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#### AUTOMATIC OPENING AND CLOSING TONGS

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2 SHEETS—SHEET 1

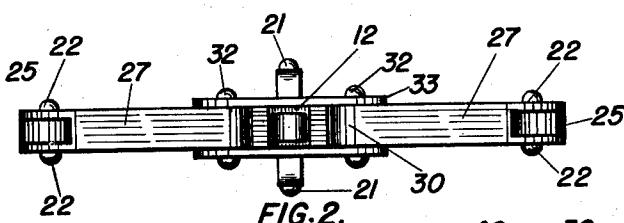


FIG. 2.

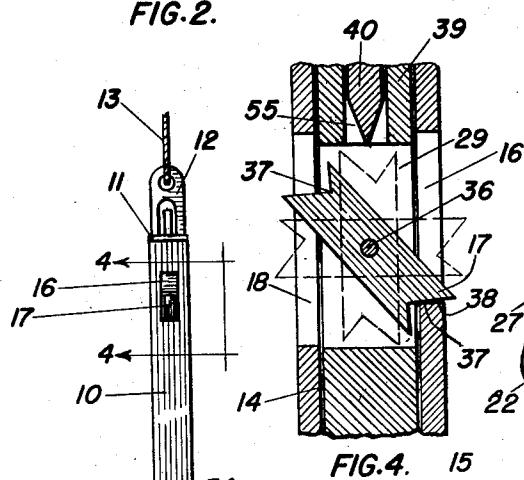
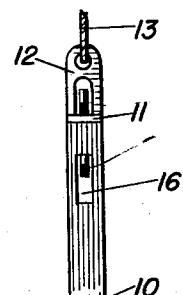
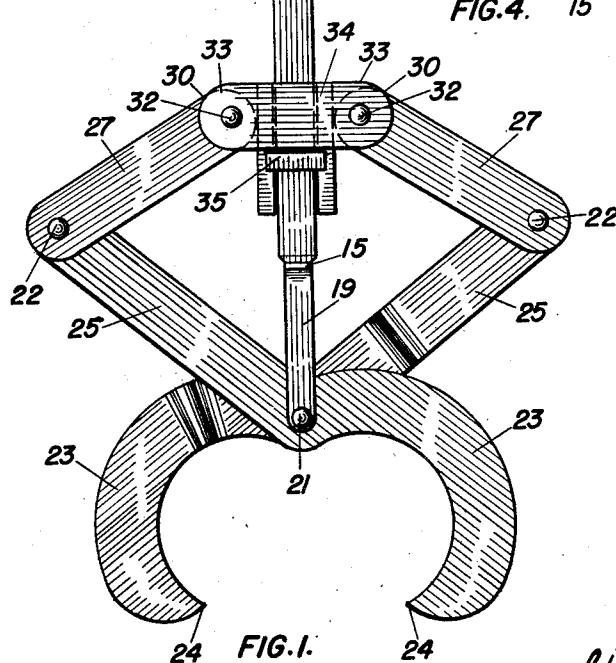


FIG. 4. 15



24 FIG. I.

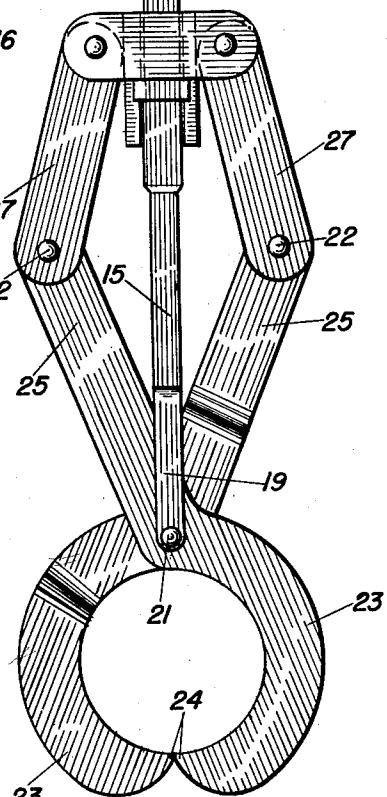


FIG. 3.

