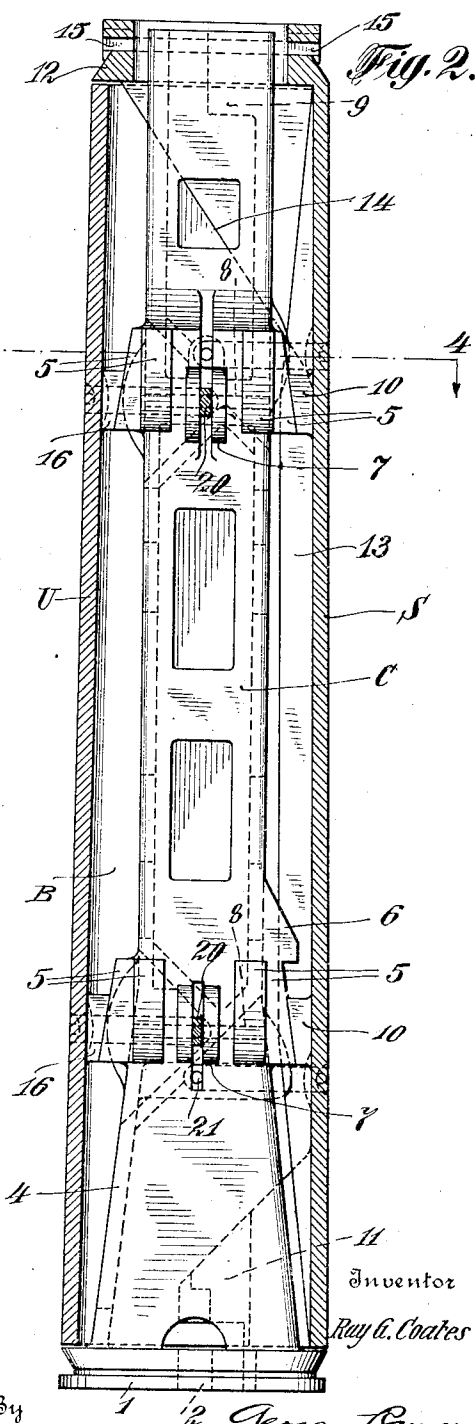
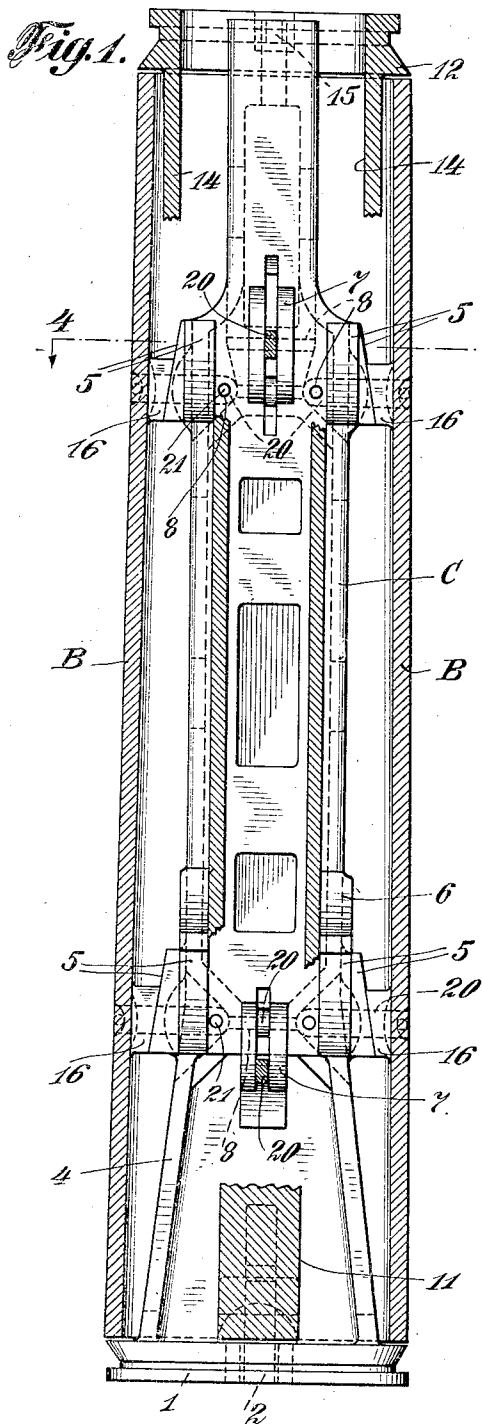


1,348,982.

R. G. COATES.
COLLAPSIBLE CORE BAR.
APPLICATION FILED JUNE 7, 1919.

Patented Aug. 10, 1920.

