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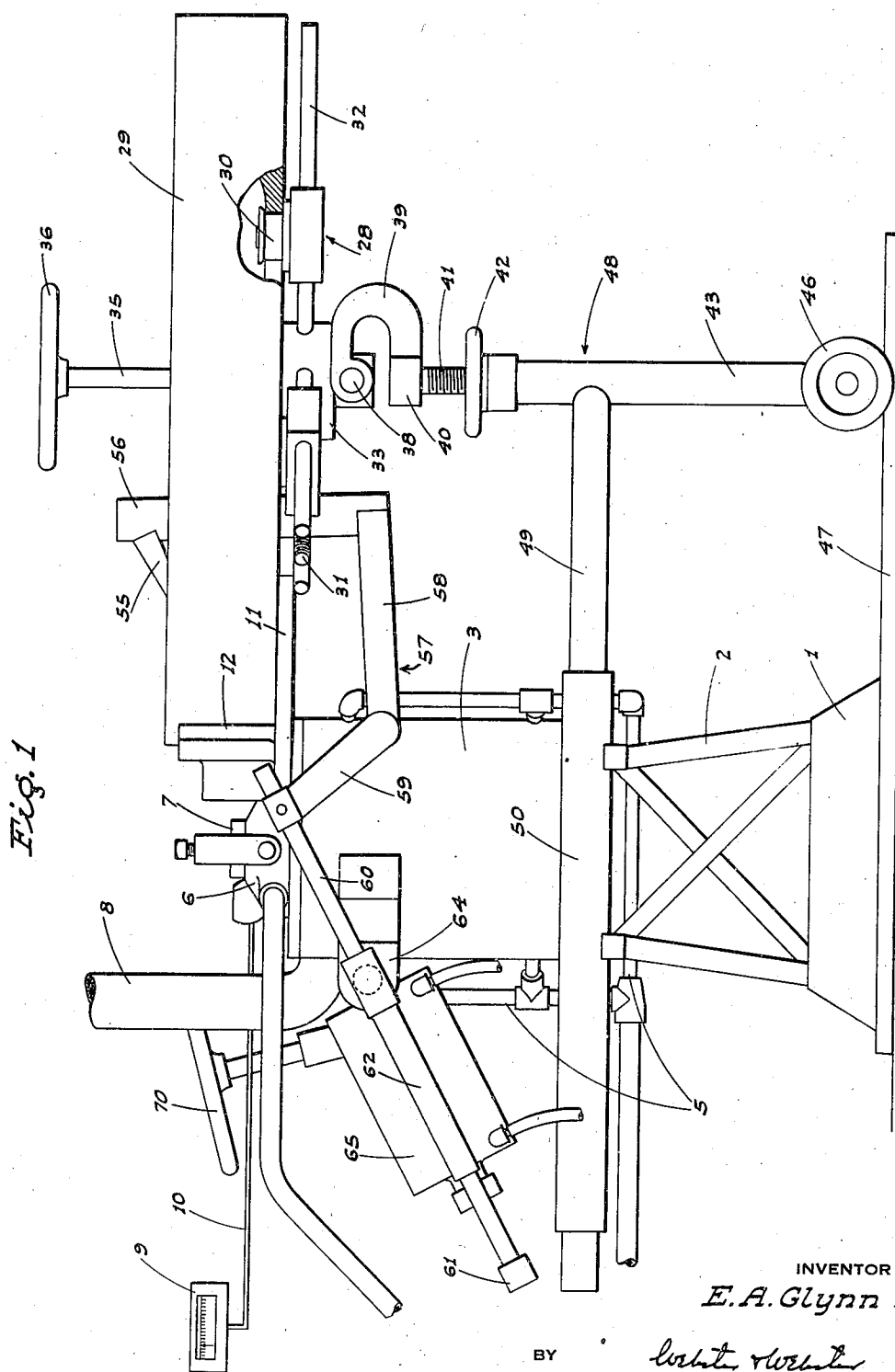
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2,478,657

