Sept. 9, 1958 H. C. THAYER, JR 2,851,300

GRAPPLE

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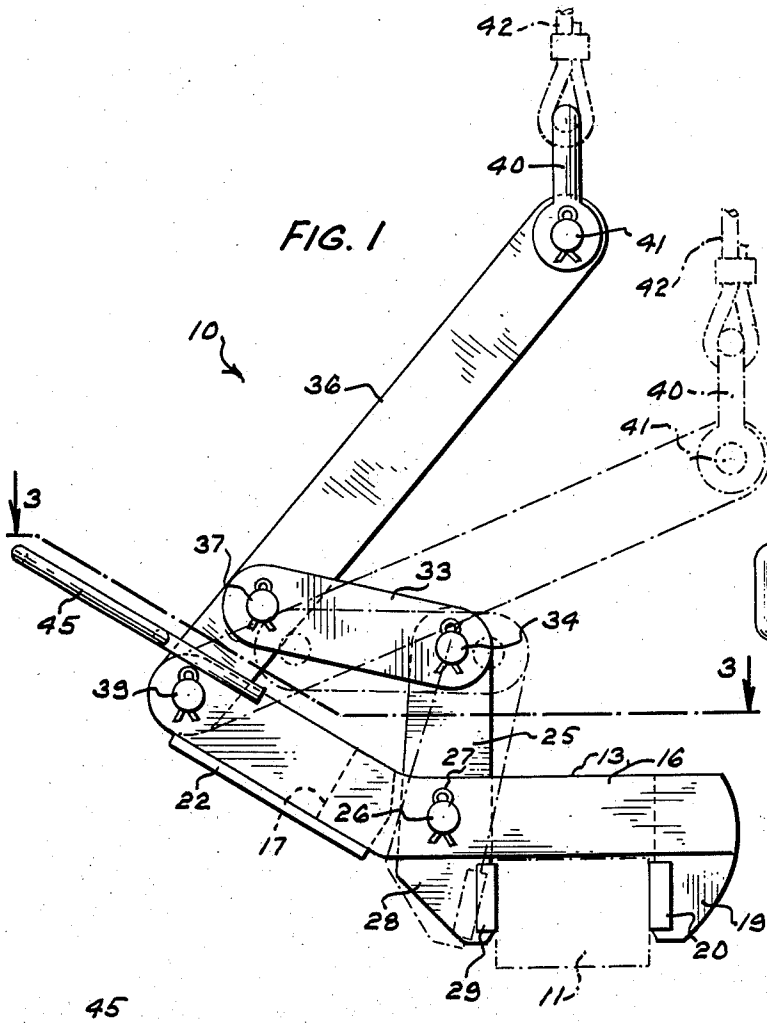


