intermediate point of each of said tong levers, a quadrangular frame symmetrical with respect to the vertical axis of said tong device and comprising

four pivotally connected arms having two opposite corners thereof mounted on said pivot bolts and the junction line of the other two corners thereof parallel to the vertical axis of said tong device, a horizontal guide bar below said bar frame having slots therein for receiving said pivot bolts and for guiding said tong levers in their to-and-fro movements about their pivotal axes on said horizontal bar frame, a guide bolt mounted perpendicularly to said guide bar at the midpoint thereof, a vertical control lever having its lower end connected to the bottom corner of said quadrangular frame and its upper end extending through said bar frame and provided with a slot at an intermediate part thereof for permitting longitudinal movement of said control lever relative to said guide bolt on said guide bar, hook means connected to the upper end of said lever for raising the lower corner of said quadrangular frame to effect a spreading of said pivot bolts and a consequent distention of said tongs, and a second hook means connected to the upper corner of said quadrangular frame for effecting a collapse of the tong levers by the weight of said tong device.

3. A tong device comprising a horizontal bar frame formed of a pair of spaced bars with an opening medially thereof, a pair of tong levers having the upper ends thereof pivotally connected to the opposite ends of said bar frame between said spaced bars, outwardly extending feet rigidly connected to the lower ends of said tong levers, a pivot bolt at an intermediate point of each of said tong levers, a quadrangular frame disposed on the opposite sides of said bar frame and each comprising four pivotally connected arms having two opposite corners thereof mounted on said pivot bolts and the junction line of the other two corners thereof parallel to the vertical axis of said tong device, a horizontal guide bar below said bar frame on the outside of each of said quadrangular frames, said guide bars having horizontal slots adjacent to the opposite ends thereof for receiving said pivot bolts and for guiding said tong levers in their to-and-fro movements about their pivotal axes on said horizontal bar frame, guide bolt means extending transversely from the midpoints of said horizontal guide bars, a vertical control lever having its lower end connected to the bottom corners of said quadrangular frames and its upper end extending through said first-mentioned opening in said bar frame and provided with a slotted portion at an intermediate part thereof for permitting longitudinal movement of said control lever relative to said guide bolt means, hook means connected to the upper end of said lever for raising the lower corners of said quadrangular frames to effect a spreading of said pivot bolts and a consequent distention of said tongs, and a second hook means connected to the upper corners of said quadrangular frames for effecting a collapse of the tong levers by the weight of said tong device.

4. A tong device as set forth in claim 3 wherein a sleeve is provided terminating in a guiding projection, said sleeve being adjustably mounted on each extremity of said guide bolt means.

5. A tong device comprising a horizontal bar frame formed of a pair of spaced bars with an opening medially thereof, a pair of tong levers having the upper ends thereof pivotally connected to the opposite ends of said bar frame between said spaced bars, outwardly extending

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feet rigidly connected to the lower ends of said tong levers, a pivot bolt at an intermediate point of each of said tong levers, a quadrangular frame disposed on the opposite sides of said bar frame and each comprising four pivotally connected arms having two opposite corners thereof mounted on said pivot bolts and the junction line of the other two corners thereof parallel to the vertical axis of said tong device, a horizontal guide bar below said bar frame on the outside of each of said quadrangular frames, said guide bars having slots therein for receiving said pivot bolts and for guiding said tong levers in their to-and-fro movements about their pivotal axes on said horizontal bar frame, a guide bolt extending transversely from the midpoint of each guide bar, a vertical control lever coincident with the vertical axis of said tong device having its lower end connected to the bottom corners of said quadrangular frames and its upper end extending through said first-mentioned opening in said bar frame, vertical levers fixedly attached to the opposite sides of said control lever beyond said horizontal guide bars, each vertical lever having a slot for permitting longitudinal movement of said control lever relative to the axis of said guide bolts extending from said guide bars. hook means connected to the upper end of said control lever for raising the lower corners of said quadrangular frames to effect a spreading of said pivot bolts and a consequent distention of

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said tongs, and a second hook means connected to the upper corners of said quadrangular frames for effecting a collapse of the tong levers by the weight of said tong device.

6. A tong device as set forth in claim 5 wherein said vertical levers are pressed by said guide bolts against said horizontal guide bars.

7. A tong device as set forth in claim 5 wherein an adjustable sleeve is fitted over the free end of each guide bolt having a finger extending perpendicularly thereto.

8. A tong device as set forth in claim 7 wherein said sleeves are fixed adjustably on said bolts so that said fingers are spaced apart slightly less than the internal diameter of a body adapted to be handled by said tongs, the ends of said fingers being bent inwardly to aid the guiding of said tongs into the interior of said body.

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