3 SHEETS—SHEET 1.



Inventor
Ray G. Coates

By

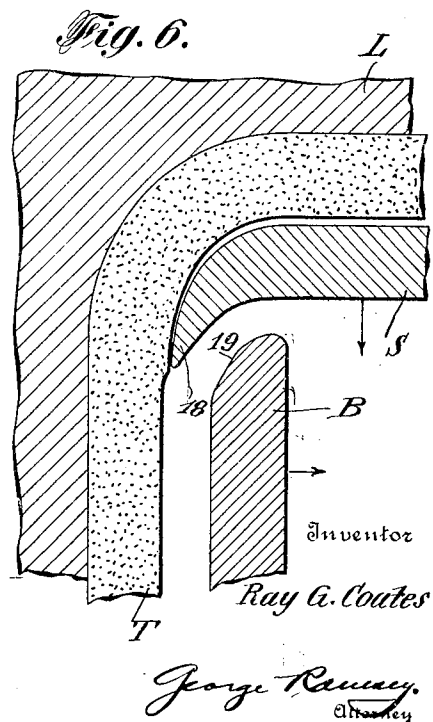
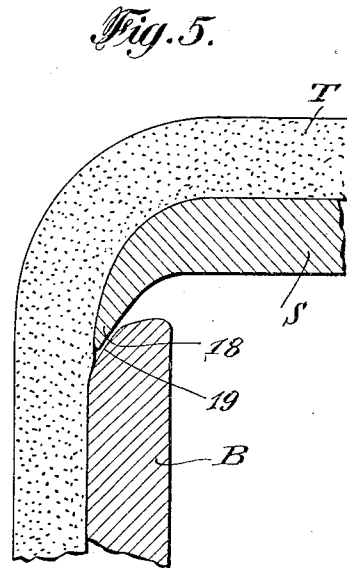
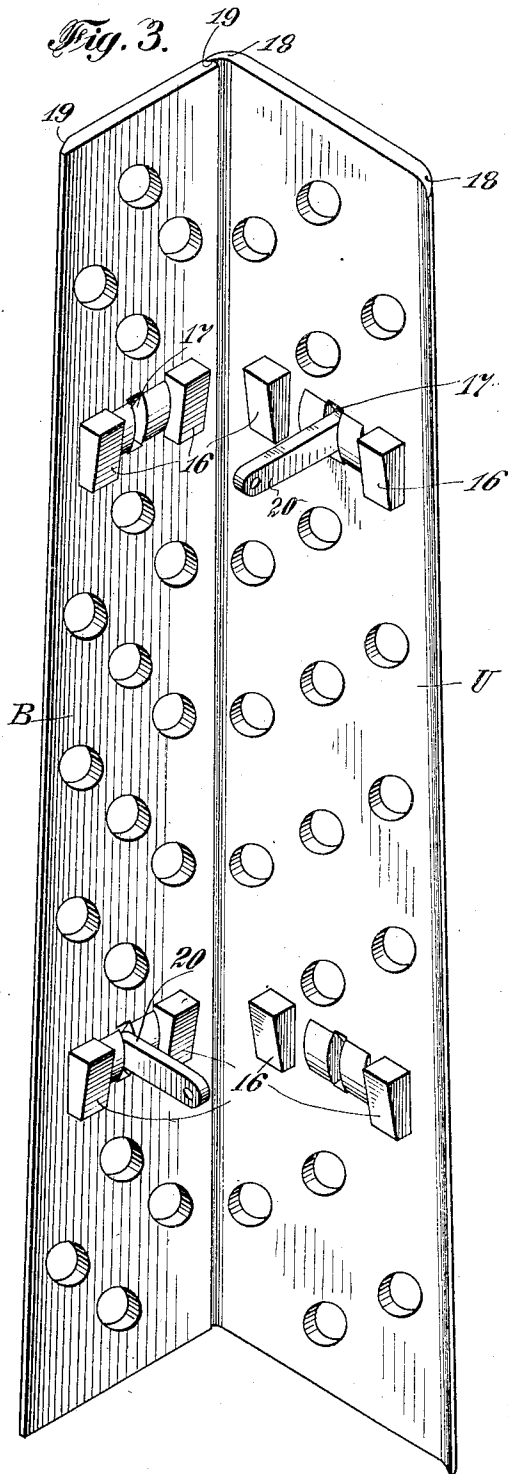
George Ramsey
Attorney

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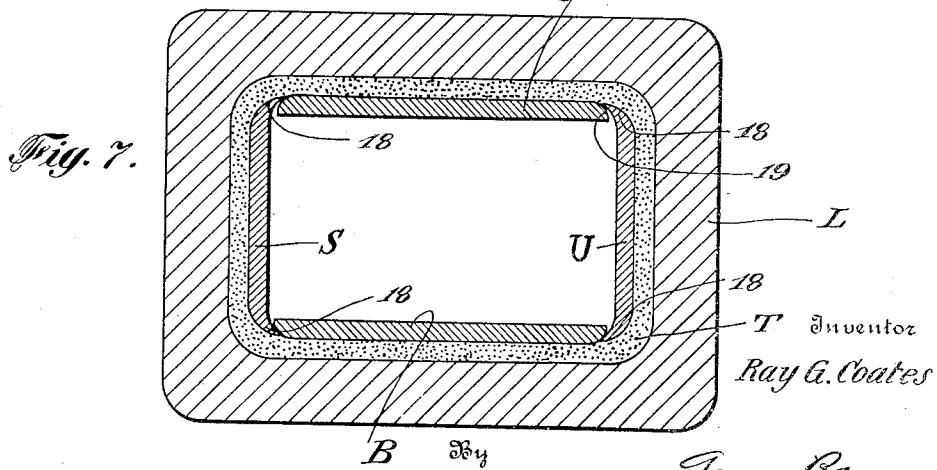
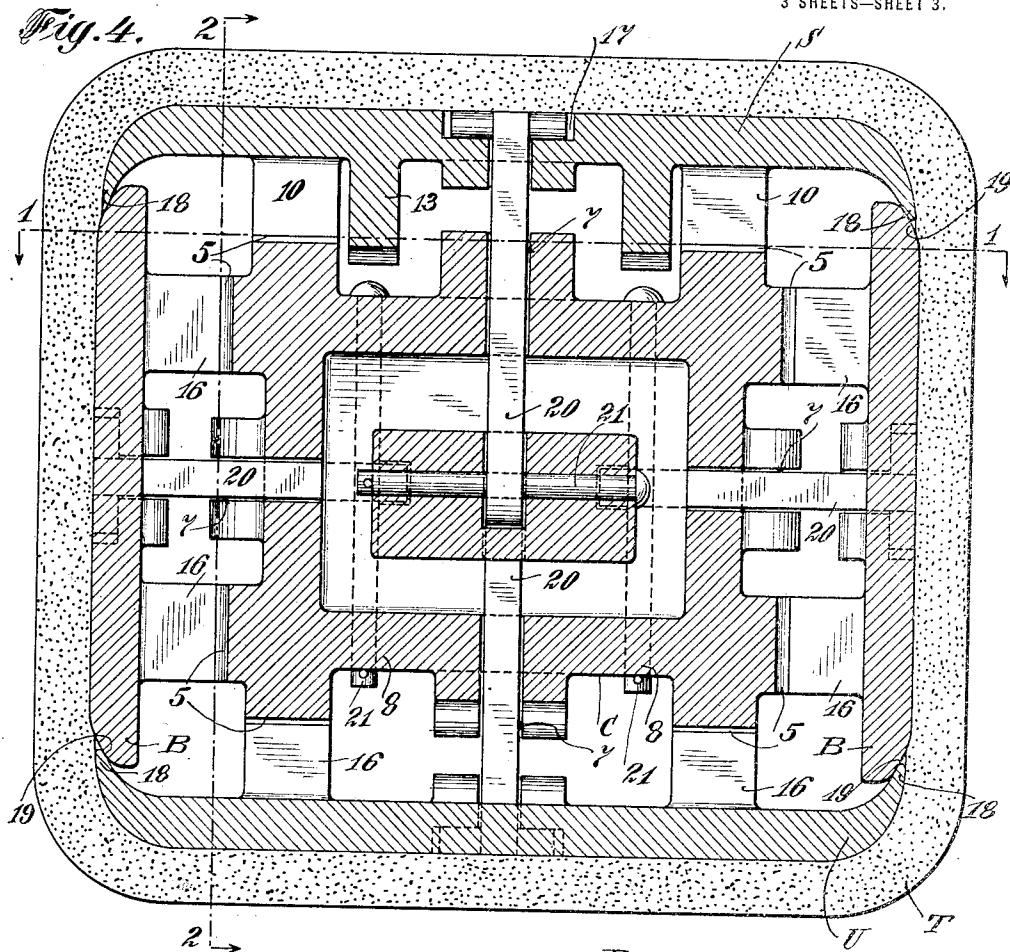
3 SHEETS—SHEET 2.



