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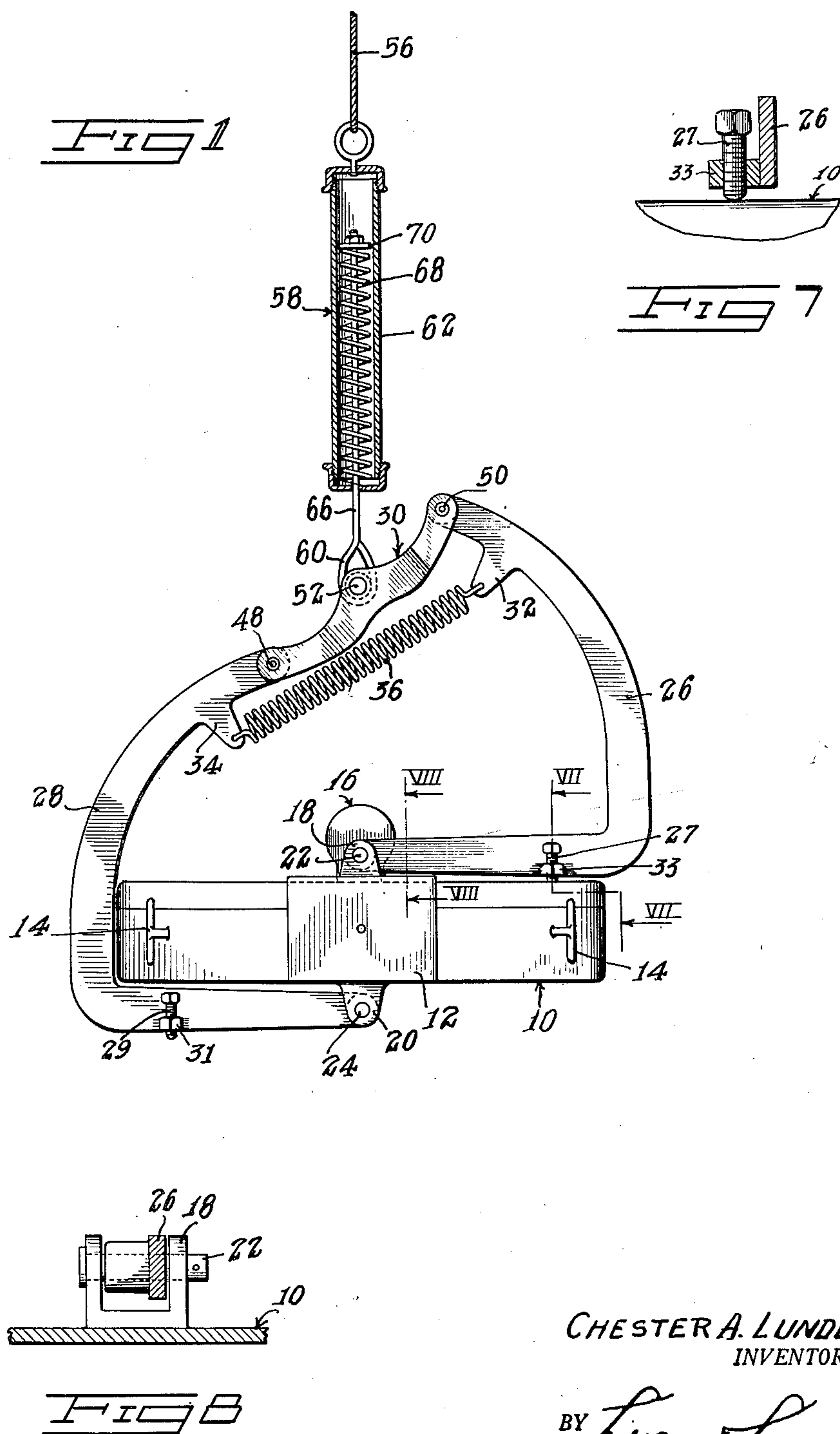
C. A. LUNDEEN

2,624,550

TURNOVER HANGER FOR TONGS

Filed Dec. 30, 1947

3 Sheets-Sheet 1



CHESTER A. LUNDEEN
INVENTOR.

BY *Lyon & Lyon*
ATTORNEYS.

