Feb. 4, 1930. J. S. THOMPSON 1,745,515

PERMANENT MOLD FOR MAKING CASTINGS

Filed April 9, 1926 5 Sheets-Sheet 1

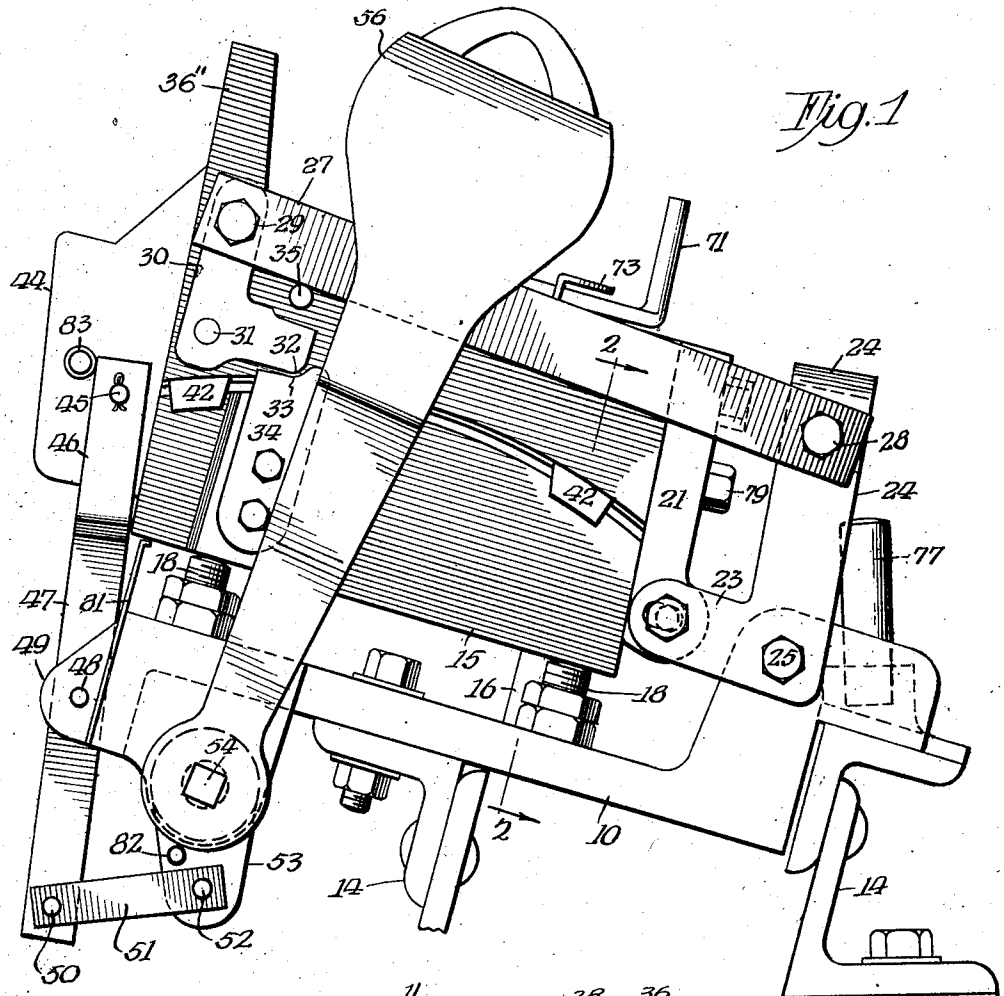

Fig. 1

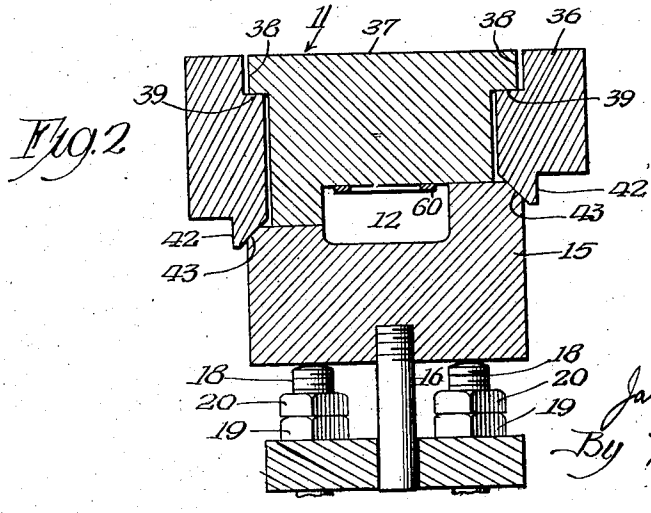

Fig. 2

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PERMANENT MOLD FOR MAKING CASTINGS

