June 12, 1962 H. C. ELSE 3,038,734

CHUCKS FOR HORIZONTAL WORK-PIECES

Filed July 24, 1961 2 Sheets-Sheet 1

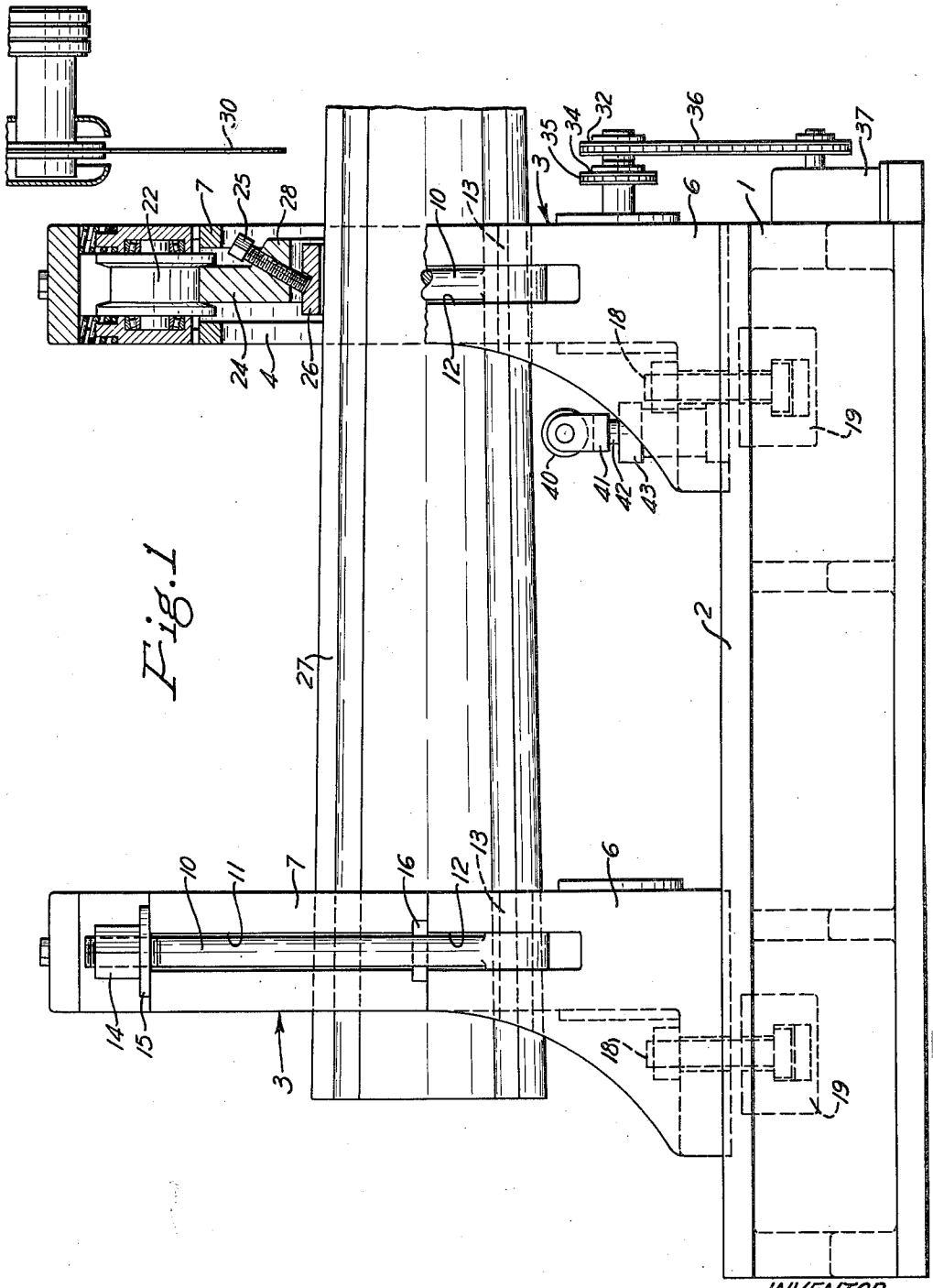


Fig. 1

INVENTOR.
HARRY C. ELSE

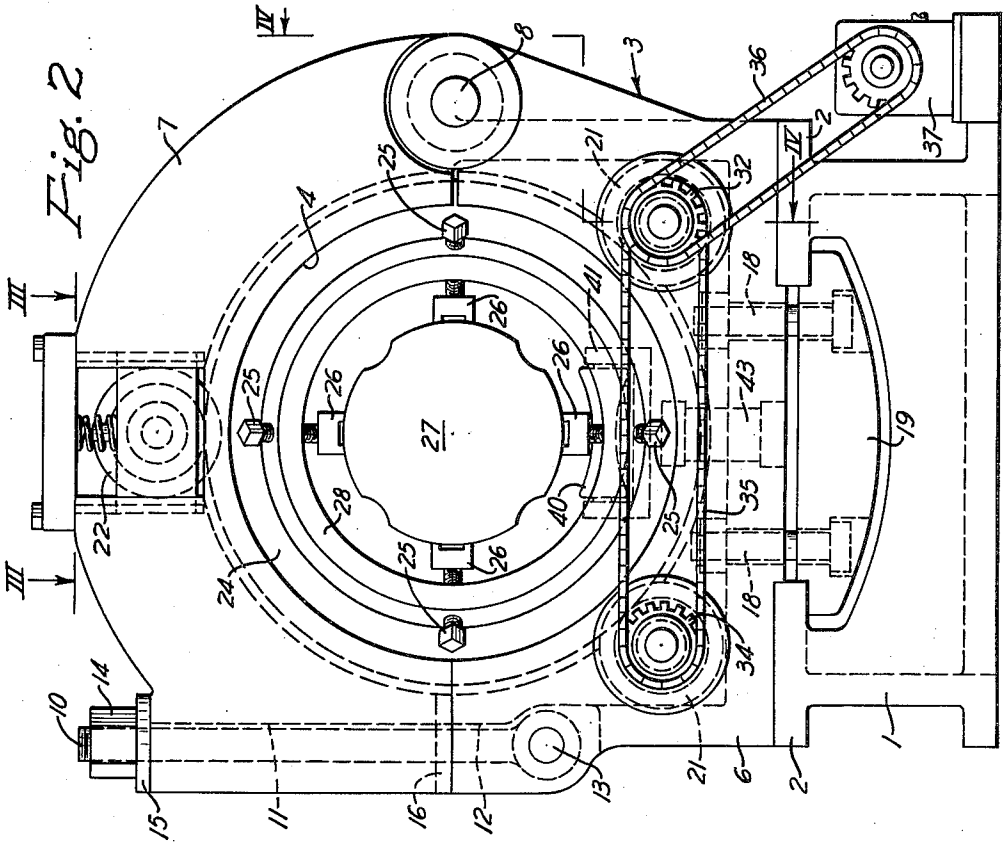
BY
Brown, Critchlow, Flick & Peckham
ATTORNEYS

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Fig. 2



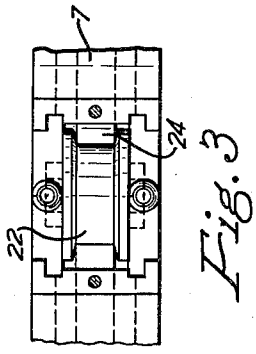


Fig. 3

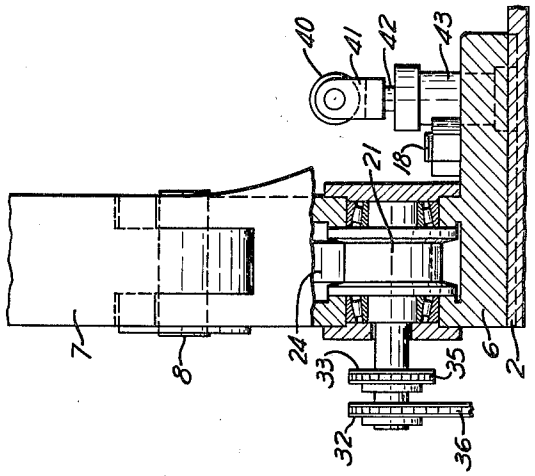


Fig. 4

INVENTOR.
HARRY C. ELSE

BY

Brown, Critchlow, Flick & Peckham
ATTORNEYS

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CHUCKS FOR HORIZONTAL WORK-PIECES

Harry C. Else, % Machinery Sales Company, 1921 Forbes St., Pittsburgh 19, Pa.

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This invention relates to chucks, and more particularly to those designed for holding rotating horizontal work-pieces while operations are performed on their projecting ends.

Cast ingots may have their ends cropped by supporting the ingots horizontally in chucks that rotate while a saw or abrasive cutter does the cropping. It requires two chucks to hold an ingot, one near each end. To mount the ingot in the chucks it has been necessary to insert it endwise into them. That is a rather difficult operation, which requires considerable manipulation of the ingot. If it is desired to crop both ends of the ingot and it has to be turned end-for-end to do so, it is necessary first to remove the ingot axially from the chucks, turn it around and then re-insert it in them. Of course, this increases the complexity of the operation.