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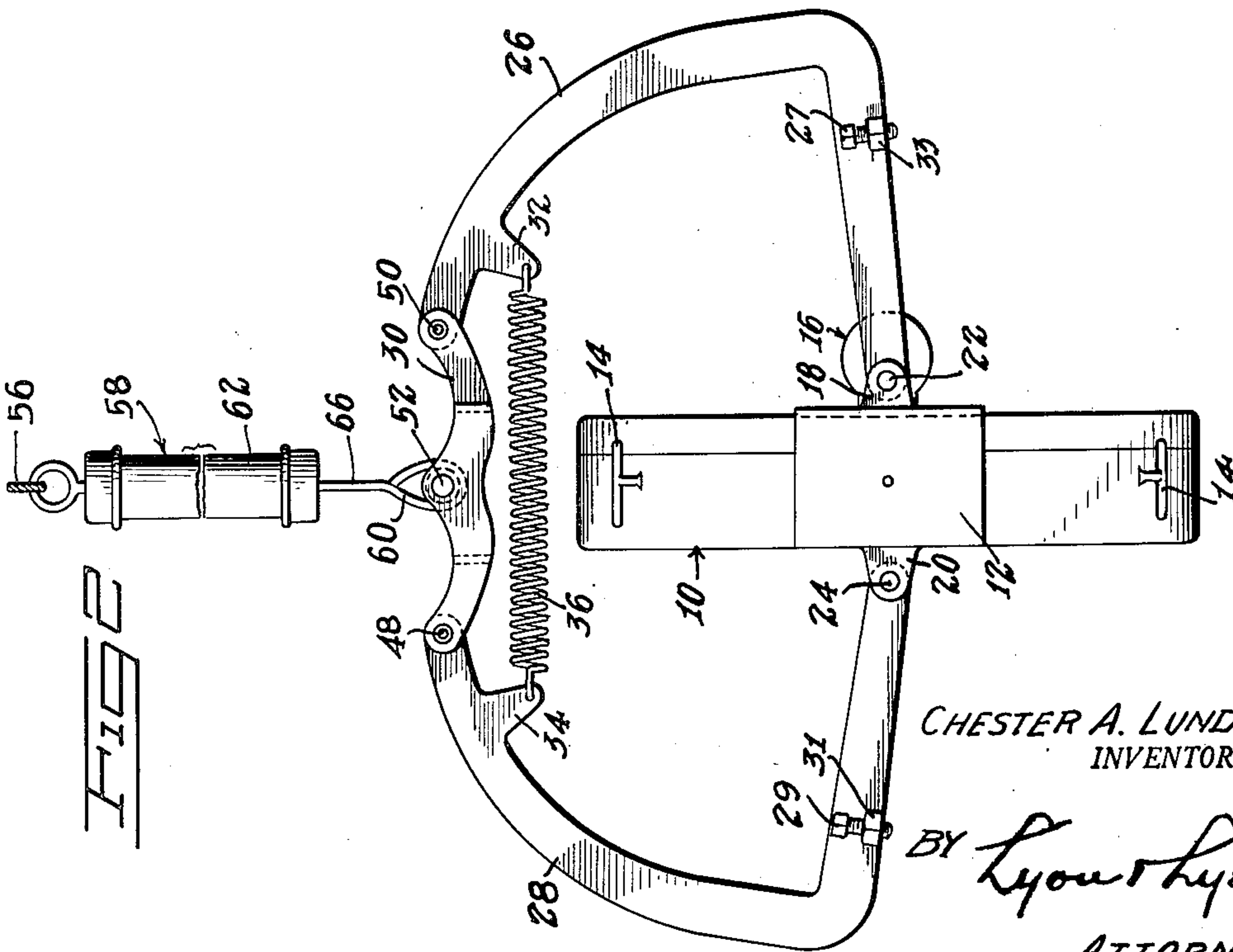
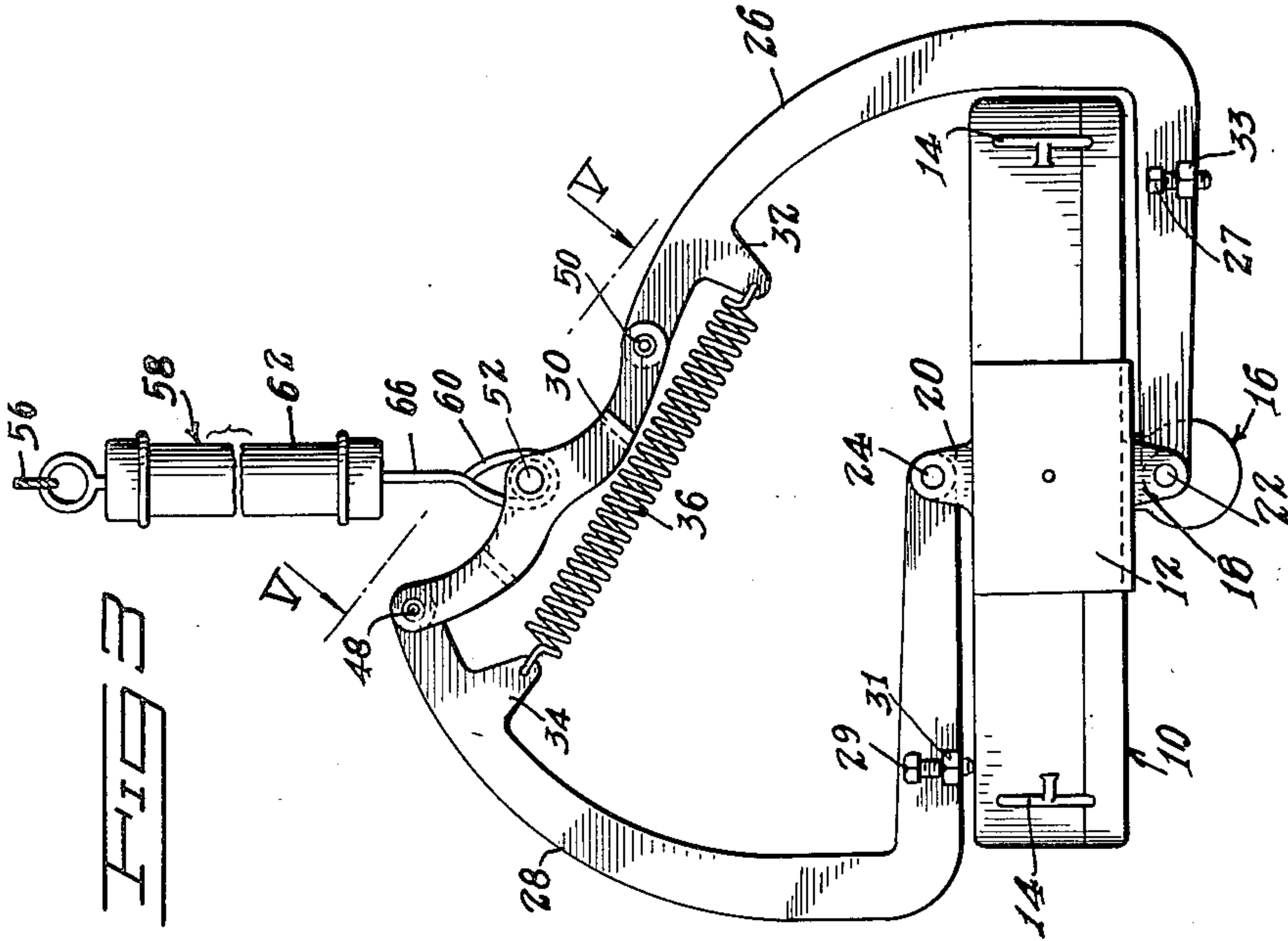
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INVENTOR.

