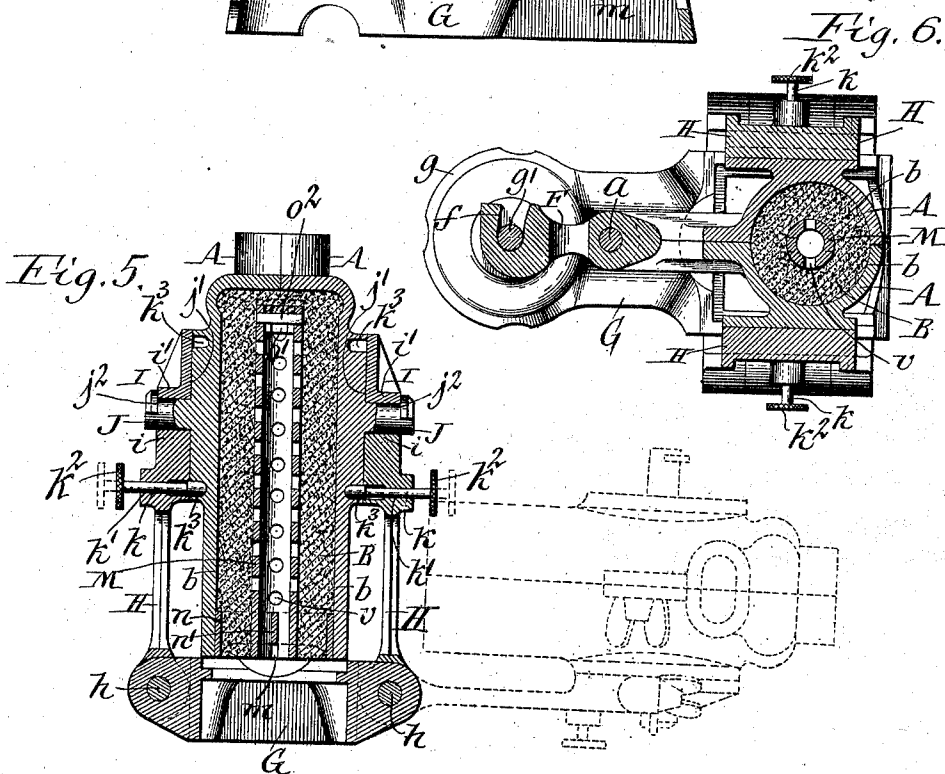
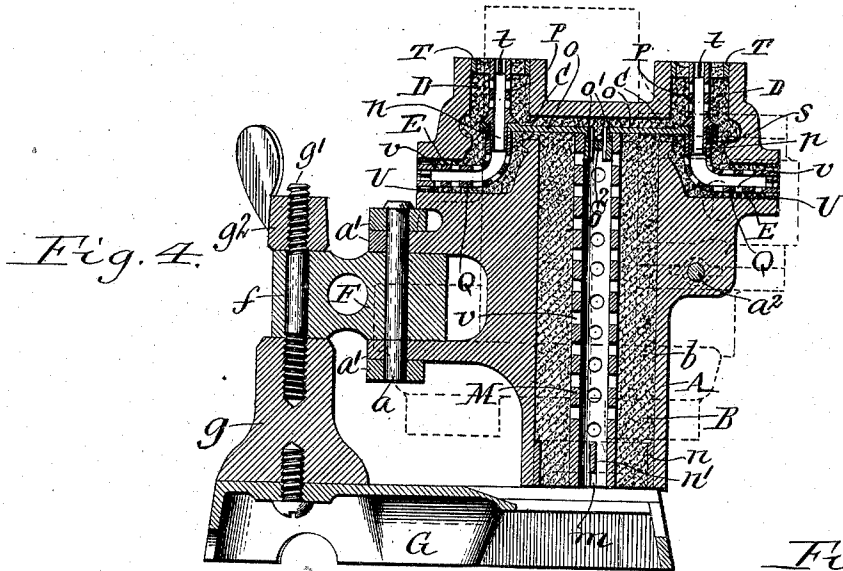


P. F. WOODS.
CORE MAKING MACHINE.
APPLICATION FILED MAR. 2, 1909.

967,479.

Patented Aug. 16, 1910.

