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CORE BOX FOR INGOT MOLDS

Filed April 2, 1927

3 Sheets-Sheet 1

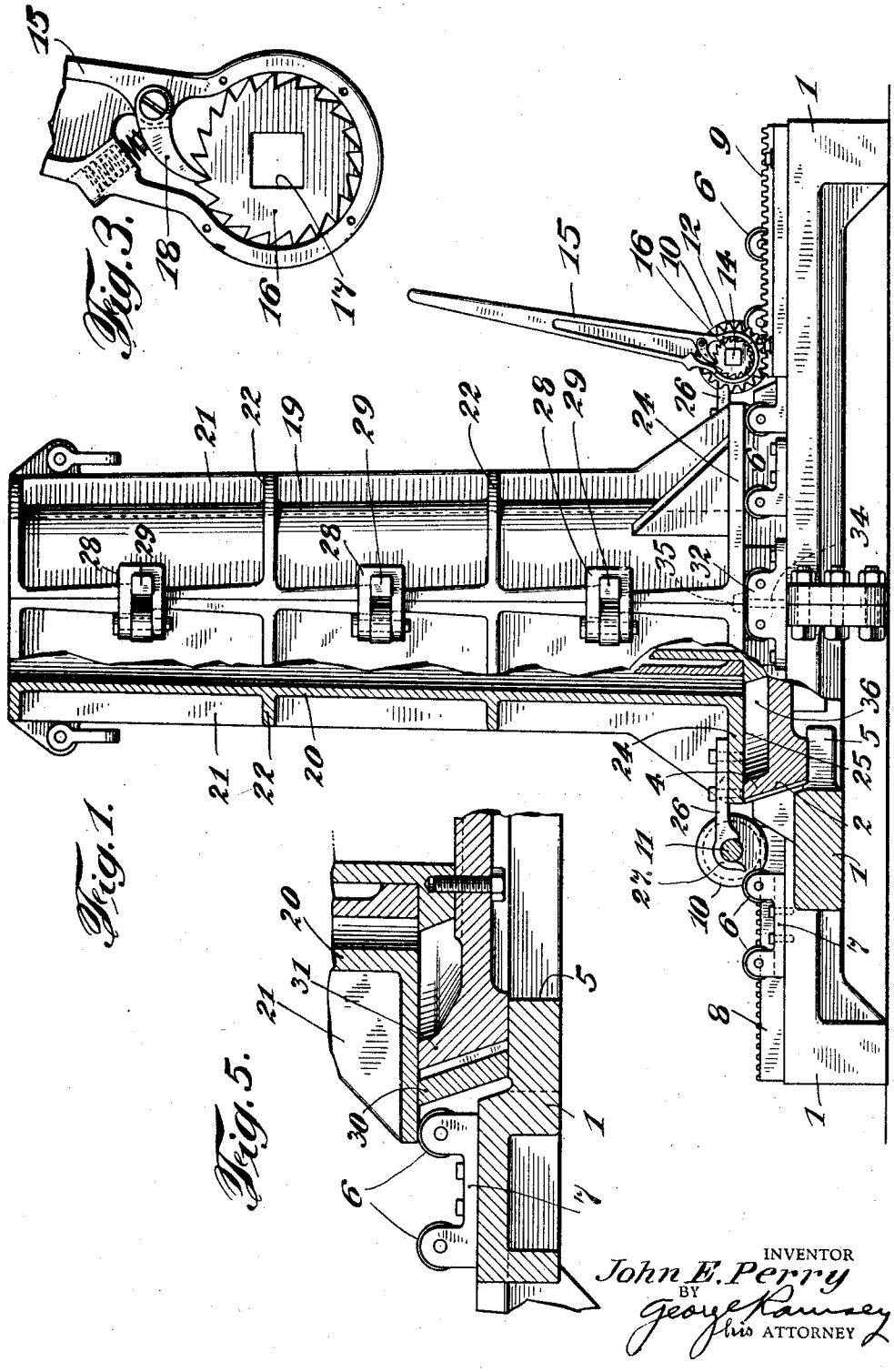


Fig. 3.