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Fig. 3

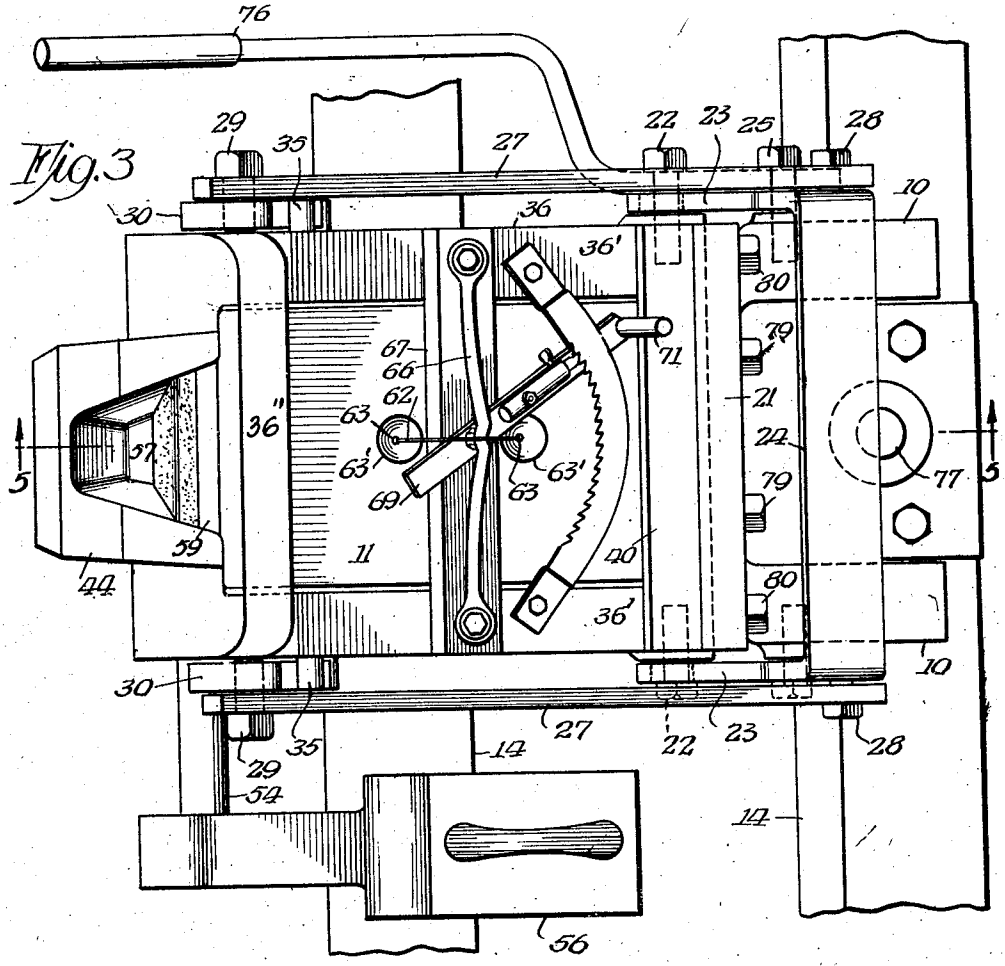

Fig. 4

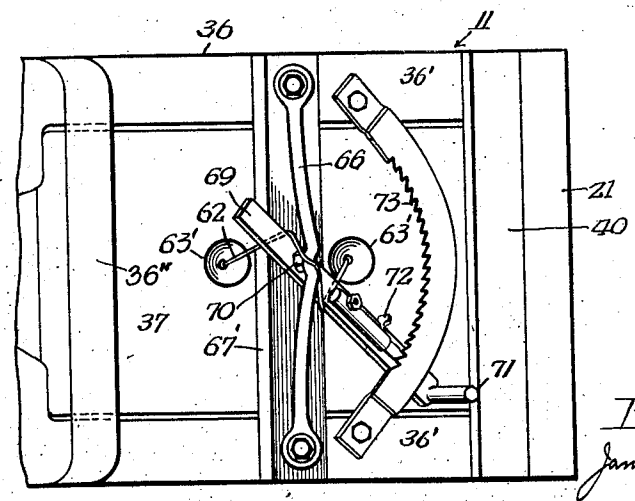

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Fig. 5

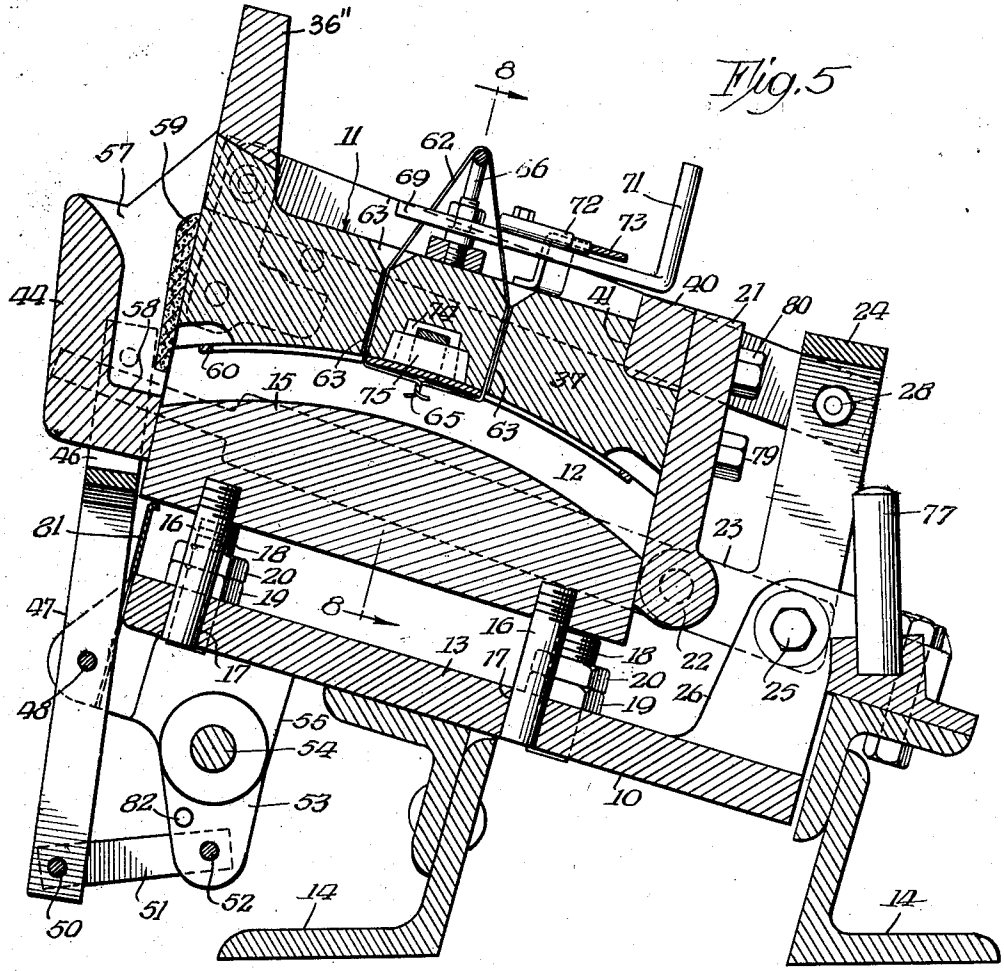