1,348,982.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

RAY G. COATES, OF PASADENA, CALIFORNIA, ASSIGNOR TO VALLEY MOULD AND IRON CORPORATION, OF SHARPSVILLE, PENNSYLVANIA, A CORPORATION OF NEW YORK.

COLLAPSIBLE CORE-BAR.

1,348,982.

Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed June 7, 1919. Serial No. 302,458.

To all whom it may concern:

Be it known that I, RAY G. COATES, a citizen of the United States, and a resident of the city of Pasadena, in the county of Los Angeles, State of California, have invented new and useful Improvements in Collapsible Core-Bars, of which the following is a specification.

This invention relates to metal founding and pertains particularly to certain improvements in collapsible core bars of a sort designed for use in the production of large and substantially uniform castings in which it is desirable to employ a core of considerable size, such as steel ingot molds.

As is well known in the art, it is customary to cast steel ingot molds and similar castings in large numbers of substantially uniform size and shape. To contribute to efficiency in the manufacture of such articles, it has been customary in the art to employ various forms of core bars or core barrels which are used repeatedly, and form part of the permanent equipment of the plant. By the use of such devices the provision of cores is a very simple matter as it requires merely supplying the permanent core barrel with a facing of clay wash, green sand, or other suitable material.

In the use of devices of this sort heretofore, however, difficulty has been experienced in stripping the core from castings in which there is little or no draft for the core. This is due to the fact that in cooling, the metal forming the casting shrinks tightly on to the core, and the heat from the metal prior to the shrinking of the casting, bakes or vitrifies the facing material, rendering it substantially incompressible, and, while under the compression between the casting and the core barrel, highly refractory and substantially non-friable. Numerous attempts have been made to accommodate core barrels to these conditions by rendering them collapsible to a greater or less extent, so that in the operation of drawing the core the pattern walls thereof will be moved inwardly away from the casting to permit the longitudinal withdrawal of the device. In some cases attempts have been made to produce the inward movement of the pattern walls by screw devices. In other instances the pattern walls have been arranged to swing on links connected to a central supporting

member. In a number of instances the pattern walls have been supported on wedges or inclined planes arranged on a central supporting member in such fashion that relative longitudinal movement of the central member and pattern walls would cause inward and outward movement of the latter. In the use of devices heretofore which have been of sufficiently simple construction to withstand ordinary shop usage, experience has shown that the use of considerable force, applied especially for that purpose, has been necessary to effect the collapsing of the core bar. This has been due to the binding of the pattern walls upon the supporting wedges or supporting links, under the heavy pressure imposed by the shrinking of the casting, and to the filling up of necessary clearance spaces between relatively movable portions of the pattern wall by the baked facing material.

It is the purpose of the present invention to provide an improved core bar construction which will obviate these various defects existing in prior devices, and which will contribute, furthermore, to efficiency in manufacture by being practically automatic in all of its operations, remain assembled at all times, susceptible of use in both upright and inverted castings, and possessed of other and further advantages.

More specifically stated, my invention contemplates among its objects the following:

The provision of a collapsible core bar wherein the clearances necessary to permit the collapsing movement of the pattern walls are so disposed as to be entirely protected from clogging by the facing material or the fluid metal.

The provision of a collapsible core bar which operates automatically in either upright or inverted position to properly position the pattern walls for the reception and sustaining of the face material.