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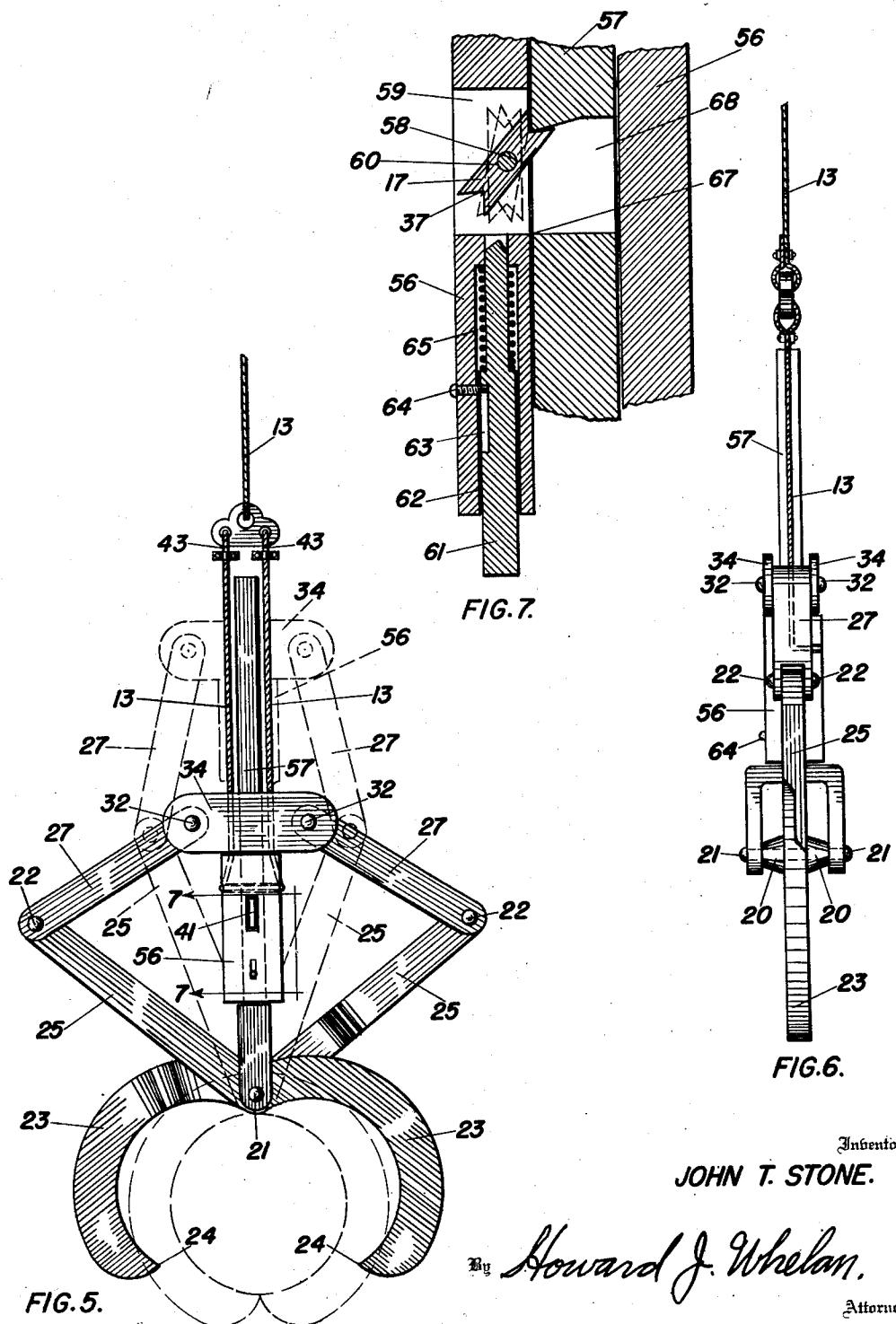
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## AUTOMATIC OPENING AND CLOSING TONGS

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2 SHEETS—SHEET 2



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## UNITED STATES PATENT OFFICE

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## AUTOMATIC OPENING AND CLOSING TONGS

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2 Claims. (Cl. 294—110)

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This invention relates to lifting equipment and more particularly to those of the lazy tong variety and employed for gripping, lifting and depositing heavy material and doing so automatically.