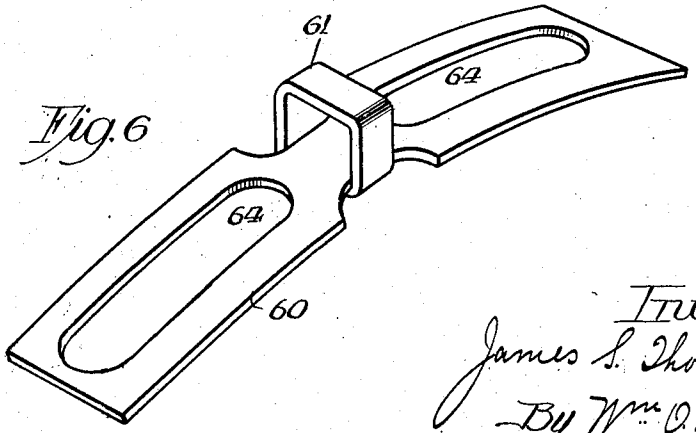


Fig. 6



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PERMANENT MOLD FOR MAKING CASTINGS

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Fig. 7

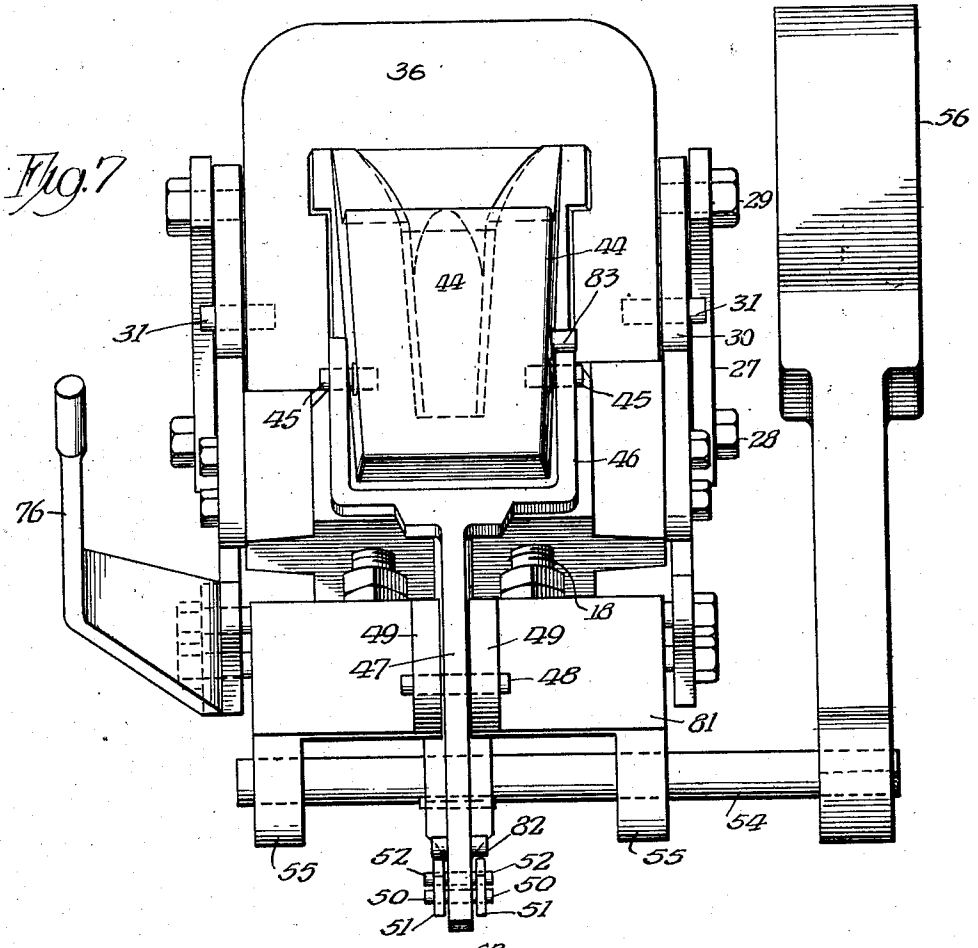
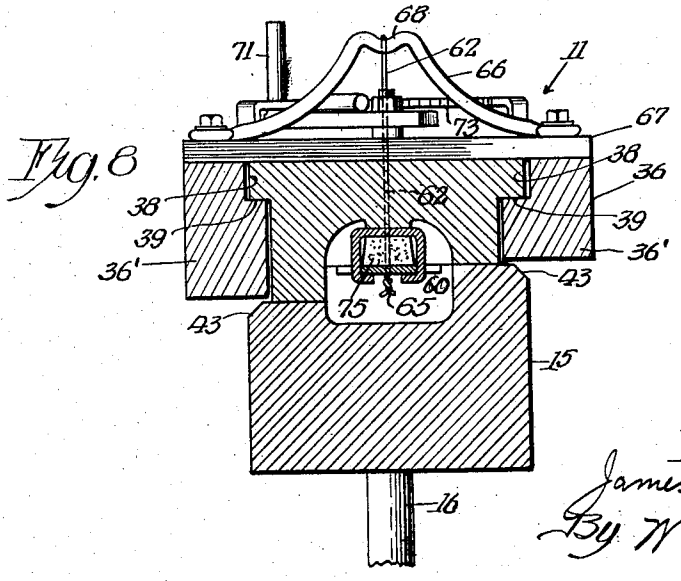