To provide a collapsible core bar which will operate automatically to sustain the ferro-static pressure of the fluid metal during the pouring of the casting, and to accommodate the shrinking of the casting at its setting, so that the casting will not bind upon the core.

To provide a collapsible core bar wherein the collapsing movement of certain portions of the pattern wall precedes such movement

of other portions thereof, the portions first moving clearing space for the movement of the later moving portions.

To provide a free arrangement of movable
5 connecting members between the various parts of the device in such fashion that there will be no binding of such members when the casting shrinks on the core.

To provide a collapsible core bar which is
10 very strong and simple in construction and adapted to withstand the customary rough usage, and such a core bar in which similarity of several parts contributes to low cost in manufacture and repair.

15 Other objects of the invention will be pointed out hereinafter in the specification and appended claims, or will be obvious therefrom or from the accompanying drawings forming part of this specification.

20 Before describing the single illustrative embodiment of my invention which is shown in the drawings, I will explain that the invention contemplates the provision of a supporting pedestal member which occupies a
25 central or axial position in the device and forms a support for a plurality of pattern wall members. These pattern wall members are of plate-like form, and are movably supported for movement both longitudinally
30 and inwardly and outwardly relative to the pedestal member. The parts have permanent connection so that they remain always in assembled relationship, and this relationship of the pattern wall members is such
35 that their complementary disposal forms a member of bar or barrel shape whose perimetrical face is adapted for the reception of a friable facing material of a sort customarily employed in known practice.

40 On juxtaposed portions, the central pedestal member and the various pattern wall members are provided with cooperating wedges or inclined planes arranged at an angle relative to the axis of the device, which wedges
45 cooperate with links pivotally connecting the respective pattern wall members to the pedestal member, to maintain the parts in assembled relationship and in proper disposal under their own weight when the device
50 is resting either on the extremity of the pedestal member or upon the extremities of the pattern wall members at the opposite end of the device. The angular disposal relative to the axis of the device of the engaging
55 wedge faces on the pattern wall members and the pedestal member is not less than the angle of friction or repose, so that when the weight of either the pedestal member or of the pattern wall members is overcome by pressure upon the latter directed
60 toward the axis of the device, the resultant will impel the wall members and pedestal members for relative longitudinal movement, which relative longitudinal displacement of these members will permit the col-

lapsing or inward movement of the wall members toward the axis of the device and away from the casting. It will be understood that what I mean by the angle of friction or angle of repose is the degree of inclination of the engaging wedge faces when
70 the axis of the device is in a horizontal plane, at which inclination the parts are just ready to slide so that the wall members will slide on the pedestal member upon the application of pressure toward the axis of the device.

At the longitudinal line of junction between the contacting wall sections the parts are so formed that when the wall sections
80 are at their outer or expanded position, they make close and substantially smooth contact, leaving no externally disposed grooves or clearance spaces to which facing material might have access. To effect this result, the
85 contacting portions of the wall members are disposed in over-lapping relationship. To provide the necessary clearance between juxtaposed wall members, so as to permit the contracting or collapsing movement
90 thereof, the arrangement of connections between the wall members and the supporting pedestal is such that the wall members carrying the external over-lapping portions are withheld from movement until the portions
95 which they over-lap have been moved inwardly to afford the necessary clearance.

Referring now to the drawings, in which is shown an illustrative embodiment of the invention, it will be understood that Figure
100 1 represents a rear sectional elevation such as would be taken on a line 1—1 of Fig. 4;

Fig. 2 is a side sectional elevation such as would be taken on line 2—2 of Fig. 4;

Fig. 3 is a perspective of front and side
105 pattern wall portions;

Fig. 4 is a cross-section such as would be taken on line 4—4 of Figs. 1 and 2, and shows in addition thereto the arrangement of facing material;
110

Fig. 5 is a detail illustrating the relationship of contacting portions of juxtaposed wall parts in expanded position;

Fig. 6 is a similar detail showing the same parts in collapsing position; and
115

Fig. 7 is a diagram illustrating arrangement of portions of the device with respect to dimensions of the casting.

Referring to these illustrations by means of the reference numerals applied, it will
120 be understood that the letter C designates the pedestal or supporting member, S the back wall member, B the side wall member, and U the front wall member.

The pedestal member C is formed with
125 a base 1 provided with an aperture 2 for the reception of the stripping hook. From the base portion rises a shaft 4 which may be cast in hollow form, and which carries wedges 5, stop members 6, link pockets 7, 130

pin seats 8, and at its upper extremity a carrying-hook keeper 9. The wedges 5 are arranged in two groups, one disposed toward the lower extremity of the shaft and the other toward the upper extremity thereof. In each group are wedges extended from the front, the sides and back of the shaft. At the link pockets the shaft is webbed and apertured, and the pin-seats are apertured.

The back wall member S is a casting formed with inwardly directed wedges 10, and carries the hook keeper 11 at its lower extremity and a forwardly extending supporting member 12 at its upper extremity, which support is reinforced by brackets 14. The support 12 is provided with laterally opening apertures 15 for the reception of holding-down wedges. The front and side wall members are substantially identical, each being provided with the wedges 16 having their active faces inclined oppositely to the incline of the wedges on the pedestal member, and each being provided with counter-sunk link pockets 17. The form and size of the side, back and front members are such that when placed together in their complementary disposal they form a core bar of proper dimensions. In the embodiment shown the front and back members are provided with the lateral overlapping extensions 18. These lateral extensions turn off from the normal planes of the members on which they are carried at an angle of about 45°, and on their inner surfaces are adapted to make contact against curved faces 19 adjacent the lateral margins of the side members. The extensions 18, however, do not reach to the line of tangency between the front faces of the side members upon the curved faces 19. The extensions 18 are tapered off to a thin edge, so as to present a smooth joint, and this contour of the extensions 18 and the faces 19 give the core bar, in the embodiment shown, rounded corners, without any channels or open spaces along the line of contact.