Fig. 1.

Fig. 5.

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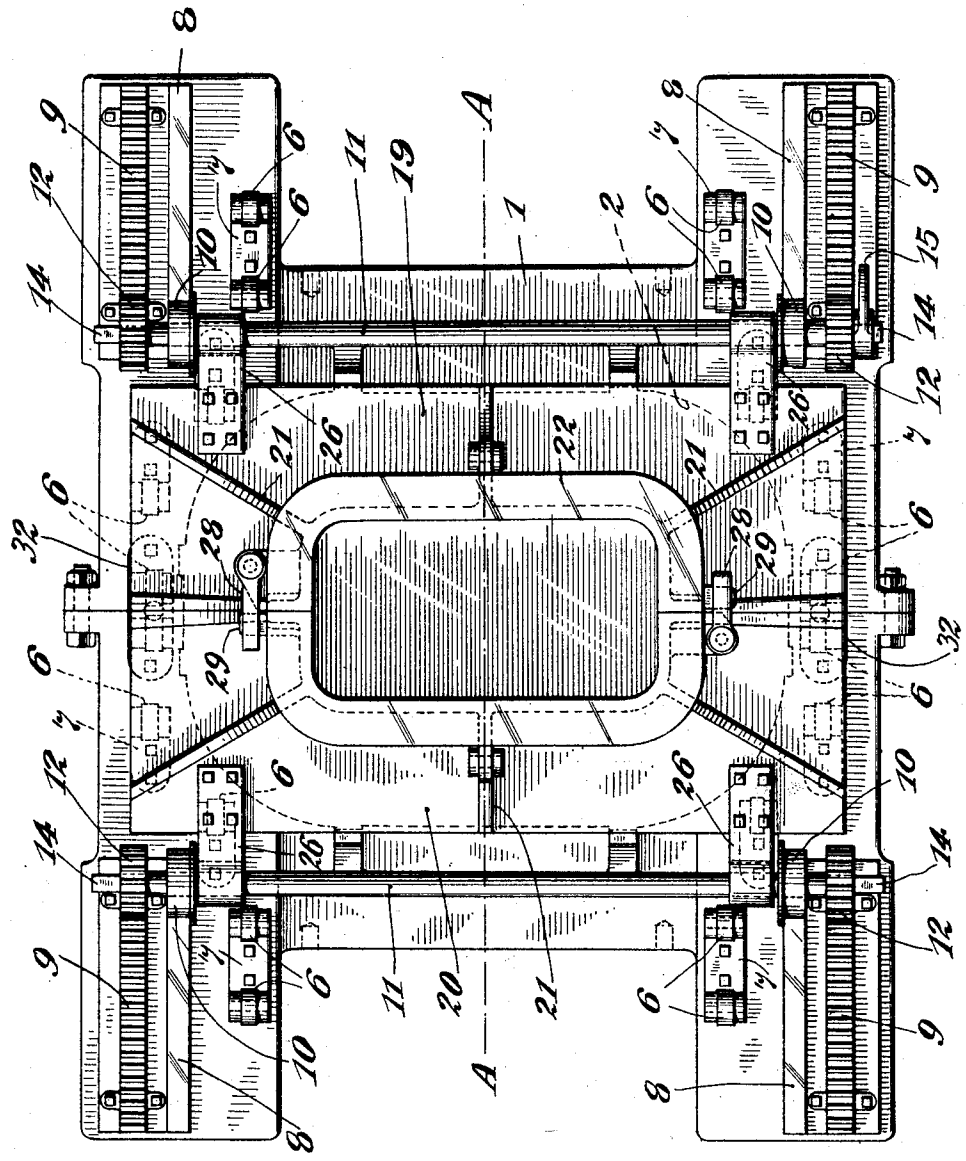


Fig. 2.