DIE CASTING MACHINE

Filed Nov. 6, 1946

3 Sheets-Sheet 1



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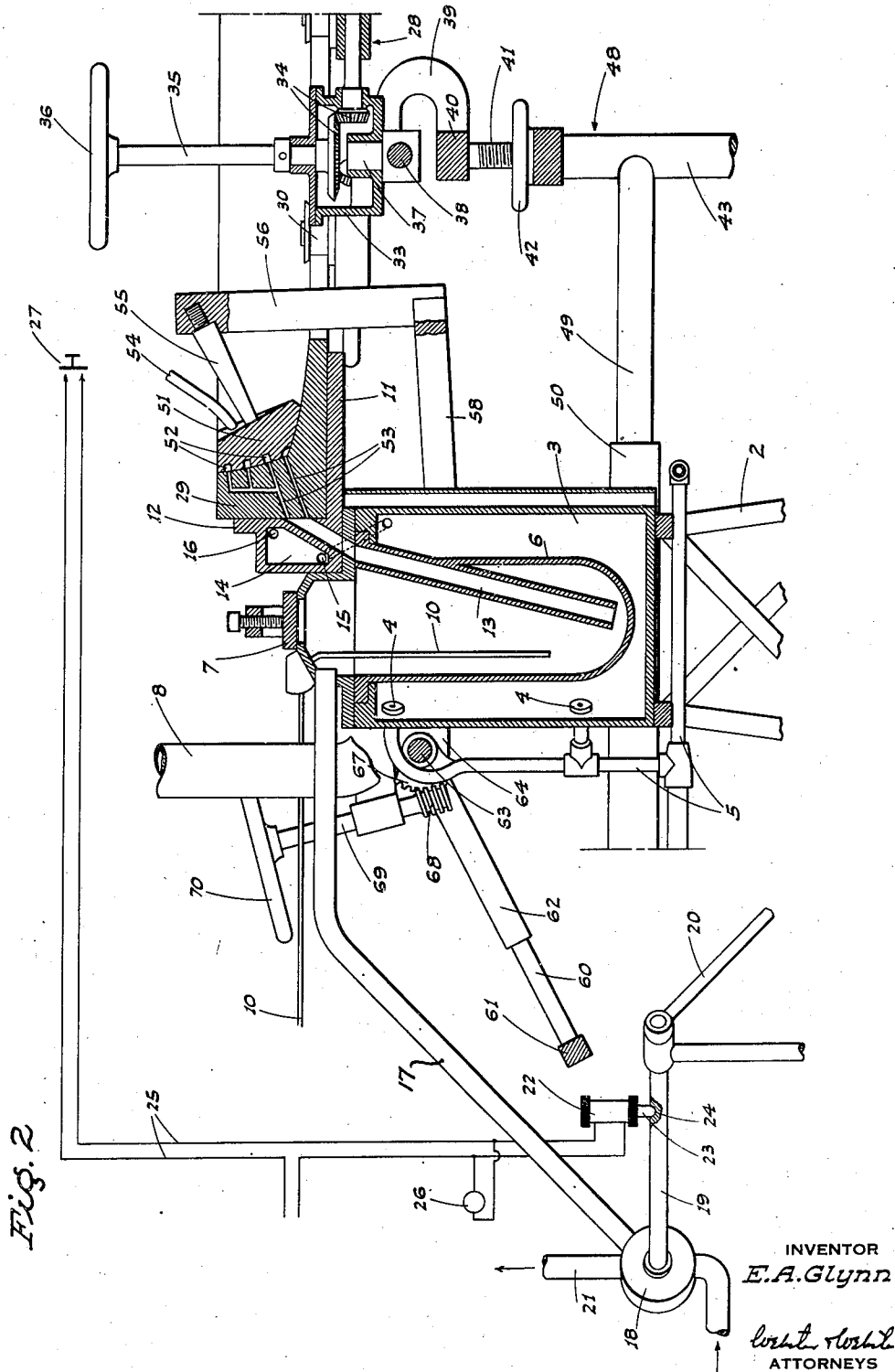
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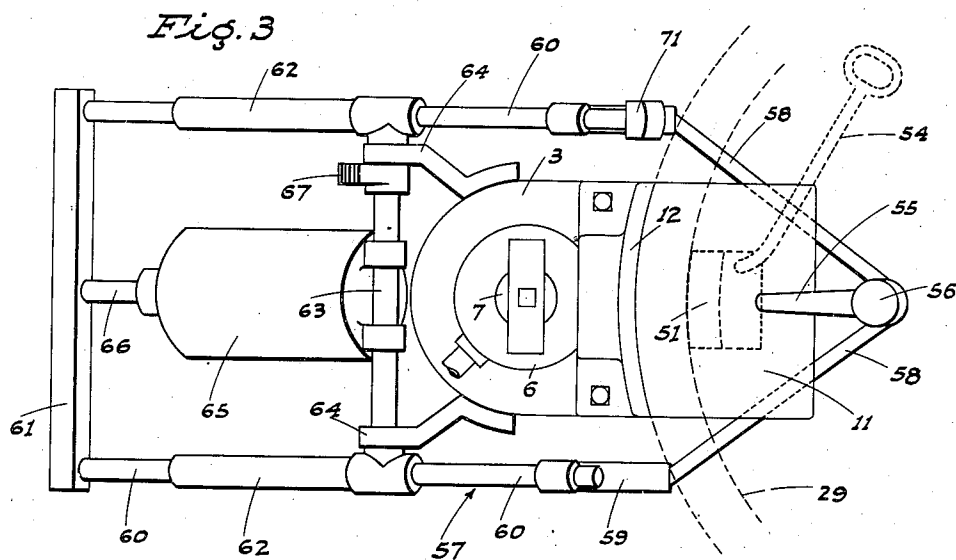