It is among the objects of this invention to provide chucking apparatus which has removable elements that can be applied to an ingot or other work-piece before it is inserted in the chucks, and which permits a work-piece to be lowered into the chucks instead of being inserted axially into them.

In accordance with this invention each of a pair of parallel chucks includes a vertical frame that is provided with a horizontal opening through it. The frame has a stationary base portion and a movable top portion hinged together on a horizontal axis at one side of the frame opening in order to permit the frame to be opened and closed. The frame normally is held closed by releasable means. A vertical ring is disposed in the frame opening, from which it is removable when the frame is opened. The ring is centered in the closed frame by rollers mounted in the top and bottom portions of the frame. Clamps connected with the ring center a work-piece in it. The rings and clamps can be applied to the work-piece before it is placed in the chucks, and then the work-piece can be lifted by a crane and deposited in the open chuck frames, where the rings will be supported by the lower rollers. After the frames are closed, the clamps are adjusted to center the work-piece in the rings. The two chucks can be adjusted toward and away from each other on a foundation base for work-pieces of different lengths.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a side view of my apparatus with one of the chucks partly broken away in vertical section;

FIG. 2 is a view of the right-hand end of the apparatus;

FIG. 3 is a fragmentary horizontal section taken on the line III—III of FIG. 2; and

FIG. 4 is an enlarged fragmentary side view and section taken on the line IV—IV of FIG. 2.

Referring to the drawings, the top of a heavy foundation base 1 may be provided with laterally spaced parallel rails 2. Seated on these rails is a pair of parallel vertical chucks. Each chuck has a frame 3 provided with a large horizontal opening 4 through it. The two openings are in axial alignment with each other. Each frame has a base portion 6 that is seated upon the foundation base, and a movable top portion 7 that is hinged to the base portion by a horizontal pivot pin 8 at one side of opening 4, about half-way between its top and bottom. The frame normally is held closed by a vertical swing bolt 10 disposed in slots 11 and 12 in the side of the frame opposite the hinge. The lower end of the bolt is pivotally mounted on a pin 13 extending through the base of the frame, and a nut 14 and

washer 15 on the upper end of the bolt press the two parts of the frame tightly together. The upper and lower portions of the frame may be provided between the swing bolt and central opening 4 with a tongue 16 and groove to maintain lateral alignment of the two parts.

The base portion of each frame projects down between the rails of the foundation base a short distance, and it also extends out behind the frame to provide stability and a support for a pair of bolts 18. These bolts clamp a heavy bar 19 against the bottoms of the rails to hold the chuck firmly in place anywhere along the base.

Rotatably mounted in the base portion of each frame is a pair of flanged rollers 21. The rollers have parallel horizontal axes spaced equidistant from opposite sides of a vertical line through the axis of frame opening 4. Directly above the axis of the frame opening a third flanged roller 22 is journaled in the top portion of the frame. Preferably, this roller is spring pressed downwardly so that it can compensate for wear of the rollers.

Supported by the three rollers and centered by them in the frame opening is a ring 24. The ring supports screws 25, by which clamping blocks 26 can be pressed against a work-piece 27, such as an ingot, for example, extending through the ring. As shown in FIG. 1, one side of the ring preferably has a laterally projecting annular portion 28, in which the screws are threaded at an inclination to the ring axis. This makes the heads of the screws accessible for turning from one side of the ring. The inner ends of the screws engage the clamping blocks but do not have to be permanently connected to them unless desired. By adjusting the screws, the work-piece can be held firmly by the clamping blocks and centered within the ring. If desired, the opposite side of the ring may also be provided with a laterally projecting annular portion, longer than portion 28, for supporting another set of clamping blocks and screws so that a short work-piece can be held at axially spaced points by one chuck alone.

When it is desired to use this apparatus, nuts 14 are loosened and bolts 10 are swung outward so that the tops of the chuck frames can be swung up and out in order to open the frames. Then the rings 24 are lifted out of the base portions of the chucks and placed over the opposite ends of a work-piece, such as an ingot 27. Clamping screws 25 are turned inward far enough to press the clamping blocks against the work-piece so that the rings will be held in place the correct distance apart. The work-piece then may be lifted by a crane and deposited in the open chuck frames, with the rings seating on bottom rollers 21. When the frames are closed and locked, upper rollers 22 also will engage the rings. The rings are now held by the rollers in axal alignment with each other. By making whatever further adjustments of the clamping screws that are necessary, the axis of the workpiece can be made to coincide with the common axis of the rings. The apparatus now is ready for use, such as cropping the end of an ingot. In that case the cropping may be accomplished by a rotary abrasive cutter 30 beside one end of the ingot.