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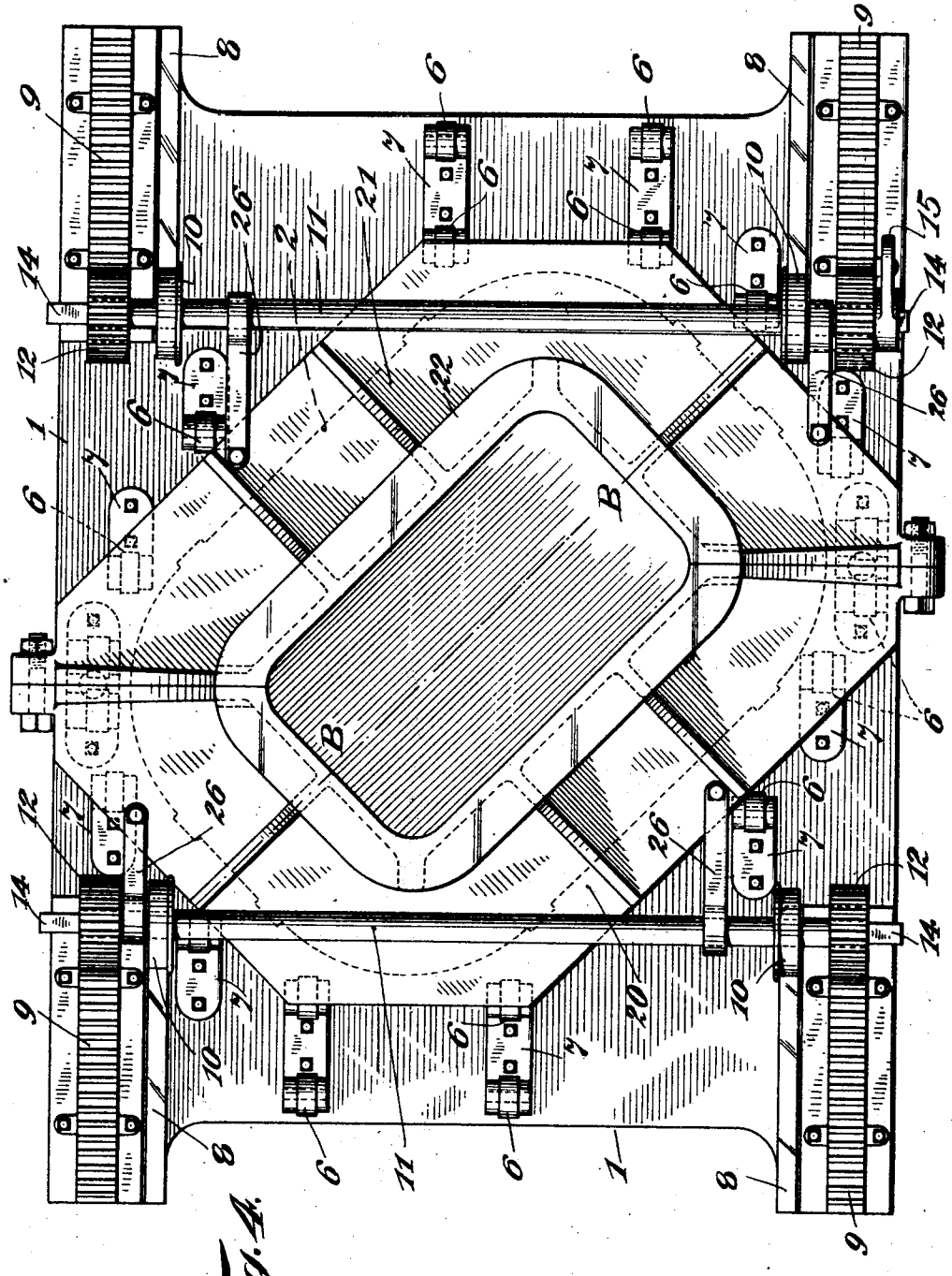


Fig. 4.

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UNITED STATES PATENT OFFICE.

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CORE BOX FOR INGOT MOLDS.

Application filed April 2, 1927. Serial No. 180,374.