Fig. 4

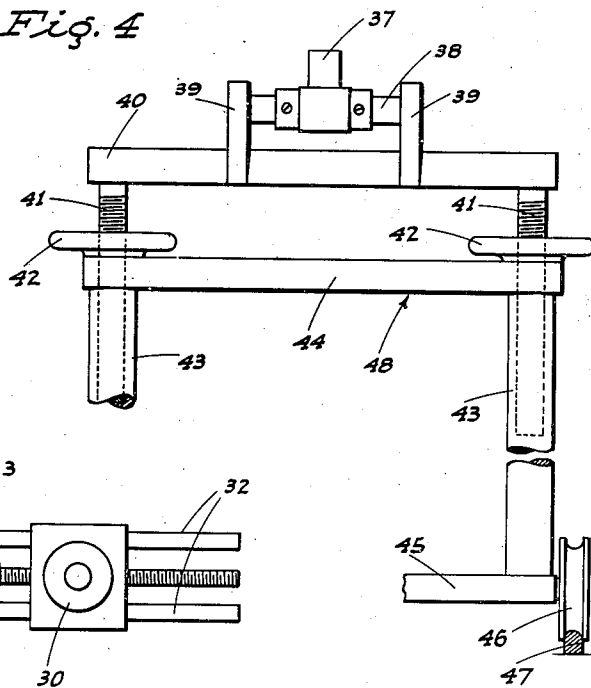
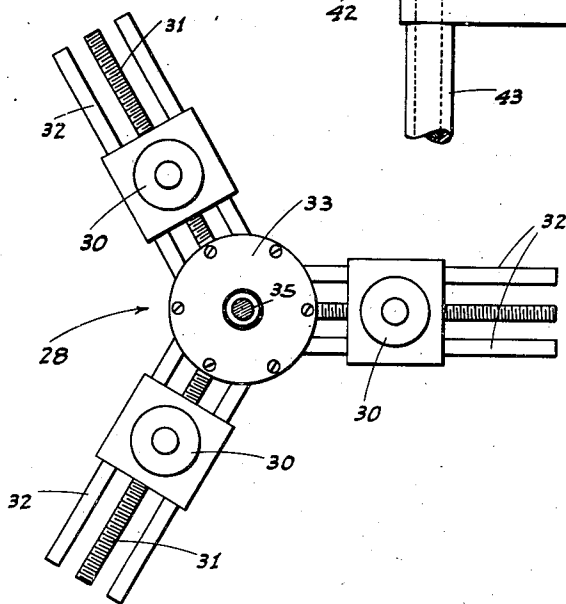