To rotate the ingot slowly during cutting, axially aligned sprockets 32 and 33 are rigidly connected with one of the lower rollers 21, and a sprocket 34 is rigidly connected with the other lower sprocket. A chain 35 extends around sprockets 33 and 34, and sprocket 32 is driven by a chain 36 from a motor-driven gear reduction unit 37.

In case the opposite end of the ingot is to be cropped by the same cutter, the chuck frames can be opened and then the ingot and rings lifted as a unit, turned end-for-end and redeposited in the frames. Since the two chucks are the same, it will not be necessary to readjust the clamping members.

If it is desired to make more than one cut through the ingot or other work-piece, following each cut the clamping screws 25 in the front chuck are loosened and the

rear chuck is moved forward on the base by any suitable means to push the work through the front chuck the desired distance. Then the clamping screws are tightened again to center the work in ring 24. To support the ingot while the front clamping screws are loose, and to facilitate its forward movement, it is desirable to mount a vertically adjustable concave roller 40 beneath it between the two chucks. This can be done by journaling the roller in a bracket 41 mounted on the upper end of a vertical rod 42 that is slidably mounted in a cylinder 43 secured to base 6 of the front chuck frame. The rod can be raised in any suitable manner such as by fluid pressure in the cylinder. Roller 40 is elevated to support the ingot just before the four clamps are loosened, and is lowered again after the ingot has been pushed forward and reclamped.

This apparatus can also be used for internally clamping hollow work-pieces, from which it is desired to cut rings, by simply extending a ring 24 axially out of a chuck frame and providing its projecting portion with radially outwardly directed clamps to engage the inner surface of a hollow work-piece telescoped over the ring extension.

I claim:

1. A chuck for a horizontal metal work-piece, comprising a vertical frame provided with a horizontal opening therethrough and having a stationary base portion and a movable top portion hinged together on a horizontal axis at one side of said opening to permit the frame to be opened and closed, releasable means normally holding the frame closed, a vertical ring disposed in said frame opening and removable therefrom when the frame is open, rollers mounted in said top and base portions of the frame centering the ring in the closed frame and rotatably supporting it, and clamps carried by the ring for centering a work-piece to it.

2. A chuck according to claim 1, in which there are only three of said rollers, two of the rollers being mounted in laterally spaced positions in the base portion of the frame, and one of the rollers being mounted in the top portion of the frame directly above the axis of said ring.

3. A chuck according to claim 1, in which said rollers are flanged to receive the marginal portion of the ring.

4. A chuck according to claim 1, in which said clamps include blocks inside the ring, and screws threaded in the ring, the screws being inclined to the axis of the ring with their inner ends engaging said blocks and their outer ends projecting from one side of the ring.

5. Chucking apparatus comprising a foundation base, a pair of parallel chucks mounted on the base, each chuck including a vertical frame provided with a horizontal opening therethrough and having a base portion secured to said foundation base, means for adjusting one of the chucks along the foundation base toward and away from the other, each frame also having a top portion hinged at one side to its base portion on a horizontal axis to permit the frame to be opened and closed, releasable means normally holding the frames closed, a vertical ring disposed in each frame opening and removable therefrom when the frame is open, rollers mounted in said top and base portions of the frames centering the rings in the closed frames and rotatably supporting them, and clamps inside the rings and connected thereto for centering therein a work-piece being chucked.

6. Chucking apparatus according to claim 5, including means between the chucks for supporting a work-piece while said one chuck is being adjusted along the foundation base and the clamps in the other chuck are loose.

7. Chucking apparatus comprising a foundation base, a pair of parallel chucks mounted on the base, each chuck including a vertical frame provided with a horizontal opening therethrough and having a base portion secured to said foundation base, means for adjusting one of the chucks along the foundation base toward and away from the other, each frame also having a top portion hinged at one side to its base portion on a horizontal axis to permit the frame to be opened and closed, releasable means normally holding the frames closed, a vertical ring disposed in each frame opening and removable therefrom when the frame is open, flanged rollers mounted in said top and base portions of the frames receiving and centering the rings in the closed frames and rotatably supporting them on a common axis, clamping blocks inside the rings for engaging a work-piece extending through the rings, and screws threaded in the rings with their inner ends engaging the blocks and their outer ends exposed for turning.

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