3 SHEETS—SHEET 2.



Witnesses:
Richard Soumel.
John H. Shormaker

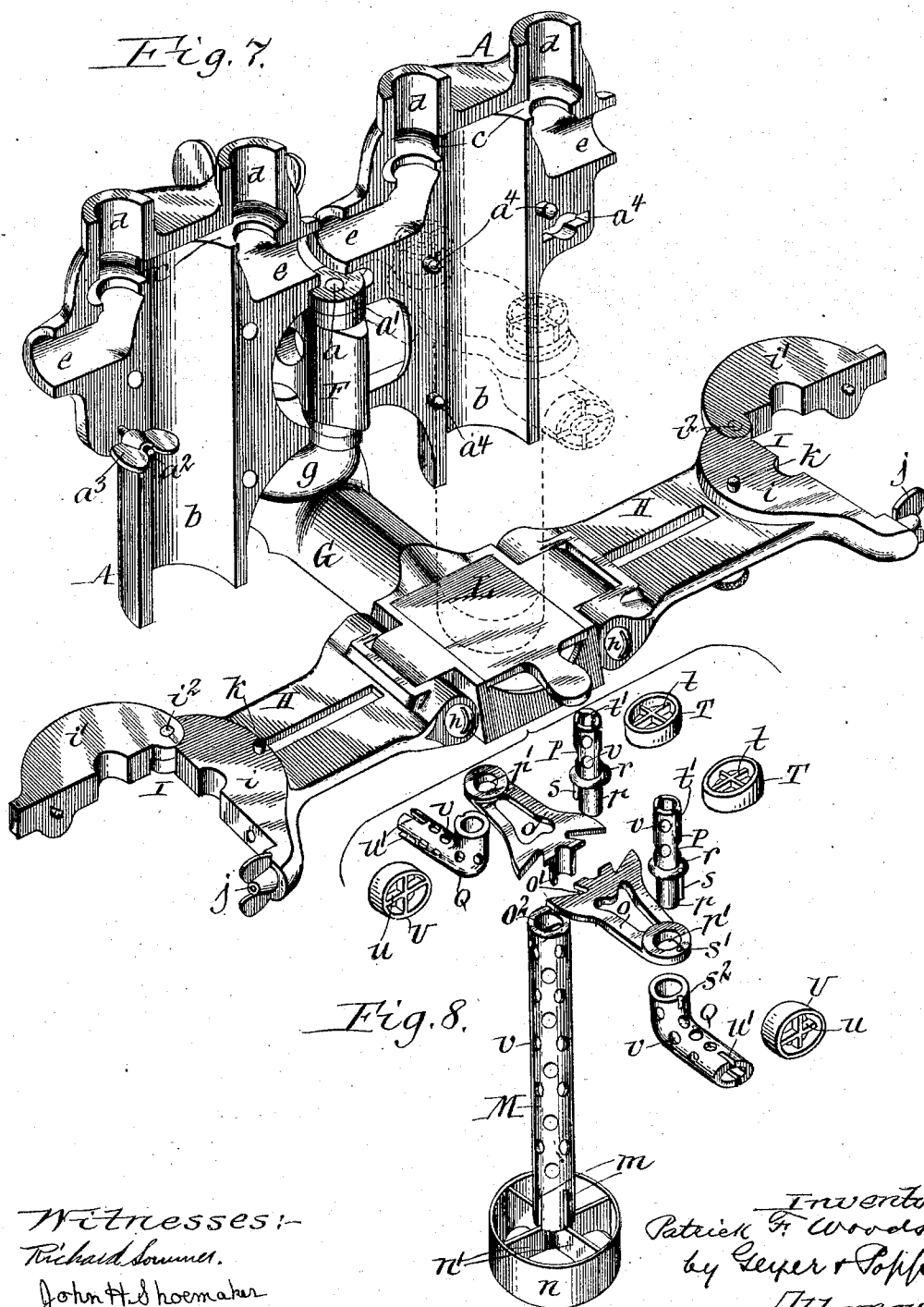
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UNITED STATES PATENT OFFICE.

PATRICK F. WOODS, OF BUFFALO, NEW YORK.

CORE-MAKING MACHINE.

967,479.

Specification of Letters Patent.

Patented Aug. 16, 1910.

Application filed March 2, 1909. Serial No. 480,895.

To all whom it may concern:

Be it known that I, PATRICK F. WOODS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Core-Making Machines, of which the following is a specification.

This invention relates more particularly to a machine for making green sand cores for molds in which cylinders of internal combustion or gas engines are cast, but which may also be used for making cores suitable for producing other articles and also for producing dry sand cores of various forms.

The object of this invention is to provide a machine of this character which permits of producing better cores at lower cost, in less time and with an expenditure of a minimum amount of labor.