Fig. 5



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DIE CASTING MACHINE

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5 Claims. (Cl. 22-69)

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This invention is directed to a die casting machine for producing the tire tread design on matrix blanks for tire retreading or recapping apparatus; the present invention representing improvements on the die casting machine shown in United States Patent No. 1,989,438.

One object of the invention is to provide a die casting machine, of the type described, wherein the tire tread design is cast onto the matrix blank sectionally as before, but here with greater ease, faster, and with more safety to the operators.

Another object of the present invention is to provide a die casting machine, as above, wherein the die block is power actuated for the purpose of quickly advancing it toward and away from the matrix, and to maintain such die block in positive contact during the casting operation.

A further object of the invention is to provide a novel mount for the matrix blank arranged for ease of movement of said blank to and from the casting platform; for rotation of the matrix blank step by step for the sectional casting operations; and for tilting of the matrix blank upwardly on the side adjacent said platform to break such blank away from the metal remaining in the adjacent end of the feed pipe.

An additional object of this invention is to provide a safety system arranged to minimize the possibility of a die casting operation being started, accidentally, before the die block is in position for use.

A further object of the invention is to produce a practical die casting machine which will be highly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is a side elevation of the improved die casting machine.

Fig. 2 is a sectional elevation thereof.

Fig. 3 is a fragmentary plan view of the power actuated yoke assembly employed to advance and retract the die block, and to maintain said die block, during a casting operation, in positive contact with the matrix blank.

Fig. 4 is a fragmentary end elevation of the mount for the chuck which supports the matrix blank.

Fig. 5 is a plan view, detached, of the chuck for the matrix blank.

Referring now more particularly to the characters of reference on the drawings, the improved die casting machine comprises a base 1 having an upstanding frame 2 thereon, such frame 2 supporting a vertical firebox 3 having burners or flame jets 4 therein fed from a fuel pipe 5.

A melting pot 6 depends into the firebox 3 from

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its upper end, and at the top the melting pot 6 includes a removable but normally locked cover 7, by means of which die casting metal may be introduced into said pot.

A vent or flue 8 leads from the firebox 3 at the top thereof. The machine includes a pyrometer 9 having a control line 10 leading into the melting pot 6, whereby the temperature within the latter is accurately indicated exteriorly of the machine.

At the top, and at one side thereof, the firebox 2 supports a horizontal platform 11, having an outwardly facing concave back wall 12.

A fluid metal feed pipe 13 leads from within the melting pot 6 upwardly through the top thereof, and opens through the back wall 12; the portion of the pipe 13 adjacent said back wall being formed in adjacent relation to a heating chamber 14 integral with said sidewall, and heated from the firebox 3 in any suitable manner, as by a passageway 15. The heating chamber is vented, as at 16.

Fluid die casting metal, from the melting pot 6, can be forcefully discharged through the feed pipe 13 by means of air under pressure introduced into said melting pot by a conduit 17 which extends from a source (not shown) of air pressure. A valve 18 is interposed in the conduit 17 and includes a control shaft 19 having a handle 20 on one end thereof. In one position of the handle 20 air under pressure is delivered to conduit 17, while in another position the air is vented through an outlet 21.