Fig. 8



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PERMANENT MOLD FOR MAKING CASTINGS

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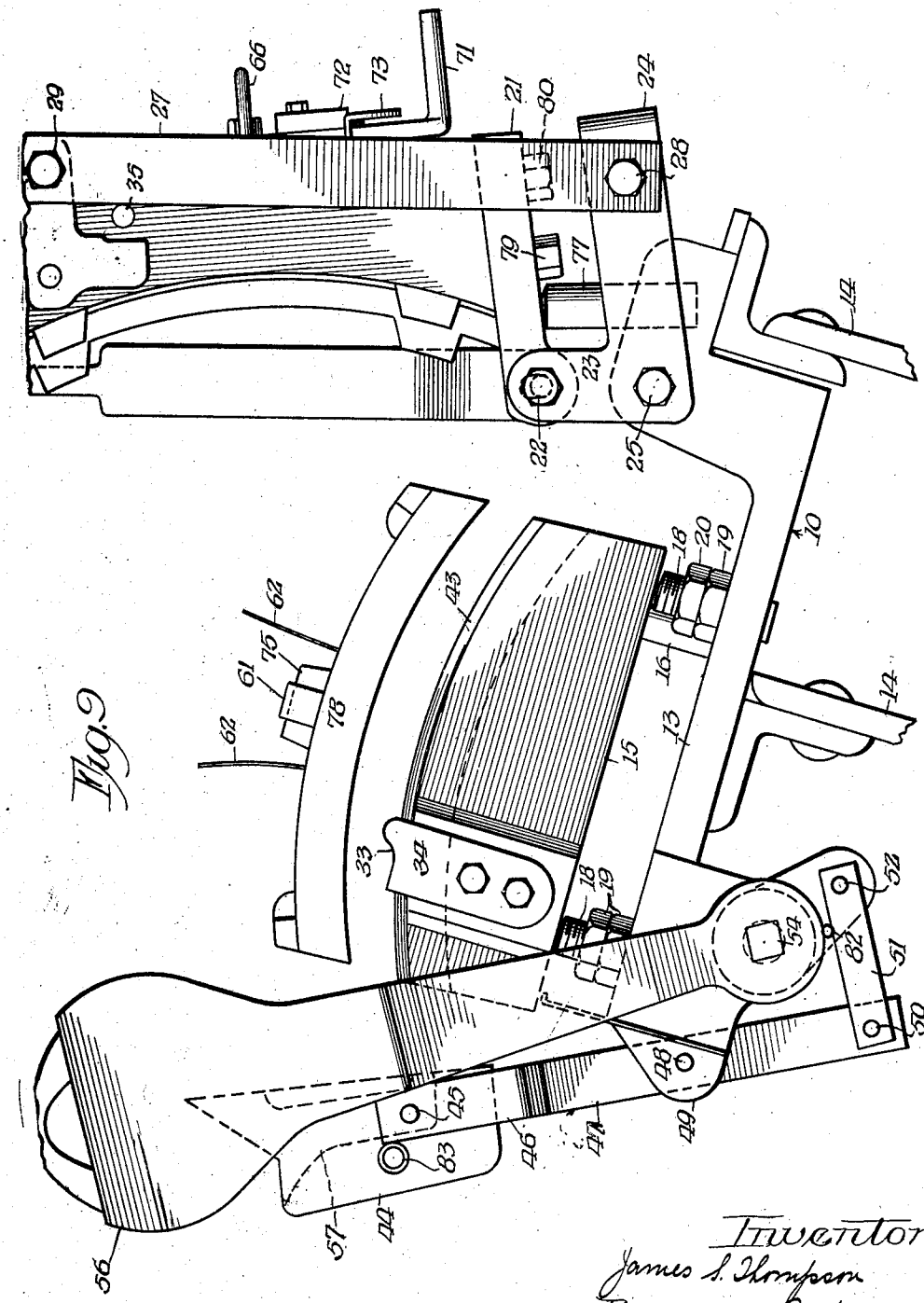