While tongs have been used in the steel and heavy metal industries for lifting and carrying ingots and other items or materials, such have in general, requirements that need the use of additional operators or extra cables for manipulating their mechanisms and controlling their positioning. These requirements add to the cost of their operation, while at the same time limiting the amount of work they can accomplish within a certain period of time. Some of the previous devices used powerful magnets and tripping or latching coils which for the most part introduced another element of danger and increase in maintenance expense. The lack of reasonably effective automatic response in the operation of the device and safety in its use has raised objections of the more serious nature to the previous types of tongs.

In this invention the functional structure is designed to be automatic in action, simple in mechanism and requiring no operators other than one, for controlling the use of the tongs in a conventional manner. Further no other cable but that required for lifting the device is needed in its use.

It is an object of this invention to provide a new and improved lifting tongs that will avoid one or more of the objections and limitations of the prior art.

Another object of the present invention is to provide a new and improved lifting tongs that will operate automatically to pick up or release a load.

An additional object of the invention is to provide a new and improved lifting tongs that will avoid the use of all extraneous cables, rods or parts other than the lifting cable, for actuating its mechanism.

An additional object of the present invention is to provide a lifting tong which will open and close automatically when the tongs are dropped against the ground or other object.

Other objects will become apparent as the invention is more fully set forth.

For a better understanding of the invention and the objects thereof, reference is made to the appended drawings. These drawings in conjunction with the following description, outline a particular form of the invention by way of example, not of limitation, in order that the principles

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thereof may be appreciated and its method of preferred operation fully understood.

In the drawings:

Figure 1 is a side elevation of a pair of automatic opening and closing tongs, embodying this invention, in open position;

Figure 2 is a plan view of Figure 1;

Figure 3 is a side elevation similar to Figure 1 except, it shows the tongs in closed position;

Figure 4 is an enlarged sectional view showing the latch mechanism;

Figure 5 is a side elevation of a modified form of the tongs, shown in open position;

Figure 6 is a side elevation of end view of Figure 5; and

Figure 7 is an enlarged sectional view showing the latch mechanism.

Similar reference characters pertain to the same parts throughout the drawings.

The particular construction indicated in the drawings, illustrates a lazy tongs structure designed for lifting, carrying and depositing ingots of metal, where its use is especially appropriate. Its main frame 10 is made preferably of rectangular tubing having a cap 11 secured at its upper portion with a ring 12 mounted on the cap 11 and usable for the attachment of a lifting cable 13. The interior 14 of the tubing is also rectangular in section, so that the wall surfaces thereof can serve as guides for a plunger 15 which is preferably of rectangular form to slidably fit in frame 10 and reciprocate longitudinally therein. The frame 10 is made of sufficient size to enable it to support the entire load placed on the tongs during its use. The plunger 15 cannot rotate about its axis in the tubing 10, and this is a necessary requirement. A slot 16 is formed in the front wall of the yoke 10 near the cap 11 and runs longitudinally for a suitable distance to suit the latch 17 rotatably mounted on the plunger 15 inside the interior 14. Opposite the slot 16 in the back wall of the yoke 10 is another slot 18 of similar form but slightly longer. The upper edges of slots 16 and 18 are aligned with each other. The latch 17 also registers in these slots during its rotation in a manner to be more fully described. The lower portion of the plunger 15 is enlarged into a bifurcated yoke 19 having openings near its free ends to support a shaft 21. This shaft 21 is the pivot on which the large pincing jaws 23 open and close. They are of conventional arcuate form with their end claws 24 arranged to grasp an ingot preferably adapted for sharpening and hardening. The jaws extend into arms

25 projecting outwardly and drilled adjacent their extremities to provide holes through which pins 22 pass to attach them to the toggle links 27.