FIG. 1

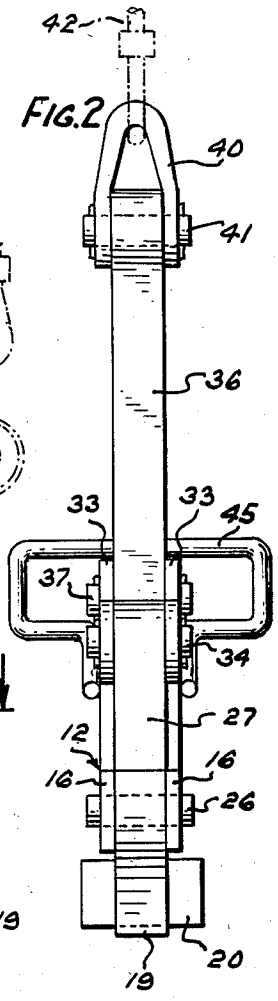


FIG. 2

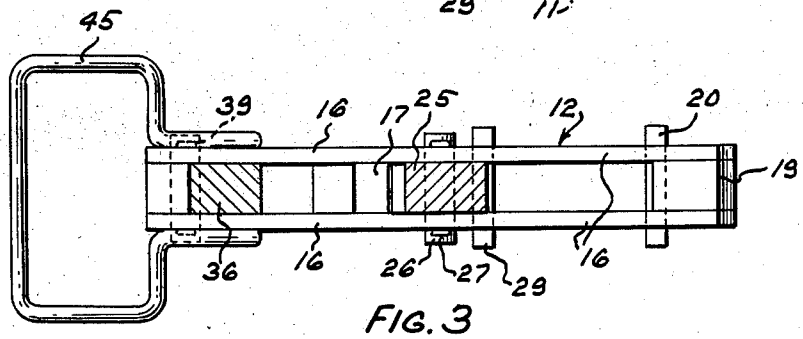


FIG. 3

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GRAPPLE

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1 Claim. (Cl. 294—104)

This invention relates to grapples and more particularly to a grapple for ingots and the like.

An object of the invention is to provide a grapple having a movable jaw and a force multiplying linkage for actuating the jaw to tightly grip a part in the grapple.

Another object of the invention is to provide an asymmetric grapple for gripping parts and permitting stacking of the parts in close relation to each other.

A further object of the invention is to provide a safety grapple for tightly gripping a part and having an asymmetric construction for reducing the possibility of accidental release of the part during lifting.

A device illustrating certain features of the invention may include a horizontally disposed arm engageable with the top of the ingot to be lifted and having a depending jaw at one end thereof engageable with one side of the ingot. An upright first lever is pivotally connected intermediate its ends to an intermediate portion of the arm with the lower end of the lever forming a second jaw engageable with the other side of the ingot to be lifted to clamp it against said first jaw. A second lever connected at one end to the other end of the arm is connected at its other end to means for raising and lowering the grapple, and the second lever is pivotally connected adjacent the arm to one end of a link, the other end of which is connected to the upper end of the first lever in a manner to actuate the first lever with a multiplication of leverage to cause the second jaw to tightly grip the ingot against the first jaw as the second lever is actuated and the grapple is raised. A handle is fixed to said other end of the arm to enable the operator to move and guide the grapple laterally as it is raised and lowered.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 is a side view of the grapple showing it in closed position in full lines gripping an ingot between its jaws and showing it in open position in dotted lines;

Fig. 2 is a front view of the grapple; and

Fig. 3 is a plan sectional view of the grapple taken along the line 3—3 of Fig. 1.

The present grapple 10 was devised for lifting ingots 11 of cast metal of rectangular cross section and of considerable weight and comprises a composite arm 12 having a horizontal portion 13 adapted to rest on the upper face of the ingot 11. The composite arm 12 comprises a pair of parallel spaced apart flat bars 16 welded intermediate their ends to a spacer 17 and at one end to a jaw 19. The jaw 19 extends downwardly from the end of the arm 12 and has a hardened wear plate 20 welded thereto and engageable with one side of the ingot 11. The left end portion of the bars 16 is sloped upwardly as seen in Fig. 1 to provide clearance therebelow for ingots or other objects and a stiffening plate 22 is welded to the bottom thereof.

A relatively short lever 25 disposed upright between

the bars 16 is pivotally connected to the arm 12 by a pin 26 which passes through aligned apertures in the lever and the bars 16 and is secured against axial displacement by cotter pins 27. The lower end of the lever 25 forms a movable jaw 28 and has a wear plate 29 engageable with the other side of the ingot 11 for clamping the ingot 11 against the first jaw 19. The upper end of the lever 25 is connected to one end of a pair of links 33 by a pin 34 which fits in aligned apertures in the links and lever, and the other ends of the links 33 are pivotally connected to an actuating lever 36 by a pin 37 passing through aligned apertures in the links and lever. The lower end of the actuating lever 36 fits between the ends of the bars 16 of the arm 12 and is pivotally connected thereto by a pin 39, and at its other end the lever 36 is pivotally connected to a clevis 40 by a pin 41, by means of which the grapple is connected to a cable 42 of a hoist for raising and lowering the grapple.