Fig. 2

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UNITED STATES PATENT OFFICE

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PERMANENT MOLD FOR MAKING CASTINGS

Application filed April 9, 1926. Serial No. 100,821.

This invention relates to permanent molds for making castings and to improvements on the inventions set forth in my Patent No. 1,552,247 patented September 1, 1925 and Patent No. 1,588,209, June 8, 1926.

The invention has for its object to simplify the construction, to increase the efficiency and to lessen the labor required for operating a permanent mold in making castings.

More specifically the invention has for its objects to lighten the weight and to dispose and balance the parts of the mold whereby to reduce the labor and promote the convenience of operating the mold; to provide improved means for securing in the mold cavity parts to be embedded in the casting and to secure these parts in fixed position so that they will not be displaced in closing the mold or in pouring the metal; to provide for quickly changing the drag liner for making different castings and for easily and accurately adjusting the liner in proper position in the mold; to provide a removable cope liner; to provide a pivoted pouring gate and means whereby it can be easily swung to open position clear of the sprue and returned to closed position when the cope is lowered onto the drag; and to construct the mold and to arrange the operating means so that the mold can be opened and closed by one man located at the back of the mold, or by one at the back and one at the front.

In the accompanying drawings illustrating a selected embodiment of the invention which I have found entirely satisfactory for commercial use in making brake shoes:

Fig. 1 is a side elevation of the mold.

Fig. 2 is a transverse sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a plan view with the supporting wire tightening means in initial position.

Fig. 4 is a detail plan view showing the supporting wire tightening means in final position.

Fig. 5 is a longitudinal sectional view on the line 5—5 of Fig. 3.

Fig. 6 is a detail perspective view of the insert which is supported in the mold cavity for embedment in the casting of a brake shoe.

Fig. 7 is a front elevation of the mold.

Fig. 8 is a transverse sectional view on the line 8—8 of Fig. 5.

Fig. 9 is a side elevation similar to Fig. 1, showing the mold in open position and a completed brake shoe as made in the mold.

Referring to the drawings the mold comprises a drag 10 and a cope 11 having a mold cavity 12 therein adapted for casting a brake shoe. The drag is in skeleton form and comprises a shell 13 which is arranged in inclined position and is mounted upon supporting rails 14, which constitute the base for the mold. A drag liner 15 is removably mounted on the shell 13 of the drag and it is provided with centering pins 16 adapted to enter openings 17 in the shell for positioning the drag liner on the shell. Two pairs of bolts 18 provided with nuts 19 and lock nuts 20 are arranged on the shell to form supports for the drag liner. These bolts can be adjusted as required to properly position the drag liner with relation to the cope and also to accommodate different drag liners.

The rear end 21 of the cope forms one end of the mold cavity and it extends down to a position behind the drag liner where it is pivoted at 22 to the forwardly projecting arms 23 of the bell crank yoke 24, which is pivoted at 25 to the upstanding lugs 26 on the shell 13 of the drag. Parallel links 27 are pivoted at 28 at their rear ends to the bell crank yoke 24 and at 29 at their front ends to the upper ends of the bell crank levers 30 which are pivoted at 31 on the sides of the cope at the front thereof. The rearwardly projecting arms of the bell crank levers 30 have rounded bearing surfaces 32 arranged to engage complementary bearings 33 on the bearing plates 34 which are fastened on the sides of the drag, being here shown conveniently bolted to the drag liner 15. Pins 35 are fixed in the cope above the bearing arms of the bell crank levers 30, and these pins project only a short distance from the sides of the cope so that they will be engaged by said arms, but will be cleared by the links 27 (Fig. 3). The cope can con-

veniently be made in skeleton form comprising a shell 36 having two sides 36′ and an arched front 36″, and it is adapted to receive a removable cope liner 37. The cope liner has shoulders 38 on its sides to engage ledges 39 on the cope shell. A projection 40 on the front of the end piece 21, which constitutes the rear end of the cope as well as the rear end of the cope shell, is seated in a recess 41 in the cope liner. The cope liner 37 and the drag liner 15 have the mold cavity 12 formed in their opposing faces with the parting line of the mold cavity disposed to permit the cope to be freely removed from the drag after the casting has been made. I provide tapered lugs 42 on the cope shell to engage beveled edges 43 on the drag liner, so that when the cope is lowered into position upon the drag liner the lugs on the cope shell engaging the beveled edges on the drag liner will register the cope in proper position on the drag liner.