BY *Lyon & Lyon*
ATTORNEYS

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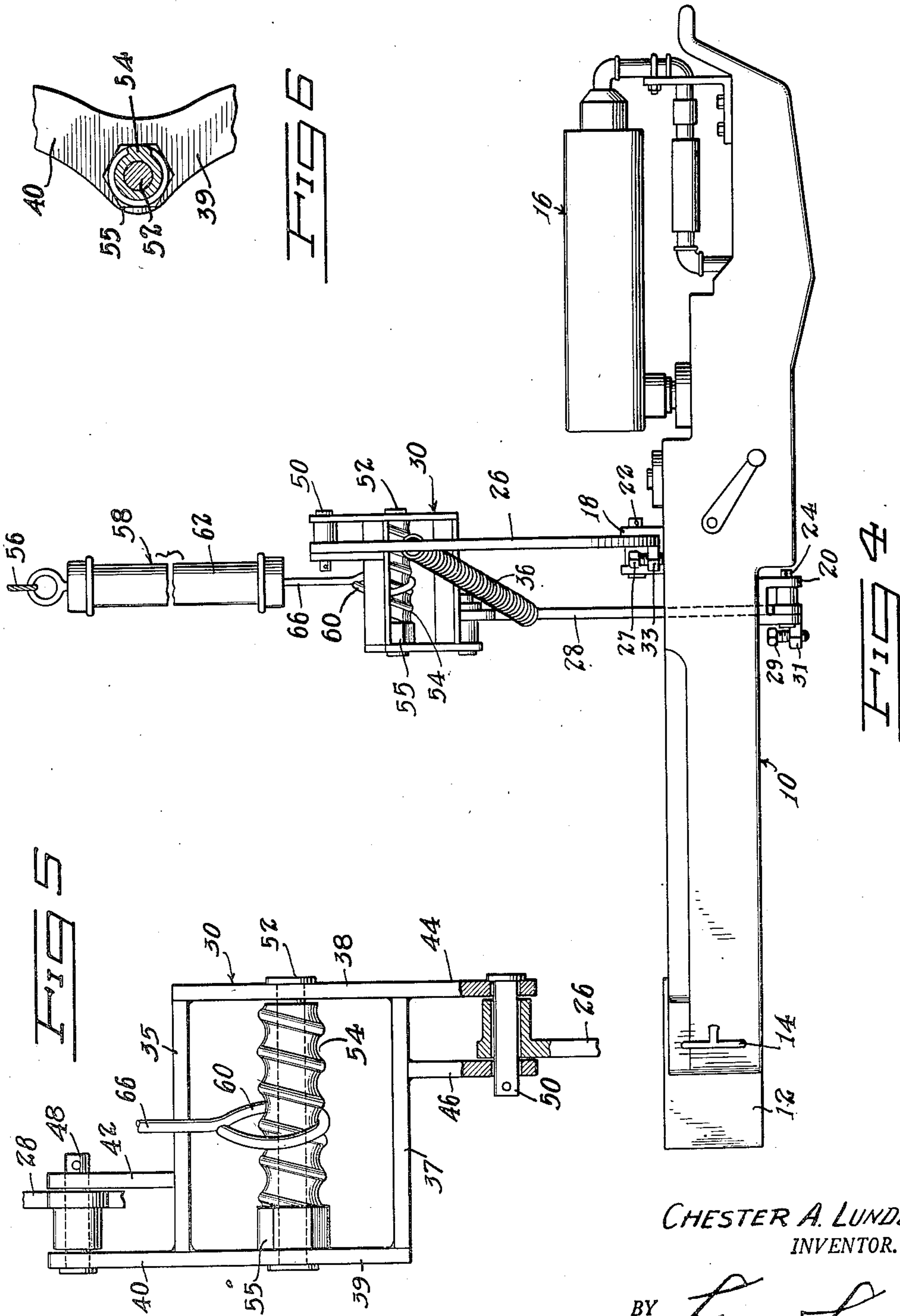
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TURNOVER HANGER FOR TONGS