This invention relates broadly to metallurgy and more especially to core bar boxes for use in sanding cores for manufacture of ingot molds.

Core bars used in the manufacture of ingot molds are of large size, usually several feet in length and often twenty inches or more on a side in width. These core bars usually comprise a stem or post adapted to carry a sand facing, that is attached thereto by ramming sand around the post. It is necessary that the sand facing shall be smooth and shall not be injured in handling. The usual way of forming the sand facing is to set up the core bar in a core box and then ram the core sand between the core bar and the smooth solid matrix face of the core box. In these large sized core bars, metal sided boxes have been used in order to secure strength and these metal sides, because of their weight, are unwieldy. It has been customary to hinge the sides together and permit the sides to slide upon a core box base. This type of mold is satisfactory for certain core bars but where extremely large sizes of core bars are to be sanded as is in the case of very large bars adapted to be used in casting ingot molds for slab ingots, adapted to be rolled into sheets, it has been found that cores are sometimes injured by the workmen in using crowbars and other pries to open the core box after the ramming operation is completed. The present invention overcomes the difficulties of the prior art and comprises a core box in which sides of the box are mounted to move in straight lines away from the axis of the core bar. The heavy sides of the core box are mounted upon rollers to enable relatively light force to open and close the box, and the movement is controlled by carriage members so that the sides of the box may be bodily moved away from the core bar which may then be lifted from the core box base by suitable crane operations.

Another feature of the present invention is the relation of the core box sides to the carriage structure which enables core boxes to be interchanged relative to a single base frame, thereby permitting a single base frame to be used with various sized core boxes to ram various sizes of core bars. The base of the core box is provided with a recess or opening sufficiently large to accommodate the largest core bar base and then liners are provided with the periphery of the liners fitting the core box base and with a recess in the liners of a smaller size to fit the bases of smaller sized core bars.

Stops are provided to limit the movement of the sides of the core boxes relative to the core box base frame and to center the core boxes over the core box base frame in such manner that the axis of the core box coincides with the axis of the opening in the core box base frame which opening receives the core bar bases. By this construction, it will be observed that when a core bar is set in the core box base frame and the core box is closed around the core bar, that the core bar is accurately centered in the core box, thereby insuring equal thicknesses of sand faces around the core bar post. Furthermore, in the preferred form of the present invention, the core bar which is adapted for use in this core box is provided with a relatively wide base that is adapted to carry a sand face and that has a periphery which comes up under the bottom portions of the sides of the core box so that the weight of the core box holds this base rigidly in place. This construction prevents any movement or swing of a core bar post when sand is being heavily rammed upon one side thereof and thereby tending to crowd over the post toward the other side of the core box. In other words, the whole construction is such as to automatically center the core bar posts in the core box and to maintain the posts rigidly in center position.

Realizing that the present invention may be embodied in constructions other than those herewith specifically illustrated and described, it is to be understood that the disclosure of this application is illustrative and not to be considered in the limiting sense.

Fig. 1 is an elevational view, with certain portions broken away, of a preferred form of the present invention.

Fig. 2 is a plan view of the device illustrated in Fig. 1.

Fig. 3 is a view of a ratchet wrench for operating the device.

Fig. 4 is a plan view of a slight modification of the invention.

Fig. 5 is a detail sectional view of a portion of the base frame and showing a filler adapted to be used with the device.

Referring now to the drawings and more especially to Figs. 1 and 2, the preferred form of the present invention comprises a base