The pouring gate 44 is pivoted at 45 upon the forked upper end 46 of a lever 47 which is pivoted at 48 upon lugs 49 on the drag shell 10. The lower end of this pouring gate lever is pivoted at 50 to links 51, which are also pivoted at 52 to the lever arm 53 rigidly mounted upon the rock shaft 54 supported in ears 55 on the drag shell. A counterbalanced lever 56 is rigidly mounted on one end of the rock shaft for operating the lever 47 to move the pouring gate into or out of operative position relative to the drag and the cope. The rear end of the mold cavity is closed by the end 21 of the cope; the front end of the mold cavity is open to permit the molten metal to flow into the cavity therethrough; and this open front end of the mold cavity is covered by the pouring gate which is constructed to fit snugly against the front ends of the drag liner and the cope liner. The pouring cavity 57 in the pouring gate extends downward in substantial size and its bottom 58 is inclined when the pouring gate is in closed position to correspond approximately with the inclination of the mold so that the molten metal will flow easily through the pouring gate into the mold cavity. A sand core 59 is arranged in the cavity of the pouring gate and against the ends of the cope liner and the drag liner. This sand core projects over a part of the end of the mold cavity and reduces the size of the neck which connects the sprue with the casting so that the sprue can be easily knocked off of the casting by a comparatively light blow. This core also protects the cope liner against the cutting action of the molten metal in pouring.

It is customary to embed a steel back 60 and a steel lug 61 as an insert in the back of the brake shoe casting and it is necessary to secure this insert in the cope liner so that it will be held in proper position for embedment. To facilitate setting in this insert and securing it in fixed position against accidental displacement I provide a looped wire 62, the ends of which are passed down through openings 63 in the cope liner and through openings 64 in the steel back and are twisted together at 65 beneath the steel back. The loop is passed over a support 66 mounted on a cross-bar 67 which is secured to the cope shell and is provided with a recess 68 to receive the looped wire (Fig. 8). A tensioning device is arranged to engage the legs of the loop and it comprises a lever 69 pivoted at 70 on the cross-bar 67 and having an operating handle 71 (Fig. 4). A detent 72 of any suitable construction is arranged to engage a toothed segment 73 mounted on the cope shell. The outer ends 63′ of the openings 63 are enlarged to facilitate insertion of the ends of the wire loop into these openings, and the legs of the wire loop are located on opposite sides of the support 66 and the cross-bar 67. In initial position the lever 69 is arranged angularly to the support 66 and the cross-bar 67 and between the openings 63 so that when the wire loop 62 is arranged in place the lever 69 will project through the loop, as shown in Fig. 3. After the ends of the looped wire have been twisted together upon the insert the tensioning lever 69 is shifted from initial position (Fig. 3) to tensioning position (Fig. 4). The tension lever thus produces a partial twist of the looped wire, as clearly indicated in Fig. 4, which places this wire under tension sufficient to hold the insert tightly and snugly against the cope liner. The cope liner is provided with a recess 74 to accommodate the lug 61 and also the core 75 which is inserted in the lug to form the key opening in the attaching lug of the shoe.

A handle lever 76 is secured by the pivot bolt 22 to the bell crank yoke 24 and is fulcrumed by the pivot bolt 25 on the drag shell. This lever is operated to swing the cope between closed position (Fig. 1) and open position (Fig. 9), the opening movement being limited by a stop 77 upon which the cope rests. In Fig. 9 I have shown the brake shoe 78 as it appears when it is lifted from the drag after the mold is opened at the conclusion of the casting operation.

My invention provides a permanent mold of simple construction and adapted to be easily operated with comparatively little labor. Provision is made for ventilating the cope and the drag by exposing the parts to the atmosphere as much as possible so that the mold may not become over heated if continued in operation over a long period of time. The mold is tilted at an angle to facilitate the pouring operation and also to position the parts most advantageously for opening the mold and for securing the insert in the cope. The pivoted pouring gate provides

a simple means for moving this gate to open and to closed position as required. The construction is such that by throwing the counterbalanced lever 56 across its pivot center the pouring gate will be swung to open position freely and without being jammed by the sprue; and when the cope is closed the pouring gate can be swung to closed position by throwing the lever 56 back over its pivot center. The pouring gate is not only pivoted to swing in an arc to and from the mold, but it is pivoted on its supporting lever so that it will automatically adjust itself to proper position against the mold. The lever 56 is counterbalanced to facilitate its operation and to insure that the pouring gate will remain in snug contact with the drag and the cope liners during the casting operation. As more fully set forth in my Patent No. 1,552,247 the cope is moved initially away from the drag in a right line to clear the drag and the casting, and then it is swung in an arc to open position, as shown in Fig. 9. The operating handle 76 is conveniently located for swinging the cope between open and closed positions and the inclined position of the mold facilitates this operation. When the cope is in open position the insert can be readily arranged therein and the wire engaged therewith, and the tension means can be operated for tensioning the wire to secure the insert rigidly in place. I provide a removable drag liner, as more fully set forth in my Patent No. 1,588,209, and I also provide a removable cope liner which may be changed like the drag liner as may be required for making different castings.