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3 Sheets-Sheet 3



CHESTER A. LUNDEEN
INVENTOR.

BY *Lyon & Lyon*
ATTORNEYS

UNITED STATES PATENT OFFICE

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TURNOVER HANGER FOR TONGS

Chester A. Lundeen, Los Angeles, Calif., assignor
to Byron Jackson Co., Vernon, Calif., a corpo-
ration of Delaware

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16 Claims. (Cl. 255—35)

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This invention relates generally to pipe tong supports, and particularly to hanger structures adapted to suspend such tongs in a well derrick. As is well known, in the lowering of casing, drill pipe, tubing, and the like into wells, it is necessary that the foregoing be lowered section by section, and that during this procedure tongs be utilized to grip the said casing, pipe, or tubing, and rotate same in order that each section may be threaded to its lower section, forming thusly a continuous tube. As the said tongs are usually of considerable weight and require support, it is also customary to suspend same, each from one end of a wire line trained over a sleeve in the upper portion of the derrick and having a counterweight attached to its other end. Each tong is suspended in a horizontal position in both longitudinal and transverse directions so that the pipe recess in the tong head may align with the pipe joint to which it is to be applied and, that the heavy tong will be properly balanced, means is provided to assure that the center of mass of the said tong is directly below the suspension line.

It is, however, also necessary to utilize tongs in the unthreading of casing, pipe, tubing, and the like when the same is retrieved from a well. It is, of course, apparent that the tongs must be suspended in the same manner as when lowering into the well, but inasmuch as most tongs are constructed so as to grip the pipe only while rotating in one direction, in order to reverse this direction as would be necessary in "coming out of the hole," each tong must be inverted. Thus, after lowering, for example, well tubing, where it is desired to retrieve same, some means must be provided for the said inverting of the tongs, and, since the advent of the heavier type of tong such as power driven tongs carrying air motors, hydraulic motors, and the like integral with themselves, this problem has become of pressing moment. It has been found necessary to devise some means of easily and quickly inverting the tongs in order that after "going into the hole" the tong may be swung clear of the derrick floor working space on its suspension line and henceforth swung back to operative and inverted position for "coming out of the hole," all without detaching the tong from its suspension line. Making even more necessary the devising of some means to easily invert the tongs periodically is the fact that when lowering pipe and the like into a well it may be required to change the direction of rotation of said pipe a number of times during the operation. This may be caused, for example,

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where in making up a joint the threads become crossed, necessitating backing off and then re-spinning the pipe. Of course, each time the pipe is backed off and respun, the tong must itself be inverted to back off position and then reinverted to spinning position, and considerable time, expense, and danger to personnel is involved where for each inverting of the tong the tong must be detached from suspension.