The front, back and side wall members are held in assembled position by pivoted links 20. These links have T heads seated in the link pockets 17 as illustrated in Fig. 4, the shanks of the links being passed through the slots in the wall members so as to project inwardly and into the link pockets 7 of the pedestal member. At their inner extremities the links are pivotally secured to the pedestal member by pins 21. The links thus pivotally connected to the wall members and the pedestal member retain the former in place upon the latter and provide a means for limiting their outward movement. These links furthermore operate to hold the cooperating wedges on the wall members and the pedestal member in effective engagement when the device is in

its normal position. In assembling the device, the appropriate links having been slipped through the holes prepared for them in the wall members, the front wall member is then set up against the pedestal and these links pushed into the appropriate link pockets and the retaining pins 21 pushed into place. The side wall members are then set up and their links pushed into their link pockets and the pins inserted from the back of the device. The side links, when in place, retain the pins of the front links from movement out of their seats, and the side link pins can be secured against longitudinal movement by heads and cot- ters. These parts having been placed in position, the back wall member is then set up against the body member and its links pushed into the link pockets. This is most readily done if the core bar is horizontal and resting on the front side, since the links then naturally fall into their proper place when the back member is positioned over the pedestal. The retaining pins for the back links can then be inserted from the two ends of the core bar by the workman, inserting his arm or a pair of tongs, and the cotters for said links can be inserted likewise in the retaining pins.

The device, thus assembled, is adapted to stand upright either in erect position upon the base 1, or in inverted position upon the support 12. In the first position the wall members are capable of upward movement longitudinally of the pedestal, and in the last mentioned position the pedestal member is capable of upward longitudinal movement on the wall members. When utilized in the customary fashion in the mold the predetermined weight of these parts thus supported one upon the other is sufficient to sustain the ferrostatic pressure of the metal poured into the mold, so that, until the metal sets, the pattern wall of the core remains at its normal position. Due to the fact, however, that the inclination of the engaging faces of the wedges on the wall and pedestal members relative to the axis of the device is never less than the angle of repose for these parts, as soon as the lateral pressure on the wall members is increased above the ferrostatic pressure of the fluid metal, as occurs on the shrinking of the casting consequent upon its cooling and setting, such pressure will be effective to impel the supported member or members of the device longitudinally, causing the narrow ends of the wedges to approach each other. This produces an inward collapsing or contracting movement of the pattern wall which accommodates the shrinking of the casting and prevents the binding of the casting upon the core. The operation of the device, consequently, is automatic in accommodating shrinking of the casting.

As illustrated particularly clearly in Fig. 4, it will be seen that the front and back wall members, which in this instance carry the curved extensions 18, are supported by longer links than are the side members B. As a consequence, the inward movement of the side members will be more rapid or greater per unit of longitudinal movement, than will be the inward movement of the front and back members, the wedges on the different parts being formed at the proper angles to accommodate these differential movements, those on the side members having greater angularity relative to the axis of the pedestal member than those on the front and back members. This provides the necessary clearance for the inward movement of the front and back members and, since the curved extensions 18 do not reach to the tangent faces of the side members, said extensions 18 may pass clear of the sand from which the side wall members have retreated. This operation is illustrated in somewhat exaggerated scale in Figs. 5 and 6. Moreover, the curved contour and angular disposal of the extensions 18 practically eliminate all binding effect from lateral shrinkage of the casting as the resultant pressure is exerted in such fashion as tends to move the wall members carrying said extensions toward the axis of the device, rather than to compress them transversely. Consequently, when the cross-sectional of the core is approximately equidimensional, it is a matter of indifference whether these extensions be placed on the front and back or on the side wall members. When, however, there is substantial difference between the two cross-sectional dimensions of the core, then it is preferable to place the curved extensions 18 on the wall members which extend in the shorter dimension of the casting, and shape the other wall members as shown for the side members in the embodiment illustrated. The reason for this is that if the core bar is left in the casting until the latter cools completely there will be the most shrinkage in the direction of the greater dimension, and since there is less clearance from the sand at the margin of the curved extensions 18 than at other surface points of the device, these margins should be disposed on the line of the least shrinkage, as illustrated in Fig. 7, wherein the casting is designated by the character L. Thus a cross-section of 4 feet by 2 feet would have a shrinkage from fluid iron to cold casting of about $\frac{1}{2}$ inch one way by $\frac{1}{4}$ inch the other. If the curved extensions had, by design, a clearance of $\frac{3}{8}$ inch, it is obvious that if placed in the long dimension, they would not clear, while if placed in the short dimension they would clear freely all around. As specified above, it is important that the wall members with-

out the curved extensions be supported on the shorter links so that they may move slightly ahead of those having the lesser clearance from the sand.