The pouring gate lever is located on one side of the mold and the operating lever for opening the mold is located on the other side so that a single operator standing behind the mold can do all the things necessary to open it for removal of the casting, and this same operator standing behind the open mold can secure the insert in place in the cope for the next casting operation and lower the cope to closed position and swing the pouring gate to closed position. Ordinarily, however, I would provide two operators, one in a path in front of a series of molds and one in a path behind the series of molds; the first operator or the second operator may open the pouring gate, the second operator will swing the cope to open position, and while the first operator is removing the casting the second operator will secure the insert in the cope. This enables the operations of the mold to be conducted in rapid succession and without laborious effect. The removable drag liner and the removable cope liner provide for changing the mold to make different kinds of castings and this change can be quickly made. The drag liner is held in place on the drag shell, resting upon the adjustable supports 18, by the pins 16, and the cope liner is secured in the cope shell by the bolts 79 which pass through the rear end piece 21 of the cope. The cope liner is held in place upon the drag liner against lifting during the casting operation by the projection 40 at its rear end and by the arch 36″ at its front end. The sides 36′ of the cope shell are secured at their rear ends to the rear end piece 21 by bolts 80. A splash shield 81, shown in Figs. 1, 5 and 9, but omitted in Fig. 7, is secured on the front of the drag shell to prevent any molten metal accidentally spilled from flowing into the drag shell. The openings 63 permit the passage of the wire 62 and also provide for the escape of gases during the casting operation. A stop pin 82 on the lever arm 53 engages the links 51 to limit the forward swing of the operating lever 56 and the outward swing of the pouring gate. A stop 83 on the pouring gate engages the forked lever to hold the pouring gate against rotative movement.

Changes in the form, construction and arrangement of parts may be made to adapt my invention for different conditions and I reserve the right to make all such changes as fairly fall within the scope of the following claims.

I claim:

1. A permanent mold for making castings and comprising a drag shell and a separate liner arranged in spaced relation to the shell, means engaging the liner with the shell against lateral and longitudinal movement, and means for adjusting the liner towards and away from the shell.

2. A permanent mold for making castings and comprising a drag shell having openings therein, a drag liner, pins engaged with said liner and with the openings in the shell to removably hold the liner in place on the shell, and screw means on said shell for permitting vertical adjustment of said liner relative to said shell.

3. A permanent mold for making castings and comprising a drag shell and a separate liner arranged in spaced relation to the shell, pins on one of said parts engaging the other part to center and hold the liner on the shell, and operable means on one of said parts engaging the other part to adjust the position of the liner relative to the shell.

4. A permanent mold for making castings and comprising a drag shell and a separate liner arranged in spaced relation to the shell, means on one of said parts engaging the other part to center and hold the liner on the shell against lateral and longitudinal movement, and means on the shell for adjusting the liner towards and away from the shell and for supporting the liner in operable position.

5. A permanent mold for making castings and comprising a drag shell having openings therein, a drag liner, pins on the liner arranged to engage the openings in the shell,

and screw adjusting means on the shell for supporting the liner and for adjusting the position of the liner relative to the shell.

6. A permanent mold for making castings and comprising a drag shell and a drag liner, a pair of pins on one of said parts arranged to engage openings in the other part, screws on the shell beneath and supporting the liner, and means for adjusting said screws to adjust the position of the liner relative to the shell, said pins being located adjacent the ends of the liner and said screws being located on opposite sides of the pins.

7. A permanent mold for making castings and comprising a drag, a cope movable relative to the drag, beveled edges on the drag, and beveled lugs on the cope to engage the beveled edges on the drag and position the cope on the drag.

8. A permanent mold for making castings and comprising a drag shell, a cope shell, a removable drag liner in the drag shell, a removable cope liner in the cope shell, each of said liners containing a portion of the mold cavity and lugs integral with the cope shell and adapted to engage the drag liner for registering the two liners when the mold is closed.

9. A permanent mold for making castings and comprising a drag shell, a removable drag liner in the drag shell, a cope shell pivoted to the drag shell, a removable cope liner in the cope shell and lugs integral with the cope shell and adapted to engage the drag liner for registering the two liners when the mold is closed.

10. A permanent mold for making castings and comprising a cope having a skeleton shell, a removable liner in said shell, said shell comprising two sides and an end piece secured to one end of said sides and integral therewith, said liner being secured at one end to said end piece, the other end of said sides and the other end of said liner being aligned in the same plane.

11. A permanent mold for making castings and comprising a cope having a skeleton shell and a removable liner in said shell, said shell comprising two sides and an end piece secured to one end of said sides and integral therewith, said liner being secured at one end to said end piece, and a cross piece extending across the top of the liner and secured at its ends to the top of the sides.

12. A cope of a permanent mold for making castings and comprising a skeleton shell, a liner, oppositely disposed ledges within the shell, and laterally projecting shoulders on the liner engaging said ledges to removably support the liner in the shell.