Heretofore, attempts have been made to provide some mechanical means for inverting a tong, all the while keeping the said tong suspended and supported. These expedients, however, have met with the problems of achieving, all at the same time, balance, stability and relative ease of manual operation. Devices adapted for this purpose heretofore have in all cases had to sacrifice as to some or all of these features, and, until now, it would appear that no tong supporting means has been devised which at all times provides a balanced suspension of the tong, permits an easy inverting of same by the operator, and at the same time assumes and retains a stable, upright or inverted position.

It is therefore the principal object of this invention to provide a novel "turn-over hanger" adapted to be suspended by a suspension line in a well derrick, support balancedly a tong at all times during the operation thereof, and during the inverting thereof, and at the same time being easily operable to cause the tong to assume either a stable upright or a stable inverted position.

It is also an object of this invention to provide such "turn-over hanger" adaptable to continuously and totally support the tong through all the positions assumed during the inverting thereof, thus rendering unnecessary that the operator should contribute in any way to the support of the tong lest his safety be endangered.

It is a further object of this invention to provide means incorporated in said hanger normally urging said hanger to a stable, either upright or inverted position.

And another of the objects of this invention is to provide means in combination with the said hanger to permit an adjustable, longitudinal balancing of the tong where such is rendered necessary by, for example, an interchanging of tong jaws to accommodate pipe and the like of varying diameter.

Further objects of the invention will appear hereinafter.

In the drawings:

Figure 1 is a front elevational view of the hanger

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shown supporting a tong in normal operating position.

Figure 2 is a similar view of the hanger shown supporting the tong rotated 90 degrees towards inverted position.

Figure 3 is a similar view showing the hanger supporting the tong in inverted position.

Figure 4 is a side elevational view of the hanger shown supporting the tong in normal operating position.

Figure 5 shows a portion of the hanger as viewed from the line 5—5 in Figure 3.

Figure 6 shows a cross sectional view of a portion of the rocker assembly shown in Figure 5.

Figure 7 shows a sectional view of a portion of the hanger stabilizing means taken on the line 7—7 of Figure 1.

Figure 8 shows a sectional view of a portion of the tong supporting means.

Referring to the drawings, Figures 1 and 4, the tong 10 is shown provided with a guard 12, turn-over handles 14 and an air or hydraulic motor driving means 16. From the upper face of the tong 10 projects a horizontal pivot lug 18, and from the lower face thereof similarly projects a horizontal pivot lug 20, said pivot lugs being bored to receive the pivot pins 22 and 24 the axes of which lie substantially in the central longitudinal vertical plane of the tong 10. As can be seen from Figure 4, the two lugs 18 and 20 are slightly out of alignment in respect to a central transverse vertical plane passing through the tong. Such offsetting is to either side of a plane which normally will pass through the center of gravity of the tong, the position of said center of gravity, of course, varying with the weight of, for example, interchangeable jaws. As will become apparent later, the fact that the lugs 18 and 20 are fixed upon the tong will not affect the longitudinal balance thereof inasmuch as it is part of the invention to provide means in combination with the hanger to compensate for a slight shifting of mass.

Pivotally connected to the pins 22 and 24 are hanger arms 26 and 28 which are themselves pivotally connected at their opposite extremities from the pins 22 and 24 to a rocker frame 30. The hanger arms 26 and 28 are each provided with tabs 32 and 34 to which is connected an extension spring 36, and the said hanger arms 26 and 28 are each of a substantial L-shape to permit clearance for the tong body, the upper L portions of the hanger arms turning inwardly towards the central, longitudinal, vertical plane of the tong. As will be apparent hereinafter, the amount of such inward turning may be lessened from the embodiment shown, or, indeed, practically eliminated depending upon the size of the rocker frame 30 and the specifications of the spring 36. Also provided in connection with the hanger arms 26 and 28 are the adjustable stop screws 27 and 29 which are threaded into bores on the lugs 31 and 33, the said lugs being carried by the horizontally extending portions of the said hanger arms 26 and 28 outwardly from the longitudinal center of the tong 10.

As best shown in Figure 5, the rocker frame 30 consists of a pair of spaced parallel side elements 35 and 37 joined at their extremities by the transverse elements 39 and 38. The transverse element 39 extends at 40 parallel to an extension member 42 connected to the side element 35, while the transverse element 38 extends at 44 parallel to an extension member 46 connected to the side

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element 37, thus providing a pair of pivot lugs bored to receive the pivot pins 48 and 50 to which are pivotally connected the hanger arms 26 and 28. Midway between the side elements 35 and 37, the transverse elements 39 and 38 are bored to rotatably receive a pin shaft 52 which carries an adjusting screw 54, there being integral with said screw a manipulating nut 55.