In operation, when the core bar is used in erect position, standing on the base 1, with the wall members resting on their respective wedge faces, and the outer limits determined by the links, the core bar will form a rigid structure. And, no matter upon which end it is thus positioned, the device under the weight and operation of its parts normally and automatically assumes its proper form and position. The automatic movement of relatively movable parts to proper position is always insured, due to the guiding and limiting influence of the wedges and the links, and due also to the fact that lateral movement of the wall members is positively prevented by the fit of the links in the link slots, and the broad bearing faces of the link pockets. When the casting is stripped from the core, the wall members rise with the casting, due to the coherence of the sand, and the weight of the pedestal acting through the links, will tend to pull the wall members bodily away from the sand. When the wall members are thus freed they fall back to their expanded position on the pedestal. If the core is made with the large end up, the bar being supported on the bracketed support 12, the weight of the pedestal member, supported on the wedge faces of the wall members, will keep the core bar expanded. The stripping is accomplished by hoisting the pedestal, thereby removing the support of the wall members, which then move bodily away from the sand and are easily pulled out of the casting by the continued lift on the pedestal. To carry the core bar expanded with the small end up requires the carrying hook to be attached to the pedestal member, for which reason the keeper 9 is provided. To carry with the large end up requires that the bar be lifted by the wall members, which is accomplished by engaging the carrying hook in the hook keeper 11 on the back member S. In stripping in the inverted process the hook is engaged with the base member 1 by insertion through the aperture 2. The relative longitudinal movement of the pedestal and wall members in this operation is limited by the engagement of the stops 6 with the ends of the wedges 10 of the back wall member S. There is no liability of straining the connection of the links at any time, as they are under tensional stress only; and only to an extent sufficient to hold the wall members from falling apart. Consequently they keep their position in the slots provided for them and do not disturb the sand about the wall members, as there is no movement of the links except when stripping, either automatically

or mechanically. During the stripping, no binding pressure is imparted to the mountings of the links, as the wall members are free to move inwardly on them, if such change of position is necessary.

Having thus described my invention, what I claim is:

1. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto and movable toward and from the same, a base carried by the pedestal member at one end of the device, a support carried by a wall member at the other end of the device, said base and said support each providing a rest upon which the device may stand, and cooperating members carried by the pedestal and wall members effective to maintain the latter normally at their outer position when the device is standing.

2. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto and movable toward and from the same, a base carried by the pedestal member at one end of the device, a support carried by a wall member at the other end of the device, said base and said support each providing a rest upon which the device may stand, cooperating members effective to maintain the latter normally at their outer position when the device is standing, and an attaching member on the pedestal member whereby it may be engaged to effect relative movement of the wall and pedestal members.

3. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto and movable toward and from the same, a base carried by the pedestal member at one end of the device, a support carried by a wall member at the other end of the device, said base and said support each providing a rest upon which the device may stand, and cooperating members carried by the pedestal and wall members effective to maintain the latter normally at their outer position when the device is standing; the pedestal member being provided with an engaging portion whereby the device may be engaged to be lifted.

4. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto and movable toward and from the same, a base carried by the pedestal member at one end of the device, a support carried by a wall member at the other end of the device, said base and said support each providing a rest upon which the device may stand, and cooperating members carried by the pedestal and wall members effective to maintain the latter normally at their outer position when the device is standing; wall and pedestal

members being provided with attaching portions whereby they may be engaged to effect their relative movement, and said wall and pedestal members being provided also with engaging portions whereby they may be engaged to permit lifting of the device with the parts in normal position.

5. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto and movable toward and from the same, means preventing lateral displacement of the wall members on the pedestal member, a base carried by the pedestal member at one end of the device, a support carried by a wall member at the other end of the device, said base and said support each providing a rest upon which the device may stand, and cooperating members carried by the pedestal and wall members effective to maintain the latter normally at their outer position when the device is standing; wall and pedestal members being provided with attaching portions whereby they may be engaged to effect their relative movement, and said wall and pedestal members being provided also with engaging portions whereby they may be engaged to permit lifting of the device with the parts in normal position.

6. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto for movement longitudinally and to and from the same, the extremity of the pedestal member at one end of the device providing a base upon which the device may stand, the extremities of the wall members at the opposite end of the device providing a base upon which the device may stand, members on the pedestal and wall members cooperating when the device is in standing position to maintain the wall members normally at their maximum distance from the pedestal member, and attaching members on wall and pedestal members whereby they may be engaged to be moved.

7. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto for movement longitudinally and to and from the same, the extremity of the pedestal member at one end of the device providing a base upon which the device may stand in upright position, the extremities of the wall members at the opposite end of the device providing a base upon which the device may stand in inverted position, members on the pedestal and wall members cooperating when the device is in standing position to maintain the wall members normally at their maximum distance from the pedestal member, and members limiting the extent of relative movement of the wall and pedestal members.

8. A collapsible core bar comprising a

pedestal member, pattern wall members separately connected thereto for movement longitudinally and to and from the same, the extremity of the pedestal member at one
 5 end of the device providing a base upon which the device may stand in upright position, the extremities of the wall members at the opposite end of the device providing a base upon which the device may stand in
 10 inverted position, and members on the pedestal and wall members cooperating when the device is standing in upright or inverted position to maintain the wall members normally at their maximum distance from the
 15 pedestal member.

9. A collapsible core bar comprising a pedestal member, pattern wall members separately connected thereto for movement longitudinally and to and from the same,
 20 the extremity of the pedestal member at one end of the device providing a base upon which the device may stand, the extremities of the wall members at the opposite end of the device providing a base upon which the
 25 device may stand, members on the pedestal and wall members cooperating when the device is in standing position to maintain the wall members normally at their maximum distance from the pedestal member
 30 under the influence of gravity.

10. A collapsible core bar comprising a pedestal member, pattern wall members severally connected thereto and movable longitudinally and to and from the pedestal
 35 member, said members including portions for maintaining the device in standing position, and cooperating portions on the pedestal member and the wall members having contacting inclined faces, the angle of said
 40 inclined faces relative to the longitudinal axis of the device including the angle of repose of the relatively movable members.

11. A collapsible core bar comprising a pedestal member, pattern wall members severally connected thereto and movable longitudinally and to and from the pedestal
 45 member, said members including portions for maintaining the device in standing position, and cooperating portions on the pedestal member and the wall members having contacting inclined faces, and effective under
 50 the influence of gravity to maintain the wall members normally at their outermost position relative to the pedestal member.
 55 when the device is standing, the angle of said inclined faces relative to the longitudinal axis of the device including the angle of repose of the relatively movable members.