In the accompanying drawings: Figure 1 is a side elevation of my improved core making machine. Fig. 2 is a top plan view thereof. Fig. 3 is a front elevation of the same. Fig. 4 is a vertical longitudinal section of the machine taken in line 4—4, Fig. 2. Fig. 5 is a vertical cross section in line 5—5, Fig. 2. Fig. 6 is a horizontal section taken in line 6—6, Fig. 1. Fig. 7 is a perspective view showing the parts of the machine thrown open. Fig. 8 is a perspective view of the core arbor sections detached from each other.

Similar letters of reference indicate corresponding parts throughout the several views.

A, A represent the two sections of a core box, the inner opposing sides or surfaces of which may be constructed to form a core of any desired shape but which, in the representation in the drawings, are constructed to form a core for internal combustion or gas engines. In this example the inner sides of the core box sections are provided with main cylindrical cavity sections *b, b* in which the body B of the cylinder core is produced, two pairs of branch cavity sections *c, c* which extend laterally from the upper end of the body cavities and in which the branch portions C of the core are formed, two pairs of bonnet cavity sections *d, d* which extend upwardly from the branch cavity sections and in which the core portions D, D for the valve bonnet openings are formed, and two pairs of inlet and out-

let cavity sections *e, e* which extend downwardly and laterally from said branch cavities and in which the core portions E, E for the full inlet and exhaust or outlet are formed.

The lower end of the body portion, the upper ends of the bonnet portions and the lateral ends of the inlet and outlet portions of the cavity in the core box sections open to the exterior, so as to permit of introducing the molding sand or material into the core box at these places for producing the core therein.

The core box sections are hinged or pivotally connected, so that the same can be opened and closed, this being preferably effected by means of a pintle *a* extending lengthwise through corresponding ears or lugs *a'* on the rear sides of the core box sections. The front or free ends of the core box sections are detachably connected by means of a clamping screw *a''* arranged on one core box section and having a screw nut *a'''* which is adapted to pass through an opening *a'''* of the other section and bear against the outer side of the same. Dowels *a''''* are also provided on the opposing joint surfaces between the core box sections for keeping the latter in place relatively to each other.

For the purpose of permitting the core box sections to be swung horizontally into an open or closed position to permit of removing the finished core therefrom in an upright position, the pintle *a* of the same is mounted on the front end of a swivel supporting arm F which latter is supported at its rear end on the upper end of a post *g* rising from the rear part of the base G of the machine. The connection between the swivel arm F and the post *g* is detachable to permit of other manipulations of the core box to be hereinafter described. This detachable connection preferably consists in constructing the rear part of the swivel arm in the form of a hook the mouth *f* of which opens laterally and receives a bolt or pin *g'* at the upper end of the post, the hook of said arm when in use being clamped between the upper end of the post engaging with the underside of the hook and a screw nut *g''* working on the upper threaded end of said pin *g'* and engaging with the upper side of said hook, as shown in Figs. 1, 2 and 4.

While filling and ramming the sand or

other material into the several openings of the core box for forming a core therein, the swivel arm is detached from the post *g* and in its stead the box is supported so as to be
 5 capable of vertical rotation in a direction lengthwise of the machine for the purpose of bringing each core box opening to the top and permit of conveniently filling and ramming sand into the same and producing a
 10 firm core therein. The means which thus support the core box during the filling and ramming operation are also preferably so constructed that the box after the core in the same is completed can be laid down in a
 15 horizontal position either on one of its sides or sections or the other according to the character of the core which is being made. The means for thus mounting the core box comprises two standards or upright arms
 20 *H*, which are pivoted by horizontal pins *h* or otherwise at their lower ends to opposite sides of the front part of the base so as to be capable of swinging vertically in a plane at right angles to the length of the machine
 25 either into an upright position, as shown in Figs. 1, 3 and 5, or into a horizontal position, as shown by full lines in Fig. 7 and by dotted lines in Fig. 5. At the upper ends of the standards the same are provided with
 30 divided bearings *I*, *I*, respectively, in which are journaled trunnions *J*, *J* arranged on the opposite outer sides of the core box sections, so that the latter can turn vertically in a direction lengthwise of the machine.
 35 Each of the bearings *I* comprises a lower part *i* fixed on the upper part of the respective standard and a movable upper part *i*¹ which is pivoted by a pin *i*² at one end to the standard, so as to swing toward
 40 and from the fixed lower section while its opposite end is detachably connected with the standard by a fastening which preferably consists of a turn button *j* arranged on
 45 the front part of the standard and engaging over the adjacent front part of the upper bearing section *i*¹. While the core box is thus journaled on a standard, the same is held against movement relatively thereto in a direction lengthwise of the axis of the re-
 50 spective trunnion, this being preferably effected by providing each trunnion with inner and outer shoulders *j*¹, *j*² which engage against the inner and outer sides of the companion bearing on the standard, as shown in
 55 Fig. 5.