In response to turning movement of the actuating lever 36 about the pivot pin 39, the lever 25 and the movable jaw 28 may be actuated from its open position shown in dotted lines in Fig. 1 to its closed position shown in full lines therein to securely clamp the ingot against the jaw 19 and permit the grapple 10 and the ingot 11 to be raised. From inspection of Fig. 1, it will be seen that the lever 25 is provided with a long lever arm above the pivot pin 26 and that the pivot connection 37 of the links 33 on the actuating lever 36 is adjacent the pivot 39 leaving a long lever arm above the pivot 37 whereby force applied by the hoist to the free end of the actuating lever 36 is multiplied many times by the lever system to enable the movable jaw 28 to apply a much greater force against the ingot 11 to securely clamp it against the jaw 19 when the ingot is being lifted by the grapple.

To aid in the lateral movement and positioning of the grapple in applying the grapple to or in removing the grapple from an ingot, a handle 45 is secured to the inclined end of the arm 12. The handle is in the form of a rod bent into a rectangular loop with the ends of the rod welded to end portions of the bars 16 of the arm 12.

When it is desired to transfer an ingot 11 from one position to another the operator grasps the handle and moves the grapple and the hoist to position the grapple over the ingot after which the grapple is lowered onto the ingot, and when the lever 36 is lowered sufficient to open the movable jaw, the grapple is positioned on the ingot as shown in Fig. 1. The hoist may then be raised to swing the actuating lever about the pivot pin 39 and actuate the lever 25 to cause the movable jaw 28 to securely clamp the ingot 11 against the jaw 19, after which continued movement of the cable 42 will raise the grapple 10 and the ingot 11 therein.

The asymmetric arrangement of the components of the grapple achieves several desirable advantages in addition to the multiplication of leverage for the movable jaw 28. With the handle 45 and the levers and linkage disposed on the operator's side of the grapple, the jaw 19 is the only part that extends on one side of the ingot 11 held in the grapple so that the grapple and the ingot therein may be moved into close proximity to other objects or stacks of ingots to deposit or pick up an ingot adjacent thereto. Also, there is no possibility of the ingot being accidentally released to fall from the grapple during the lifting of the ingot as a result of accidental engagement and actuation of the actuating lever 36 by an object in its path as the grapple is being raised since the actuating lever is supported from the cable and extends toward the operator and does not extend from the cable 42 in a direction away from the operator where it could be engaged and accidentally actuated to release the ingot

by a part of a machine or other object which might happen to be in its path of upward movement.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

A grapple for ingots of predetermined rectangular cross section comprising an arm having a substantially horizontally disposed portion engageable with the top of an ingot and having an inclined portion to provide clearance for ingots adjacent to the one being lifted, a first jaw depending from one end of said arm on the horizontal portion thereof and provided with a substantially vertically disposed flat face engageable with one side of the ingot, an upright first lever pivotally connected to the arm intermediate its ends and in a predetermined spaced relation to the first jaw and having a second jaw disposed below said arm and provided with a substantially flat face engageable with the opposite side of the ingot, a second lever having a lower end thereof pivotally connected to the other end of the arm, a connector element pivotally attached to the upper end of the second lever and connectible to means for suspending the grapple, and a link pivotally connected to the upper end of the first lever and to an intermediate portion of the second lever for actuating the second jaw to clamp the ingot against the first jaw in response to upward movement of the said upper end of the second lever, the levers and the links being disposed on one side of a vertical plane substantially midway between the jaws and with the said upper end of said second lever disposed above the jaws and in substantial alignment with said plane when the grapple is being raised with an ingot clamped therein, the pivotal connection of the link to the second lever being closer to the lower end thereof than to said upper end and the distance between the pivotal connections of the arm and the link to the second lever being less than the distance between the pivotal connections of the arm and the link to the first lever to obtain a multiplication of force on the jaws, and the arrangement of the components of the grapple being such that the arm and jaws of the grapple are maintained in substantially horizontal and vertical positions, respectively, when an ingot is being held therein to hold the ingot at all times in a horizontal position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,453,812	Thomas	May 1, 1923
2,675,261	Egge	Apr. 13, 1954
2,708,592	Dalkranian	May 17, 1955

FOREIGN PATENTS

23,229	Sweden	Dec. 19, 1906
62,605	Sweden	Oct. 14, 1925