The arms 25 are formed at their contacting surfaces to slide cooperatively on one another as the jaws open and close. The toggle links 27 are bifurcated to enable them to straddle the ends of the arms 25 and suitable openings are provided to receive pins 22 so that the arms 25 and links 27 can rotate about the pins 22. The upper end portions 30 of the toggle links 27 have holes therein aligned with holes in the bifurcated end portions or lobes 33 of a saddle 34. These holes receive pins 32 so that the links 27 may swivel about said pins. The saddle 34 is longitudinally slidable on the outer walls of the frame 10. The travel of the saddle 34 is limited in its downward direction by lugs 35 mounted on the sides of the yoke 10. The travel 20 upwardly is restricted by the length of the arms 25 and toggle links 27 when extended as far vertically as they can go.

The latch mechanism consists of a latch 17 pivoted on a pin 36 which extends internally and transversely of the plunger 15 at its upper portion 34. A through slot 29, alignable with the slots 16 and 18 of the frame 10, is provided at this point so that the latch 17 may, at times, extend through all of the said slots while pivoting about its pin 36. The latch has its end portions cut into V-like pawls 27 of unequal length for the purpose of engaging the edge 38 of the slot 16 to immobilize the plunger 15 within the frame 10. When this occurs the jaws 23 are wide open, the saddle 34 is resting on the lugs 35 and the cable 13, which is connected to a lifting boom, is taut. When tension in the cable is lessened, the tong mechanism, which rests on the floor, moves downwardly, causes the plunger 15 to move upwardly inside of the frame 10 and uncovers the point 55 of a deflecting pin 40 rigidly secured to the cap 11. This deflector strikes the latch 17 at a point to the side of the pivot pin 36 and rotates the latch partially to the left in Figure 4. The point of contact would be, in Figure 4, on the upper face of the latch and to the left of pin 36. The net result of this action is to remove the lower right hand of the latch from its rest on the edge 38 of the frame 10. When the cable 13 is pulled upwardly with the jaws still resting on the floor, the frame 10 rides upwardly on the plunger 15 and, eventually, the lower edge of the latch to the right of Figure 4, strikes the edge 38 of the frame 10 and pivots about its pin 36. The size of the left hand opening 18 allows the left side of the latch to rotate unhampered and as the cable 13 continues its ascent, the latch moves completely, and in vertical position, within the frame 10. During this movement, the jaws 23 have closed about the article to be lifted and

5 moved. When the article has arrived at its destination, the cable 13 is slackened, the toggle mechanism releases its article and the plunger moves upwardly within the frame to a point where the deflector 40 hits the upper end of the latch in its upper V-groove. At this time the jaws are opened to their widest extent and the plunger is at the end of its travel. The longer side of the V-groove, when contacted by the deflector 40, partially rotates the latch to the left with its lower V-groove projecting through the slot 16 of the frame 10. The cable 13 is then tensioned and the frame is raised upwards of the plunger 15 until the larger face of the lower V-groove strikes the edge 38 of the frame, as shown in Figure 4. In this position, the frame and the plunger are locked together so long as the cable 13 remains tensioned. The device may then be moved about with the jaws in open position. To release the parts, it is only necessary to slacken the cable by resting the jaws on the floor as explained above and repeat the operation.

While the form illustrating the invention is of 25 preferable types, it is not desired to limit the scope of the invention to such form in particular, since it is appreciated the construction could be varied considerably and be within the scope of the claims.

Having thus described the invention, what is claimed is:

1. Tong mechanism comprising a hollow frame, an abutment carried outwardly by said frame near the lower end thereof, a pair of toggle arms, said arms terminating in jaws at their lower ends, connecting means between the upper ends of said arms straddling the frame above the abutment and normally resting on said abutment, a plunger slidably mounted in said frame, pivot means between one end of said plunger and the lower ends of the toggle arms, releasable locking means between the frame and plunger carried by said plunger, said releasable locking means consists of a latch pivoted to the plunger, and a deflector for said latch carried by the frame.

2. Tong mechanism as set forth in claim 1 wherein the locking means consist of a latch pivoted to the plunger, said latch having locking surfaces adapted to cooperate with surfaces of the frame, and a deflector carried by the frame to rotate the latch.

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