When the core box is supported by the swivel arm the standards may be moved laterally with their bearings into and out of engagement with the trunnions of the core
 60 box. To permit of such movement of the standards the outer shoulder *j*² of each trunnion extends only across one half or less of the trunnion, and this part is arranged on top of the trunnion when the core box is in
 65 position to be engaged with or disengaged

from the bearing of the respective standard. The outer shoulders of the trunnions are preferably so located relatively to the core box that these shoulders are arranged on the upper side of the trunnions when the greater
 70 or heavier part of the box is below the trunnions at which time the box which remains in position by gravity and requires no special means for holding it in place while coupling or uncoupling the same from one
 75 or the other standard or from both.

Preparatory to forming a core, the two sections of the box are closed and coupled by the clamping device on the front sides of
 80 its sections and the trunnions thereof are seated in the bearings of the standards, and the swivel arm at the rear side of the box is disconnected from the rear posts. While the core box is thus supported the same may be
 85 turned vertically for bringing each of its openings successively to the top, as shown by dotted lines in Figs. 1 and 4, and thereby permit of conveniently filling the core material into the box and ramming the same tight. The core box is held firmly in the
 90 several positions into which it is rotated about its trunnions by means of retaining or holding means which may be variously constructed, the means for this purpose shown in the drawings being suitable and
 95 consisting of locking bolts or catch pins *k* slidable horizontally in guide openings *k*¹ in the standards and each provided at its outer end with a finger piece or handle *k*² while its inner end is adapted to engage with
 100 one or the other of an annular row of recesses or seats *k*³ formed in the adjacent inner shoulder *j*¹ of the respective core box section.

The recesses *k*³ are so arranged relatively
 105 to the openings in the core box that one of said recesses is in line with its locking bolt and may be engaged by the latter for holding the box against turning on its trunnions when the corresponding opening of the box
 110 is uppermost and in position for receiving the core material and ramming tools.

After the core box has been turned the required extent for bringing all of its open-
 115 ings uppermost and the core material has been filled and rammed into the same from all sides until the core is completed, then the box is returned to its initial position in which its heaviest part is lowermost. If the core is of such a character that it can
 120 stand up on its lower end without liability of breaking up, the core may be removed from the box and permitted to rest at its lower end on a supporting plate or tray *L* or other suitable support preparatory to
 125 being inserted into the flask to complete the mold for which it is intended. This supporting plate is not in use while the core box is being rotated and filled with molding material but after the core is completed and
 130

the box is returned to its normal position, the supporting plate is placed horizontally on the front part of the base and underneath the lower end of the box and the core therein, so as to form a support for the latter, as shown in Fig. 7. After the supporting plate has been thus placed underneath the core box and core, the swivel arm is first connected with the rear post of the base, then both standards are detached from the trunnions of the box and swung vertically downwardly away from opposite sides of the same, and then the sections of the box are disconnected and swung horizontally away from opposite sides of the core, as shown by full lines in Fig. 7, leaving the finished core standing on the supporting plate L, as shown by dotted lines in the same figure. The core may now be transferred by any suitable means and assembled with other parts of the mold in a flask preparatory to casting the article to be made.

The character of the core may not permit of standing it up on end, or for other reasons it may be more desirable to withdraw the core from the box while the same is lying lengthwise in a horizontal position. To remove the core from the box in this last mentioned position, the swivel arm of the box is not connected with the post *g* after the core is completed. Instead, however, one of the standards is disconnected from one of the trunnions while the other standard remains connected with the other trunnion. The box together with the core therein may now be turned over with the attached standard into a horizontal position, as indicated by dotted lines at the right hand side of Fig. 5. While in this lowered horizontal position the core is removed in any suitable manner and transferred to the molding flask.

If dry cores are made in this machine the same are first baked in a well known manner before placing them in a flask.

To facilitate the removal of dry sand cores from the core box preparatory to baking them, the core box together with one of the standards is first laid down into a horizontal position. The upper half of the box is then removed from the lower half by withdrawing the pintle *a* connecting the same. A core drier or shell, such as are commonly used in foundries, is then placed over the exposed upper half of the core after which the shell, core and lower core box section are rolled half way over to cause the core to lie in the drying shell when the same can be readily transported to the oven for baking.