frame 1 which may be in two sections bolted together. This base frame is provided with a recess 2 shown in Fig. 1. This recess is adapted to receive the core bar base 4, such as is indicated in section in Fig. 5. The core bar base accurately fits recess 2 and sets upon projecting supports 5 which may be integral with the base frame 1. The base frame 1 is provided with a series of rolls 6 mounted in bearings 7 secured to the top of the base frame 1, which rolls are adapted to act as a support for the core box as will be later described. Each side of the base frame 1 is provided with track rails 8 and stationary racks 9. Flanged guide wheels mounted on shafts 11 are adapted to roll on the track rails 8. Cog wheels 12 are also mounted on the shafts 11 adjacent to the guide wheels 10 and these cog wheels engage the stationary racks 9. The four ends 14 of the shafts 11 are squared to receive a ratchet wrench (Fig. 3) having an operating handle 15, a rotary center 16 provided with a squared opening 17 to fit the ends 14 of the shafts 11. The rotary center 16 is formed with ratchet teeth with which a spring pressed dog 18 is adapted to cooperate. The ratchet wrench may be slipped on and off the ends 14 with the ends 14 entering the opening 17 from either side so that the operator determines the effective rotative direction of the center 16 by placing it on the squared end of the shaft with the pawl on the ratchet pointing in the direction which the operator desires to rotate the shaft.

The core box comprises a pair of large cast members comprising core box sides 19 and 20. These side members are formed with supporting ribs 21 and 22, and with horizontal extensions 24. These horizontal extensions 24 are preferably provided with substantially plane undersurfaces 25, which ride upon the anti-friction rolls 6 to support the sides. The horizontal extensions 24 of each core box side carry bearing brackets 26 having U-shaped bearing ends 27 adapted to fit down over the shafts 11. The joints where the core box sides meet are adapted to be locked together, so as to comprise a closed, solid, core box member when the sides are closed. One convenient and effective form of lock comprises a plurality of clevises 28 which are pivoted to one core box side and adapted to extend over projections 29 on the other core box side. These projections may be provided with rounded surfaces acting as wedges when the clevises are closed so that the driving of the clevises over the projections tightly wedges the sides of the core box together. The wedging surfaces adjacent the normal position of rest of the clevis members are such that there is no tendency of the clevises to spring open after once having been closed.

Fig. 2 illustrates a core box having the matrix portion thereof which is substantially rectangular with rounded corners arranged in such manner that a central axis A of the rectangle substantially coincides with the direction of movement of the sides for opening or closing the core box, and with the joints substantially bisecting one of the sides of the rectangle. In this construction, preferably, the sides of the core box adjacent the joint may be substantially plane surfaces parallel to the axis of the movement of the sides of the box in opening or closing, or these surfaces may be given a very slight taper outwardly from the corners toward the joints so that as the box opens, there will be a very slight clearance to prevent dragging of the sand by the box during the opening movement of the box.

Fig. 4 illustrates a core box also having a substantially rectangular matrix and with the matrix portion turned relative to the movement of the sides of the box in opening and closing in such manner as to prevent an angle of substantially 45° between the line of movement of the sides and the axis B of the rectangle. In this construction shown in Fig. 4, the joints of the core box are preferably arranged at corners of the matrix so that when the core box opens, the side faces of the matrix immediately move away from the sanded core, thereby obviating any dragging of the core box over the sanded core. In this construction shown in Fig. 4, the recess in the base frame for the core bar base and also the arrangement of the anti-friction rolls 6 is such as to accommodate the angular disposition of the core box relative to the movement of the sides.

In Fig. 5 is illustrated a section through a corner of the core box base frame, and the side and base of a core bar. In this view, there is illustrated a filler 30 which may comprise a metal member or members, preferably, however, in the form of a continuous ring, which is adapted on its periphery to exactly fit the recess 2 in the bottom of the base frame. This filler 30 is provided with an opening of a smaller size than the recess 2 in the main frame, which smaller opening receives and fits a core bar base 31 of a smaller size than that which would be required to fit the recess 2 in the main base frame. By means of this filler, the same core box base frame may be used to accommodate smaller core bar bases.