The shaft 19 and handle 20 are normally maintained in position with the valve 18 vented through outlet 21, and this is accomplished by means of a solenoid 22, whose plunger 23 normally engages in a locking seat 24 in said shaft 19. The solenoid 22 is interposed in a normally open control circuit 25 which includes a signal light 26 adjacent the station for the operator of the handle 20, while a normally open switch 27 is included in said circuit at adjacent the station for the operator who attends to positioning of the die block, as will hereinafter appear.

Outwardly of the horizontal platform 11, the machine includes an adjustable spider chuck, indicated generally at 28, for an annular matrix blank 29; the chuck 28 normally being disposed with its axis vertical and including chuck heads 30 which are carried on screws 31 for simultaneous adjustment, inwardly or outwardly, in a radial direction.

The chuck heads 30 are carried on guide rods 32 and said rods, together with the screws 31, radiate from a hub 33. The screws 31 are simultaneously actuated in one direction or the other by means of a gear assembly 34 in the hub 33; such assembly being operated by an upstanding shaft 35 carrying a hand wheel 36 on its upper end. When the die casting machine is in use the

annular matrix blank 29 is supported, in internally clamped relation, by the chuck heads 30 in the manner illustrated.

The above described adjustable spider chuck is turnably mounted on an upstanding boss 37 which projects into a matching bore in the hub 33, and said boss is fixed on a transverse rocker shaft 38. The rocker shaft 38 is mounted, at opposite ends, by means of goosenecks 39 to a cross beam 40 having depending end posts 41 threaded through hand wheels 42.

The depending end posts 41 extend downwardly into tubular legs 43 connected at the top by a cross beam 44, and the hand wheels 42 bear against said cross beam from above, whereby rotation of such hand wheels effects vertical adjustment of the posts 41 for the purpose of leveling the spider chuck 28.

The legs 43 are connected adjacent the bottom by an axle 45 having wheels 46 which run on a pair of transversely spaced, horizontal tracks 47. The legs 43, connected together as described, thus provide an upstanding, horizontally movable frame, indicated generally at 48, which movement is in a direction lengthwise of the machine, i. e. in the direction that the concave back wall 12 faces.

Such movement of the frame 48 is guided by guide rods 49 which extend horizontally from the legs 43 through guide sleeves 50 fixed on the upstanding frame 2, as clearly shown in Fig. 1.

A die block 51, of limited segmental extent, is formed with an arcuate working face having a tire tread design 52 cut therein; such die block being adapted to engage the matrix blank 29, in matching relation, on the inner face of the latter.

The annular matrix blank 29 is drilled about its entire circumference with a plurality of sets of ducts 53 adapted to establish communication between the upper end of the feed pipe 13 and the design 52 on the die block, when the adjacent portion of the matrix blank 29 is seated on the platform 11 and clampingly engaged between the matching concave back wall 12, and die block 51, in the manner shown in Fig. 2.

The horizontal platform 11, with the upstanding concave back wall 12, and the cooperating die block 51, form what may be termed the work supporting and casting assembly.

The matrix block 51 includes a guiding handle 54 by means of which an operator guides said block to proper position for engagement with the matrix blank, but movement of such block and its positive contact with said matrix blank is accomplished by power means as follows:

The die block 51 is fitted with a rigid shank 55 which extends at an upward and inward incline relative to the axis of the spider chuck 28, and a post 56 is fixed in connection with and depends through said chuck to a termination therebelow. The post 56 is included in a yoke assembly, indicated generally at 57, which straddles the firebox 3 and extends to a termination on the opposite side of said firebox from the platform 11. The yoke assembly 57 comprises, with said post 56, a pair of rearwardly diverging arms 58 which connect, at opposite ends, with downward extensions 59 on the upper ends of a pair of transversely spaced, inclined side rods 60, which side rods are connected, at their outer ends, by a cross head 61.