In order to suspend the hanger and thus the tong 10 itself, there is provided connected to the suspension line 56 a connector 58 having an eye 60 engaging the thread groove in the adjusting screw 54. The connector 58 comprises a housing 62 having an eye attached to its upper end for connection to the suspension line 56 and a shank 66 movable axially in the said housing and terminating in the eye 60. A compression spring 68 interposes between the lower wall of the housing 62 and a flange 70 on the upper end of the shank 66, the spring being of sufficient strength to provide a freely floating suspension of the tong and hanger.

In operation the hanger assembly is suspended floatably from the suspension line 56 by the connector 58, and itself carries the tong 10. The pivot lug members 18 and 20 providing connection between the tong and the hanger arms 26 and 28 are substantially in the central, vertical, longitudinal plane of the tong 10 which passes through the point of suspension of the rocker frame 30 and of the connector 58, providing a balancing of the tong about its longitudinal axis. The spring 36, acting as a toggle or overcenter spring urges the hanger arms 26 and 28 always toward each other, producing a tendency in the tong 10 to rotate in the position shown in Figure 1 counterclockwise. Such counterclockwise rotation is resisted by the stop screw 27, and thus is eliminated any tendency of the tong 10 to freely rotate, either clockwise or counterclockwise, the spring 36 and screw 27 performing the function of stabilizing the tong 10 in the position shown. Additionally, the stop screw 27 being threadably adjustable may be raised or lowered with respect to the tong arm 26 and may thus be utilized to stabilize the tong 10 in a precisely horizontal position, such positioning being desirable for operation of the tong. The pivot lugs 18 and 20, as heretofore stated, are mounted offset longitudinally from a transverse vertical plane passing through the center of gravity of the tong. Inasmuch as such center of gravity is subject to variance caused by changing elements on the tong, the adjusting screw 54 has been provided. This adjusting screw 54 may be turned at any time by manipulation of the nut 55 to change the point of suspension of the hanger from the connector 58 to provide such point of suspension precisely over the center of gravity of the tong. This feature, combined with the fact that the pivot lugs 18 and 20 are placed normally to be on either side of the said center of gravity function to first, balance the tong under its point of suspension, and second, minimize any tendency of the tong to rotate about its transverse axis either clockwise or counterclockwise.

When an inverting of the tong from its normal operating position shown in Figure 1 becomes necessary, the operator faces the tong assembly and grasps the tong, preferably by its two handles 14 and rotates the same clockwise by exerting a downward pressure with his right hand and an upward pressure with his left hand. During this rotation, the pivot pin 22 described a descending clockwise arc about the longitudinal

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axis of the tong, while the pivot pin 24 describes a rising clockwise arc thereabout. When the tong has been rotated through 90 degrees, as shown in Figure 2, the pivot pins 22 and 24 are in horizontal alignment, and the pivot pins 48 and 50 and the pin shaft 52 are likewise in horizontal alignment. The spring 36 has, of course, resisted such clockwise turning, but it will be noted that since this spring is in tension and since the maximum tension is reached at centering, i. e., the position shown in Figure 2, the operator is not working against maximum spring tension when starting rotation of the tong, but, rather, reaches such maximum spring tension after there has been induced in the tong 10 a rotational momentum which aids the operator in rotating the tong to and through the centering position shown in Figure 2.

After having reached the position shown in Figure 2, the operator continues the clockwise rotation of the tong, and, having gone over center, is now aided by the spring 36 in reaching the inverted operating position shown by Figure 3. Again, the spring 36 serving to urge the hanger arms 26 and 28 towards each other, the tong reaches stability by virtue of the said spring urging the tong clockwise to abut against the stop screw 29. The stop screw 29 performs thus the same function as does the stop screw 27 in the Figure 1 position, and, similarly, may be adjusted to cause the tong to reach in its inverted position a precisely horizontal disposition.

When it becomes necessary to return the tong to its normal upright position, the above described process is, of course, reversed, the operator rotating the tong counterclockwise by its handles 14 from the position shown in Figure 3. The rotational momentum of the tong again aids the operator in overcoming the high point of force exerted by the spring 36 and, after the tong has rotated over center, the spring 36 aids the operator in returning the tong to the stable position shown in Figure 1.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A turn-over tong hanger comprising: a horizontally pivoted supporting rocker element adapted to be suspended in a well derrick; means for pivotally suspending said rocker intermediate its ends; and tong supporting arms pivotally suspended from said rocker element on either side of said means, one of said arms having a pivot element for connection to the upper face of a tong and the other arm having a pivot element for connection to the lower face of said tong, said arms being adapted to continuously support said tong and to reverse their relative positions with respect to said tong upon rocking movement of said rocker, pivotal movement of said arms and longitudinal rotation of said tong.