When it is desired to produce green sand cores by the use of this machine, a core arbor of appropriate construction is placed within the core box before the sand is introduced into the same, so as to form a support for the sand while the core is being handled

and also to prevent disintegration thereof in the flask. Various forms of arbors may be used for this purpose, but that shown in the drawings is particularly suitable for making the core of a gas engine cylinder corresponding to the core box shown in the drawings and is constructed as follows:—

M represents a main arbor section which is of tubular form and adapted to be arranged centrally and lengthwise in the main cylindrical cavity of the core box. This main arbor section is supported at its lower end with the box by means of an annular print head or ring *n* which fits the bore of the main box cavity flush with the lower end thereof and is provided with a plurality of cross arms *n*¹ which engage detachably with longitudinal slots *m* formed in the main arbor section and extending upwardly from the lower edge thereof, as shown in Figs. 4, 5 and 8.

o, *o* represent two horizontal arbor sections having preferably the form of flat wings or arms which project laterally from the upper end of the main arbor section and which are arranged in the branches of the core box cavity. These arms or wings are detachably connected with the main arbor section by means of two curved stem sections *o*¹, *o*¹ which project downwardly from the inner ends of the arms *o*, *o* into the upper end of the main arbor section. These arms are held against turning horizontally on the main arbor section by means of a pin *o*² which extends transversely across the upper part of the main section and which is engaged on opposite sides by the stems *o*¹ of the arbor arms, as shown in Figs. 4 and 5. At the outer ends of the arm section *o* the same support upright auxiliary sections or heads P of tubular form which are arranged in the bonnet cavities of the core box and also depending auxiliary sections or tails Q of tubular form which are arranged, respectively, in the inlet and outlet cavities of the core box. The head and tail of each arbor arm are connected with each other and with the respective arm by means of a tubular shank *p* arranged at the lower end of the head and passing downwardly through an eye or opening *p*¹ in the outer end of the arbor arm and into the inner upper end of the respective lower arbor tail, as shown in Fig. 4. The head is provided with a shoulder or collar *r* which is adapted to bear against the top of the arbor arm and the upper inner end of the arbor tail is adapted to bear against the underside of said arm, thereby causing these parts to be held in their proper relative position when assembled. The companion head, tail and arm are prevented from turning relatively to each other by means of a key or pin *s* arranged on the collar of the head and pass-

ing through an opening s^1 in the arbor arm and a recess s^2 in the respective tail, as shown in Fig. 4.

Each of the heads is held centrally in the bonnet cavity of the core box by a centering and supporting ring T which fits into the bore of the respective bonnet cavity flush with the outer end thereof and is provided with transverse arms or cross pieces t which enter longitudinal slots t^1 formed in the arbor head and extending downwardly from the upper end thereof. At its outer end each arbor tail is supported and centered in the respective arbor cavity by means of a centering and supporting ring U which fits into the bore of the respective cavity flush with the outer end thereof and provided with cross arms or pieces u which engage with longitudinal slots u^1 formed in the respective arbor tail and extending inwardly from the outer end of the same, as shown in Figs. 4 and 8.

The fit between the several parts of the arbor and the interior of the core box is sufficiently close or snug so that the same remain in place relatively to each other and the core box and will not become displaced when the sand for the core is introduced into the box and rammed therein.

The tubular main section and the heads and tails of the arbor are provided with a plurality of openings v in their sides which enable the sand to anchor itself on the arbor and be held firmly in place thereby. By extending the tubular members of the arbor to the ends of the filling openings and providing these members with the openings v the interior of the core is vented and permits a free escape of the gases from the center of the flask during the operation of casting, thereby insuring the production of perfect castings.

After the metal has been poured into the mold and the casting is completed, the several parts of the arbor are detached from each other, so as to permit the same to be removed from the casting and used over again in making another green sand core.

The supporting and centering rings of the arbor serve as prints to support the core in the prints of the molding flask. These prints of the arbor are outside of the cavity of the flask, so that none of the poured metal of the casting will adhere to the same.

By the use of my improved machine for green sand cores it is possible to make smoother, better and closer grained casting than has been produced heretofore, no fins or joints being present in the castings, thereby effecting a considerable saving of labor both in sand and machine work which has heretofore been necessary to render the casting suitable for use. The possibility of making green sand cores for cored castings of motor cylinders reduces the cost and labor

as compared with the use of dry sand cores for this purpose such as the extra handling, in baking, pasting and drying joints, lead washing &c. which are unavoidable expenses in the present system of using dry sand cores.