13. A cope of a permanent mold for making castings and comprising a skeleton shell, a liner adapted to be inserted in said shell through one end thereof, oppositely disposed ledges within the shell, laterally projecting shoulders on the liner engaging said ledges to removably support the liner in the shell, and cross-members on the shell engaging the top of the liner to prevent the liner from lifting in the shell during the casting operation.

14. A permanent mold for making castings and comprising a drag shell, means for supporting a drag liner in inclined position on the drag shell, a cope shell, a removable cope liner on the cope shell, means for supporting the cope shell and liner in inclined position on the drag shell and liner and an inclined pouring gate pivoted to said drag shell and located at one end thereof.

15. A permanent mold for making castings comprising a drag, a cope, pivoted means at one end of the cope for pivotally mounting the cope on the drag, lifting means at the opposite end of the cope for lifting the cope, an operating lever fulcrumed on said pivot means and engaged with said cope for opening and closing the cope, and means for connecting said lever with said lifting means.

16. A permanent mold for making castings and comprising a drag and a relatively movable cope, a lever fulcrumed at one end on the drag and extending alongside of the drag, the handle and cope being pivotally connected between the operating end and the fulcrum of the handle, and means controlled by the handle for imparting to the movable member an initial rectilinear movement relative to the fixed member followed by a swinging movement to open the mold.

17. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein, and an inclined pouring gate arranged on one end of said cope and drag and adapted to communicate with said mold cavity and pivotally mounted relative to the drag and the cope.

18. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein, a pouring gate arranged on one end of said cope and drag and adapted to communicate with said mold cavity and pivotally mounted on the drag, and a handle for swinging said gate about its pivot.

19. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end, and a pivotally mounted inclined pouring gate abutting one end of said drag and cope, said pouring gate covering the open end of the mold cavity and having its pouring cavity in communication with the mold cavity.

20. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end, and a pouring gate pivotally mounted on the drag and abutting one end of said drag and cope, said pouring gate covering the open end of the mold cavity and having its pouring cavity in communication with the mold cavity.

21. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein, a pouring gate adapted to communicate with said mold cavity and pivotally mounted relative to the drag and the cope, and counterbalanced means at one end of the cope and drag for swinging said pouring gate to open position or to closed position.

22. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein, a pouring gate pivotally mounted at one end of the drag and adapted to be swung into communication with said mold cavity, and counterbalance means connected with said gate for swinging the gate to open position or to closed position.

23. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end of the drag and cope, a pouring gate pivotally mounted at one end of the drag and adapted to be swung into abutting relation with the ends of the drag and cope to cover the open end of the mold cavity and establish communication between the pouring cavity of the gate and the mold cavity, and pivoted counterbalance means for swinging said pouring gate to open position or to closed position.

24. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end of the drag and cope, a lever pivoted at one end of the mold, a pouring gate carried by said lever and abutting the ends of the drag and cope at the open end of the mold cavity, said pouring gate covering the open end of the mold cavity and having its pouring cavity in communication with the mold cavity, and means for operating said lever.

25. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end, a pivoted lever at one end of the mold, an inclined pouring gate pivoted on said lever and abutting the ends of the drag and the cope, said pouring gate covering the open end of the mold cavity and having its pouring cavity in communication with the mold cavity.

26. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end, a forked lever pivoted on the drag, a pouring gate pivoted in said forked lever and abutting the ends of said drag and cope, said pouring gate covering the open end of the mold cavity and having its pouring cavity in communication with the mold cavity.

27. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end, a pivoted lever, a pouring gate pivotally mounted on said lever and abutting the ends of the drag and cope, said pouring gate covering the open end of the mold cavity and having its pouring cavity in communication with the mold cavity, and a counterbalance lever for operating said pouring gate lever to swing the pouring gate to open position or to closed position.

28. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end, a forked lever pivotally mounted on the drag, a pouring gate pivoted in the forked lever and abutting the ends of the drag and the cope, said pouring gate covering the open end of the mold cavity and having its pouring cavity in communication with the mold cavity, a rock shaft, connections between said forked lever and said rock shaft, and a counterbalance lever on said rock shaft for operating the forked lever to swing the pouring gate into and out of operative relation to the drag and the cope.

29. A permanent mold for making castings and comprising a drag arranged in inclined position, a cope arranged in inclined position on the drag, said drag and cope having a mold cavity therein open at the high end of the drag and cope, and an inclined, pivoted pouring gate mounted to swing into and out of operative relation to the high end of the drag and the cope and the open end of the mold cavity therein.

30. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end of the drag and cope, said end of the drag and cope being uniformly inclined, a movable pouring gate arranged to abut said inclined end of the drag and cope to form a communication between its pouring cavity and the open end of the mold cavity, and means for bodily moving said pouring gate to and away from the drag and cope.

31. A permanent mold for making castings and comprising a drag and a cope having a mold cavity therein open at one end of the drag and cope, said drag and cope being arranged in inclined position with the open end of the mold cavity elevated, a pivoted pouring gate arranged to engage the elevated end of the drag and cope to form a communication with the open end of the mold cavity, and means for swinging said pouring gate into and out of operative position relative to the drag and cope.

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