2. A turn-over tong hanger comprising: a pivotally suspended supporting element; means for suspending said element for pivotal movement about a horizontal axis intermediate its end; and tong engaging arms pivotally suspended from said supporting element on either side of said means, one of said arms having a pivot element for connection to the upper face of a tong and the other arm having a pivot element for connection to the lower face of said tong, said arms being of substantially L-shaped configuration to clear the lateral extremities of said tong, and said arms

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being adapted to continuously support said tong and to reverse their relative positions with respect to said tong upon pivotal movement of said element, pivotal movement of said arms and longitudinal rotation of said tong.

3. A turn-over tong hanger comprising: a tong supporting member adapted to be suspended above a tong for pivotal movement about an axis longitudinal of said tong; means for pivotally suspending said member intermediate its ends and tong engaging arms connected to transversely spaced points of said supporting member on opposite sides of said means for pivotal movement with respect to said supporting member about axes parallel to said axis, one of said arms having a pivot element for connection to the upper face of said tong and the other arm having a pivot element for connection to the lower face of said tong, said arms being adapted to continuously support said tong and to reverse their relative positions with respect to said tong upon pivotal movement of said member, pivotal movement of said arms and longitudinal rotation of said tong.

4. A tong hanger comprising: a tong supporting member adapted to be suspended above said tong for pivotal movement about an axis longitudinal of said tong; arms connected to transversely spaced points on said supporting member for pivotal movement with respect to said supporting member about axes parallel to said axis, one of said arms being adapted for pivotal connection to the upper face of said tong and the other arm being adapted for pivotal connection to the lower face of said tong, said arms being adapted to continuously support said tong and to reverse their relative positions upon longitudinal rotation of said tong; and resilient means connecting said arms and urging said arms to pivot with respect to said supporting member toward each other.

5. A tong hanger comprising: a rocker element adapted to be suspended in a well derrick; arms pivotally suspended from said rocker element, one of said arms being adapted for pivotal connection to the upper face of a tong and the other arm being adapted for pivotal connection to the lower face of said tong, said arms being adapted to supportingly reverse their relative positions upon longitudinal rotation of said tong; and an over-center spring connected to each of said arms at spaced points from said rocker element, said over-center spring urging said arms to pivot with respect to said supporting member toward each other whether in normal position or reversed relative position.

6. A tong hanger comprising: a pivotally suspended supporting element; arms pivotally suspended from said supporting element, one of said arms being adapted for pivotal connection to the upper face of a tong and the other arm being adapted for pivotal connection to the lower face of said tong, said arms being of substantially L-shaped configuration to clear the lateral extremities of said tong, and said arms being adapted to continuously support said tong and to reverse their relative positions upon longitudinal rotation of said tong; and stop elements mounted on the transverse portions of said arms, one of said stop elements being adapted to abut against the upper face of said tong and the other of said stop elements being adapted to abut against the other face of said tong upon longitudinal rotation of said tong.

7. A tong hanger comprising: a pivotally suspended supporting element; arms pivotally sus-

pended from said supporting element, one of said arms being adapted for pivotal connection to the upper face of a tong and the other arm being adapted for pivotal connection to the lower face of said tong, said arms being of substantially L-shaped configuration to clear the lateral extremities of said tong, and said arms being adapted to continuously support said tong and to reverse their relative positions upon longitudinal rotation of said tong; and adjustable stop means mounted on the transverse portions of said arms, one of said adjustable stop means being adapted to abut against the upper face of said tong and the other of said adjustable stop means being adapted to abut against the other face of said tong upon longitudinal rotation of said tong.

8. A tong hanger comprising: a pivotally suspended supporting element; arms pivotally carried by said supporting element, one of said arms being adapted for pivotal connection to the upper face of a tong and the other arm being adapted for pivotal connection to the other face of said tong, said arms being of substantially L-shaped configuration to clear the lateral extremities of said tong; stop elements mounted on the transverse portions of said arms; and an over-center spring connected to said arms and urging said arms toward each other to rotationally urge the upper face of said tong against one of said stop elements when said tong is in normal operative position and to rotationally urge the other face of said tong against the other of said stop elements when said tong is in inverted operative position.

9. A tong hanger comprising: a pivotally suspended supporting element; arms pivotally suspended from said supporting element, one of said arms being adapted for pivotal connection to the upper face of a tong and the other arm being adapted for pivotal connection to the other face of said tong, said arms being adapted to continuously support said tong and to permit the rotation of said tong through 180 degrees from a normal operative upright position to an operative inverted position and vice versa; stop elements mounted on said arms; and an over-center spring connected to said arms and urging said arms toward each other to urge said tong to rotate its upper face toward and against the first of said stop elements when said tong is in normal operative position and during 90 degrees of the said 180 degrees rotation of said tong and to rotate its other face toward and against the other of said stop elements when said tong is in operative inverted position and during the other 90 degrees of said 180 degree rotation of said tong.