12. A collapsible core bar comprising a
 60 pedestal member, pattern wall members severally connected thereto and movable longitudinally and to and from the pedestal member, said members including portions for maintaining the device standing on end,
 65 and cooperating guiding portions on the

pedestal member and the wall members having contacting inclined faces, the angle of said inclined faces relative to the longitudinal axis of the device including the angle of repose of the relatively movable members, and the angle of inclination of guiding
 70 portions associated with certain wall members being greater than the angle of inclination of the guiding portions associated with other wall members.

13. A collapsible core bar comprising a pedestal member, pattern wall members associated therewith and movable longitudinally and to and from the pedestal
 75 member, said members including portions for maintaining the device in standing position, pivoted links connecting the wall and pedestal members, and cooperating portions on the pedestal member and the
 80 wall members having contacting inclined faces, the angle of said inclined faces relative to the longitudinal axis of the device including the angle of repose of the relatively movable members; the links
 85 connecting certain wall members to the pedestal member being longer than the links connecting other wall members to the pedestal member.

14. In a collapsible core bar, the combination of a pedestal member, pattern wall
 90 members freely supported on the pedestal and movable longitudinally relative thereto by pressures directed inwardly against the outer faces of the wall members, guide members, and operative connections joining
 95 the wall members severally to the pedestal member; said operative connections being arranged to permit movement of the wall members to and from the pedestal member during their relative longitudinal movement,
 100 and the guide members being arranged to permit different wall members to approach the pedestal member at different speeds.

15. In a collapsible core bar, the combination of a pedestal member, pattern wall
 110 members freely connected to the pedestal member and movably longitudinally relative thereto and to one another by pressures directed inwardly against the outer
 115 faces of the wall members, and operative connections joining the wall members to the pedestal member; said operative connections being disposed to guide the wall members to and from the pedestal member during
 120 their relative longitudinal movement, the connections associated with different wall members permitting different wall members to approach the pedestal member at different speeds.

16. In a collapsible core bar, the combination of a pedestal member, pattern wall
 125 members freely connected to the pedestal member and movable longitudinally relative to one another and the pedestal member by

pressures directed inwardly against the outer faces of the wall members, and operative connections joining the wall members to the pedestal member and disposed to guide the wall members to and from the pedestal member during their relative longitudinal movement, the connections associated with certain wall members permitting their movement toward the pedestal member ahead of other wall members.

17. In a collapsible core bar, the combination of a pedestal member, pattern wall members disposed in complementary arrangement and movable longitudinally relative to one another and the pedestal member by pressures directed inwardly against the outer faces of the wall members, and operative connections joining the wall members to the pedestal member and disposed to guide the wall members to and from the pedestal member during their relative longitudinal movement, the connections associated with certain wall members permitting their movement away from other wall members.

18. In a collapsible core bar, the combination of a pedestal member, pattern wall members supported thereon and movable longitudinally and to and from the pedestal member by pressures exerted inwardly upon the outer surfaces of the wall members, guiding members associated with the pedestal and wall members and having oblique cooperating faces for controlling the movement of the latter toward and from the former; the faces of guiding members associated with certain wall members having a greater degree of angularity than others for permitting a more direct approach to the pedestal member by some wall members than by others.

19. In a collapsible core bar the combination of relatively movable pattern wall members disposed in complementary arrangement about an axis, spacing means for varying the distance of said wall members from such axis, juxtaposed wall members having contacting over-lapping marginal portions, the margins of the exterior over-lapping portions tapering down to the surfaces which they contact and terminating short of the planes of the outermost faces of the wall members juxtaposed thereto.

20. In a collapsible core bar the combination of relative movable pattern wall members disposed in complementary arrangement about an axis, spacing means for varying the distance of said wall members from such axis, juxtaposed wall members having curved contacting over-lapping marginal portions, the margins of the exterior over-lapping portions terminating short of the planes of the tangent faces of the members having the internal over-lapping marginal portions.

21. In a collapsible core bar the combination of relative movable pattern wall members disposed in complementary arrangement about an axis, spacing means for varying the perpendicular distances of said wall members from such axis, juxtaposed wall members having contacting over-lapping marginal portions, the margins of the wall members bearing the exterior over-lapping portions tapering down to the outer faces of the wall members juxtaposed thereto.

22. In a collapsible core bar the combination of relative movable pattern wall members disposed in quadrilateral arrangement about an axis, spacing means for varying the distance of said wall members from such axis, juxtaposed wall members having contacting over-lapping marginal portions, the margins of the exterior over-lapping portions terminating short of the planes of the outermost faces of the wall members juxtaposed thereto.

23. In a collapsible core bar the combination of relatively movable pattern wall members disposed in quadrilateral arrangement about an axis, spacing means for varying the perpendicular distance of said wall members from such axis, juxtaposed wall members having contacting over-lapping marginal portions, the margins of the exterior over-lapping portions terminating short of the planes of the outermost faces of the wall members juxtaposed thereto.

24. In a collapsible core bar, the combination of relatively movable pattern wall members disposed in quadrilateral arrangement about an axis, spacing means for varying the perpendicular distance of said wall members from such axis, juxtaposed wall members having contacting over-lapping marginal portions forming curved corner patterns, the margins of the exterior over-lapping portions terminating short of the planes of the outermost faces of the wall members juxtaposed thereto.

25. In a collapsible core bar, the combination of a plurality of relatively movable pattern wall members disposed in complementary arrangement, spacing means operable to vary the perpendicular distance of wall members from each other, juxtaposed wall members having contacting over-lapping marginal portions, the distance between the external over-lapping margins of a wall member being less than the parallel distance between the adjacent outer surfaces of wall members juxtaposed thereto.