Core boxes such as now in common use in foundries can be used in this machine by simply providing the sections of the same with trunnions suitable for use in connection with the standard bars, so as to permit of turning the same and presenting each opening to the filling position. By this means workmen are relieved of lifting the heavy core boxes and enables them to produce a better and larger amount of work with the expenditure of less labor. The liability of breaking the cores after the same are finished is also avoided as well as wear and tear on the core boxes the latter being frequently the cause of defective castings.

I claim as my invention:

1. A core making machine comprising a base having a post, a sectional core box, an arm to which the sections of the core box are pivoted and which is provided with a hook and a clamping device arranged on said post and adapted to receive said hook.

2. A core making machine comprising a sectional core box, and a vertically swinging standard on which said box is pivoted.

3. A core making machine comprising a sectional core box, and a vertically swinging standard having a separable bearing in which said box is journaled.

4. A core making machine comprising a sectional core box having a trunnion, and a vertically swinging standard having a separable bearing in which the trunnion of said box is journaled.

5. A core making machine comprising a sectional core box, and a pair of vertically swinging standards in which said box is pivoted.

6. A core making machine comprising a sectional core box having trunnions on its opposite sides, and a pair of vertically swinging standards provided with separable bearings in which said trunnions are journaled.

7. A core making machine comprising a sectional core box having trunnions each provided with inner and outer shoulders, said outer shoulder extending only across one side of said trunnions, and a pair of standards pivoted to swing laterally toward and from the opposite sides of said box and provided with separable bearings in each of which one of said trunnions is journaled between its shoulders.

8. A core making machine comprising a sectional core box, a standard on which said box is pivoted, and a lock for holding said box in different positions on the standard.

9. A core making machine comprising a

sectional core box, a standard on which said box is pivoted, and a lock for holding said box in different positions on the standard comprising a bolt slidable on the standard and adapted to engage with one of a series of recesses in the core box.

10. A core making machine comprising a separable core box, and means constructed to permit laying the box on its side or turning any part of the same upward.

11. A core making machine comprising a separable core box, a support to which the sections of the box may be pivoted for turning the same horizontally toward and from each other, and a vertically swinging support on which said core box is adapted to be mounted.

12. A core making machine comprising a separable core box, a support to which the sections of the box may be pivoted for turning the same horizontally toward and from each other, and two vertically swinging supports on either of which said box is adapted to be mounted.

13. A core making machine comprising a separable core box having trunnions on its opposite sides, a support on which the sections of said box are adapted to be pivoted for horizontally swinging movement, and a pair of standards pivoted to swing vertically toward and from opposite sides of the core box and each provided with a separable bearing in which one of said trunnions is journaled.

14. A core making machine comprising a sectional core box, and an arbor comprising a tubular main section, an arm detachably connected with said main section, and an auxiliary tubular section detachably connected with said arm.

15. A core making machine comprising a sectional core box, and an arbor comprising a tubular main section, an arm detachably connected with said main section and two auxiliary tubular sections detachably con-

nected with the upper and lower sides of said arm.

16. A core making machine comprising a sectional core box, and an arbor comprising a tubular main section, an arm detachably connected with said main section and provided with a socket, and two auxiliary tubular sections arranged above and below the arm, respectively, and detachably connected therewith by means of a shank arranged on the auxiliary sections and passing through said socket into the other auxiliary section.

17. A core making machine comprising a sectional core box, and an arbor comprising a tubular main section, an arm detachably connected with said main section and provided with a socket, and two auxiliary tubular sections arranged above and below the arm, respectively, and detachably connected therewith by means of a shank arranged on the auxiliary sections and passing through said socket into the other auxiliary section and means for preventing said auxiliary sections from turning on said arm.

18. A core making machine comprising a sectional core box, and an arbor comprising a tubular main section, an arm detachably connected with said main section and provided with a socket, and two auxiliary tubular sections arranged above and below the arm, respectively, and detachably connected therewith by means of a shank arranged on the auxiliary sections and passing through said socket into the other auxiliary section and means for preventing said auxiliary sections from turning on said arm, consisting of a key arranged on one auxiliary section and engaging openings in said arm and the other auxiliary section.

Witness my hand this 23rd day of February, 1909.

PATRICK F. WOODS.

Witnesses:

THEO. L. POPP,
ANNA HEIGIS.