10. A tong hanger comprising: a rocker element adapted to be pivotally suspended in a well derrick; arms pivotally suspended at spaced points from said rocker element, one of said arms being pivotally connected to the upper face of a tong and the other arm being pivotally connected to the other face of said tong, said arms supporting said tong and permitting longitudinal rotation of same from an upright to an inverted position; adjustable screw elements mounted on transverse portions of said arms; and an over-center spring connected to said arms and urging said arms toward each other to rotationally urge the upper face of said tong toward and against one of said adjustable screw elements when said tong is in normal upright position or is approaching same and to rotationally urge the other face of said tong toward and against the other of said adjustable screw elements when

said tong is in inverted position or approaching same.

11. A tong hanger comprising: a pivotally suspended tong supporting element, the point of suspension of said element being in the central vertical longitudinal plane of said tong; arms pivotally suspended from said supporting element, one of said arms being adapted for pivotal connection to the upper face of said tong, its pivotal connection being in the same aforesaid plane, and the other arm being adapted for pivotal connection to the other face of said tong, its pivotal connection also being in the same aforesaid plane; stop elements mounted on transverse portions of said arms, said stop elements being offset along said arms to either side of said pivotal connections connecting said arms and said tong; and an over-center spring connected to said arms and urging said arms toward each other to rotationally urge the upper face of said tong against one of said stop elements when said tong is in normal operative position and to rotationally urge the other face of said tong against the other of said stop elements when said tong is in inverted operative position.

12. A tong hanger comprising: a pivotally suspended tong supporting element; arms pivotally suspended from said supporting element, one of said arms being pivotally connected to the upper face of said tong, its pivotal connection being in the central vertical longitudinal plane of said tong, and the other arm being pivotally connected to the other face of said tong, its pivotal connection being in the same aforesaid plane; stop elements mounted on transverse portions of said arms, said stop elements being offset along said arms to either side of said pivotal connections connecting said arms and said tong; and an over-center spring connected to said arms and urging said arms toward each other to rotationally urge the upper face of said tong against one of said stop elements when said tong is in normal operative position and to rotationally urge the other face of said tong against the other of said stop elements when said tong is in inverted operative position.

13. A turn-over tong hanger comprising: a tong supporting member; means for suspending said member above said tong for pivotal movement about an axis longitudinal of said tong, the point of suspension of said supporting member being in the central vertical longitudinal plane of said tong; and tong engaging arms connected to transversely spaced points on each side of said supporting member for pivotal movement with respect to said supporting member about axes parallel to said axis, one of said arms having a pivot element for connection to the upper face of said tong, its pivotal connection being in the same aforesaid plane, and the other arm having a pivot element for connection to the other face of said tong, its pivotal connection also being in the same aforesaid plane, said arms being adapted to continuously support said tong and to reverse their relative positions with respect to said tong upon pivotal movement of said supporting member, pivotal movement of said arms and longitudinal rotation of said tong.

14. A turn-over tong hanger comprising: a tong supporting member; means for suspending said member above said tong for pivotal movement about an axis longitudinal of said tong; and tong engaging arms connected to transversely spaced points on said supporting member for pivotal movement with respect to said support-

ing member about axes parallel to said axis, one of said arms being pivotally connected to the upper face of said tong, its pivotal connection being in the central vertical longitudinal plane of said tong, and the other arm being pivotally connected to the lower face of said tong, its pivotal connection also being in the same aforesaid plane, said arms being adapted to continuously support said tong and to reverse their relative positions with respect to said tong upon pivotal movement of said member, pivotal movement of said arms and longitudinal rotation of said tong.

15. A turn-over tong hanger comprising: a pivotally suspended tong supporting element; means for pivotally suspending said element, the point of suspension of said element being in the central vertical longitudinal plane of said tong; and tong engaging arms pivotally suspended from said supporting element, one of said arms being pivotally connected to the upper face of said tong, its pivotal connection being in the same aforesaid plane, and the other arm being pivotally connected to the other face of said tong, its pivotal connection also being in the same aforesaid plane, said arms being adapted to continuously support said tong and to reverse their relative positions with respect to said tong upon pivotal movement of said element, pivotal movement of said arms and longitudinal rotation of said tong.

16. A turn-over hanger for supporting a pipe

tong in either of two operative positions with respect to the longitudinal axis of the tong, comprising a first tong supporting arm having a pivot element for connection to the tong at a location above its longitudinal axis, a second tong supporting arm having a pivot element for connection to the tong at a location below its longitudinal axis, a suspension device for supporting said arms, the arms being adapted to continuously support the tong and to reverse their relative positions with respect to the tong upon pivotal movement of said suspension device, pivotal movement of said arms and turning of the tong about its longitudinal axis; and means for pivotally supporting said suspension device.

CHESTER A. LUNDEEN.

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