26. In a collapsible core bar, the combination of a plurality of relatively movable pattern wall members disposed in quadrilateral arrangement, spacing means operable to vary the distance of opposite wall members from each other, certain wall members having marginal extensions over-lapping the margins of the juxtaposed wall members

the width of the wall members having said marginal extension being less than the distance between the outer surfaces of wall members perpendicular thereto.

27. In a collapsible core bar, the combination of a plurality of relatively movable pattern wall members disposed in quadrilateral arrangement, spacing means operable to vary the distance of opposite wall members from each other, juxtaposed wall members having curved contacting over-lapping marginal portions, forming rounded corners on the pattern wall, the margins of the members having the external over-lapping portions being within the span of the outer surfaces of wall members disposed perpendicular thereto.

28. In a collapsible core bar, the combination of a pedestal member, relatively movable pattern wall members arranged in complementary relationship around the pedestal member, and hinged connections joining the pedestal and the wall members, the wall members being movable upon said hinged connections toward the pedestal member.

29. In a collapsible core bar, the combination of a pedestal member, relatively movable pattern wall members arranged in complementary relationship around the pedestal member, and rigid links pivoted on the pedestal member and cooperating with the wall members to limit outward and lateral movement thereof, the wall members being movable longitudinally on said links.

30. In a collapsible core bar, the combination of a pedestal member, relatively movable pattern wall members freely supported upon the pedestal member, and operable by inwardly directed pressure upon the wall members to permit movement of the wall members obliquely toward the pedestal member.

31. In a collapsible core bar, the combination of a pedestal member, pattern wall members arranged in complementary relationship around the pedestal member and having relative longitudinal movement, operative guiding connections between the pedestal and the wall members operable by inward pressure upon the latter to effect movement of the wall members obliquely toward the pedestal member, and members on wall and pedestal members whereby they may be engaged to effect their relative movement.

32. In a mold device, a collapsible core bar comprising the combination of a plurality of relatively movable pattern wall members disposed in quadrilateral arrangement about an axis, spacing means operable to vary the perpendicular distance of wall members from the axis, the wall members disposed in the shorter cross-sectional dimension of the mold having marginal extensions forming corner patterns contacting

with and over-lapping marginal portions of juxtaposed wall members, and members retaining the wall members against lateral movement.

33. In a collapsible core bar, the combination of a pedestal member, relatively movable pattern wall members of different widths arranged in complementary relationship around the pedestal member and movable to and from the same, guiding members associated with the pedestal and the wall members having angular relationship to control their special relationship, the guiding members permitting movement of the wider wall members ahead of the narrower wall members and means connecting the wall members to the pedestal member effective to prevent lateral displacement of the former on the latter.

34. In a collapsible core bar, the combination of a pedestal member, longitudinally movable pattern wall members arranged in polyhedral relationship around the pedestal member and movable independently to and from the same, guiding members associated with the pedestal and the wall members for guiding the latter toward and from the former independently of one another, and members associated with the wall and pedestal members effective to prevent lateral displacement of the former upon the latter.

35. In a collapsible core bar, the combination of a pedestal member relatively movable pattern wall members supported thereon for movement longitudinally and to and from the pedestal member, guiding members associated with the pedestal and wall members for controlling the movement of the latter toward and from the former, link pockets provided on the pedestal member, links pivotally seated in said pockets and connected to the wall members to permit inward movement of the latter upon the links and limit the outward movement of said wall members and means cooperating with the links to retain them against lateral movement.

36. In a collapsible core bar, the combination of a pedestal member, relatively movable pattern wall members supported thereon for movement longitudinally and to and from the pedestal member, guiding members associated with the pedestal and wall members for controlling the movement of the latter toward and from the former, link pockets provided on the pedestal member, links pivotally seated in said pockets and pivotally connected to the wall members, and means between the pivotal connections of the links for limiting their lateral movement.

37. In a collapsible core bar, the combination of a pedestal member, pattern wall members supported thereon in polyhedral arrangement for movement longitudinally and

to and from the pedestal member, guiding members associated with the pedestal and wall members for controlling the movement of the latter toward and from the former, and marginal extensions on certain of the wall members extending angularly from the normal planes thereof and over-lapping and contacting with the marginal portions of the wall members juxtaposed at each side thereof, said extensions being disposed on the wall members which extend in the lesser cross-sectional dimension of the mold.

38. In a mold, a collapsible core bar comprising the combination of pattern wall members supported in polylateral arrangement about an axis for movement longitudinally and to and from the axis, spacing means associated with the wall members for controlling their movement toward and from the axis and marginal extensions extending angularly from the wall members disposed in the lesser cross-sectional dimension of the mold and over-lapping the juxtaposed wall members; said spacing means enabling inward movement of such juxtaposed wall members in advance of such movement of the wall members carrying the marginal extensions.

39. In a collapsible core bar, the combina-

tion of a spacing member, pattern wall members movable toward and from the axis of the spacing member arranged around the spacing member, based portions disposed at opposite ends of the device upon which it may stand upright, and operative guiding connections between the spacing and the wall members whereby the latter are maintained normally in complementary relationship by gravity when the device is standing on either end.

40. In a collapsible core bar, the combination of a pedestal member, relatively movable pattern wall members arranged in complementary relationship around the pedestal member and movable to and from the same, associated means on the pedestal and wall members for maintaining the latter at a maximum distance from the former by gravity when the device is standing upright, a pedestal portion extending beyond the wall portions at one extremity of the device to afford a base upon which the device may stand, and a wall member portion extending beyond the pedestal member at the other extremity of the device to provide a base upon which the device will stand upright.

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