The roller bracket 32 adapted to form the final support for the inner edge of the core box sides 19 when the boxes are closed, carries a side stop member 34 which may comprise a stub bolt or dowel pin preferably having a slightly tapered head 35. This head 35 cooperates with the corresponding openings in the bottom of the core box sides, so that when the operator uses the ratchet wrench to rotate the shaft 11, and close the box, each side is stopped in its closing movement by means of this taper head stop member 35. In

this way, the axis of the matrix of the core box exactly coincides with the axis of the opening for the base of the core bar, thereby accurately centering the core bar within the core box since the base 4 of the core bar rests upon the projecting supports 5 and is covered by the horizontal extensions 24. Thus, the core bar base is securely and accurately locked so that uneven ramming of sand around the core bar during preliminary ramming operations cannot displace the centering of the core bar relative to the core box.

From the foregoing, it will be observed that when the core box sides 19 and 20 are securely locked together, the core box may be lifted as an entity from the core box base frame. In this operation, a crane may be employed and the horizontal extensions 24 are raised directly from the rolls 6 and the open ends 27 of the bearing brackets 26 rise from over the shafts 11. A larger or smaller size core box, or a box having a different shaped matrix, may now be replaced on the core box base frame 1 with the bearing bracket ends 27 coming down over the shafts 11 and with the stop openings in the bottom of the core box sides coming into position over the tapered heads 35 on the stop members 34. By means of this arrangement, various sizes and shapes of cores may be sand rammed with a minimum amount of equipment; the filler 31 taking care of the core bar base and the assembled core boxes taking care of the core bodies. It will also be observed that the end surfaces 25 on the extensions 24 come over and smooth the sand which has been rammed upon the recess 36 in the core bar base 4, thereby smoothing this sand and permitting the side wall sand to make an intimate and close bond therewith.

This core box enables the handling of very large sized core bars without danger of injury and with assurance of accuracy and rigidity necessary for successful construction of large cores adapted for use in the manufacture of ingot molds, as well as a flexibility of equipment, whereby a maximum number of sizes and shapes of core bars may be rammed with a minimum amount of equipment.

Having described my invention, I claim:

1. A core box for sanding core bars for ingot molds comprising a base frame, core box side members setting on said base frame and capable of being freely lifted from said base frame, said side members having rectilinear movement on said base frame, and means cooperating with said sides and said base frame to move said sides on said base frame to open and close said core box.

2. A core box for sanding core bars for ingot molds comprising a base frame provided with a recess to receive a core bar base, core box side members having rectilinear movement on said base frame, stops to accurately center the axis of the matrix of the core box over the axis of the core bar, and means cooperating with said sides and said base frame to move said sides on said base frame to open and close said core box.

3. A core box for use in sanding core bars for ingot molds comprising a core box base frame, core box sides mounted for rectilinear movement on said base frame, said core box sides being sufficiently heavy to rest securely on said base frame, stops to limit the movement of said sides and to center said sides over said base frame when the core box is closed, means to move said sides upon said base frame, and locking devices to lock said sides together when the core box is closed, said sides being freely removable from said base when the sides are in either open or locked position.

4. A core box for use in sanding core bars for ingot molds comprising a core box base frame, core box sides having plane base portions mounted for rectilinear movement on said base frame, anti-friction rolls upon which said plane base portions are adapted to set, stops to limit the movement of said sides and to center said sides over said base frame when the core box is closed, means to move said sides upon said base frame, and locking devices to lock said sides together when the core box is closed.

5. A core box for use in sanding core bars for ingot molds comprising a base frame provided with an opening to fit the base of a core bar, core box side members movable over said base frame and having horizontal extensions adapted to extend over said opening to lock suitable core bar bases in said opening, and independent operating means for each section of said core box, and adapted to independently move each section.

6. A core box for use in sanding core bars for ingot molds comprising a base frame provided with an opening to fit the base of a core bar, core box side members movable over said base frame and having horizontal extensions adapted to extend over said opening to lock suitable core bar bases in said opening, and independent operating gear and rack means for each section of said core box, and ratchet mechanism adapted to independently move said gears over said racks to move each section.

7. A core box for sanding core bars for manufacture of ingot molds comprising a base frame provided with an opening to receive a core bar base, a core box formed of sections and movable upon said base frame, operating means to move each section of said core box independently of the remainder of the core box, stops between said sections to position the vertical axis of said core box centrally over said opening when said core box is closed, and locking means to lock said sections around said stops.

8. A core box for core bars for ingot molds

comprising a base frame provided with a recess to receive the bases of suitable core bars, a sectional core box adapted to be moved over said base frame, operating means for moving said core box to open and close the same, means connecting said core box with said operating means, said connecting means being adapted to permit said core box being removed bodily from said base to permit interchange of the core boxes relative to said base.

9. In a core box for core bars for ingot molds, the combination of a base frame provided with a recess to receive the bases of suitable core bars, a sectional core box adapted to be moved over said base frame, operating means comprising shafts having translatory movement for moving said core box to open and close the same, open bearings connecting said core box with said operating means, said open bearings being adapted to permit said core box being removed bodily from said base to permit interchange of the core boxes relative to said base.

10. A core box for sanding core bars for the manufacture of ingot molds comprising a base frame, a core box having sections adapted to be moved over said base frame to open and close said box, parallel racks upon said base frame, shafts having cog gears thereon adapted to engage said racks to cause said shafts to have a translatory movement over said base frame when said shafts are rotated, and bearing members operatively connecting said shafts with the sections of said core box to permit said shafts to control the movements of said sections.

11. A core box for sanding core bars for the manufacture of ingot molds comprising a base frame adapted to support a core bar base, a core box having sections adapted to be moved over said base frame to open and close said box, said sections forming a vertical matrix with horizontal plane extensions therefrom, parallel racks upon said base frame, shafts having cog gears thereon adapted to engage said racks to cause said shafts to have a translatory movement over said base frame when said shafts are rotated, and bearing members operatively connecting said shafts with the sections of said core box to permit said shafts to control the movements of said sections.

12. In a core box for core bars for casting ingot molds, the combination of a base frame, a core box formed of sections adapted to move upon said base frame, pairs of parallel racks on said base frame, shafts provided with pairs of cog gears adapted to engage said racks, and bearing brackets operatively connecting the core box section with the shafts whereby the rotation of said shafts causes said cogs to travel upon said racks and thereby control the opening and closing movements of said core box.

13. In a core box for core bars for casting ingot molds, the combination of a base frame, a core box formed of sections adapted to move upon said base frame, pairs of parallel racks on said base frame, shafts provided with pairs of cog gears adapted to engage said racks, bearing brackets operatively connecting the core box section with the shafts, and ratchet means to rotate said shafts whereby the rotation of said shafts causes said cogs to travel upon said racks and thereby control the opening and closing movements of said core box.

14. A core box for core bars for ingot molds comprising a base frame, a sectional vertical core box having the sections adapted for movement over said base frame, operating means for moving said sections, and open connections between said core box and said operating means whereby core boxes may be interchanged relative to said operating means without destructive effort.

15. A core box for core bars for ingot molds comprising in combination a base frame, a core box comprising sections with substantially horizontal wide base flanges on said sections, anti-friction rolls mounted on said base frame and cooperative with said flanges to facilitate movement of said sections over said base frame, and means to move said sections over said rolls.

16. A core box for core bars for ingot molds comprising a base frame, supporting means thereon, a sectional core box mounted on said supporting means, pairs of parallel racks mounted on said base frame, shafts carrying cog gears adapted to engage said racks, trackways adjacent said racks, track wheels mounted upon said shafts and adapted to travel upon said tracks to guide said shafts relative to said racks, and means operatively connecting said sections of the core box to said shafts.

17. In a core box for core bars for ingot molds, the combination of a base frame provided with a recess to receive the base of the core bar, core box operating means on said base and adapted to open and close a core box, core boxes adapted for interchangeability relative to said operating means, and core bar base adapters constructed to fit within said recess and provided with an opening to receive and support core bar bases of smaller sizes than fit the recess in said base frame.

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CERTIFICATE OF CORRECTION.

Patent No. 1,694,105. Granted December 4, 1928, to

JOHN EDMUND PERRY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 86, for the word "prevent" read "present"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of January, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)