Intermediate their ends the side rods 60 run through guide sleeves 62 fixed on opposite ends of a cross shaft 63 journaled in brackets 64 on the firebox 3.

A fluid pressure actuated power cylinder 65 is fixed in connection with the cross shaft 63 and projects toward the cross head 61; said cylinder including a piston rod 66 connected to such cross head.

The angular position of the yoke assembly 57 is adjusted, in order to set the correct elevation of the die block 51, by means of a segmental gear 67 on the cross shaft 63 in mesh with a worm pinion 68 on a shaft 69 turnably mounted in connection with the firebox; said shaft having a hand wheel 70 on its upper end. By adjusting the hand wheel 70, the cross shaft 63 is rotated to change the angle of guide sleeves 62, and consequently the working or angular position of the yoke assembly 57.

Movement of the die block 51 toward or away from the annular matrix blank 29 is accomplished by operation of the power cylinder 65, which is of double acting type, as shown.

The cylinder is included in a fluid pressure system (not shown), valve controlled by the operator who manually guides the die block.

Operation

In operation of the above described die casting machine, an annular matrix blank 29 is first clamped in the spider chuck 28 and then the movable frame 48 is shifted in a direction to engage said annular matrix blank 29 against the concave back wall 12 in matching relation; said matrix blank then seating flush on the platform 11 by reason of proper adjustment of the depending end posts 41.

The post 56 of the yoke assembly 57 projects upwardly through the matrix blank 29 and supports the die block 51 within said blank.

As guided by the handle 54, the die block 51 is brought into positive matching engagement with a segment of the matrix blank 29, with the design 52 in matching relationship to one set of the ducts 53 as formed in said blank in circumferential relation. This positive contacting of the die block 51 with the matrix block 29 is effected by operation of the power cylinder 65 in a direction to advance the piston rod 66, which imparts a like motion to the yoke assembly 57.

With the die block 51 so contacting the matrix blank the operator, who guides said block to position, then closes the switch 27 which is adjacent his station. When this occurs the signal light 26 is illuminated and the solenoid 22 energized, causing the plunger 23 to retract from the locking seat 24 in the shaft 19.

Thereafter the other operator who is adjacent the handle 20 turns the latter so that air under pressure delivers through the conduit 17 into the melting pot 6, creating a pressure in the latter. When this occurs molten or fluid die casting metal is forced from the melting pot upwardly in the feed pipe 13, and into the ducts 53 and tread design 52.

The above die casting operation is repeated, step by step, about the entire circumference of the matrix blank 29 until a continuous and unbroken tread design is formed on said blank.

Between each of the segmental die casting operations the die block 51 is of course released from the matrix blank 29 by reverse operation of the cylinder 65, and with the die block 51 so released, the blank 29 is tilted upwardly from the platform 11 so as to effect a breaking away of any metal adherent between the ducts 53 and the feed pipe 13. This tilting or canting of the matrix blank 29 is accomplished by swinging the spider chuck 28 about rocker shaft 38 as an axis.

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The step-by-step turning of the matrix blank 29 may be accomplished either by rotating the chuck 28, or by loosening said chuck and rotating said blank thereon; it being obvious that the full extent of rotation cannot be obtained solely by turning the chuck, for the reason that the post 56 projects between the spider arrangement of the guide rods 32 of said chuck.

Breaking away of the matrix blank 29 from the platform 11 and back wall 12, after each segmental die casting operation, is facilitated by a pusher block 71 on the yoke assembly 57, which pusher block engages the matrix blank and urges the same upwardly when said yoke assembly is shifted by the power cylinder in a direction to retract the die block 51 from its working position.

From the foregoing it will be readily seen that there has been produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

1. A machine for die casting tread designs on a preformed annular matrix blank, comprising a frame, a matrix blank support and tread design casting assembly mounted on the frame, said assembly including a segmental die block adapted to matchingly engage the matrix blank, means mounting the die block for movement between a position free of the matrix blank to a position in positive contact therewith, said means including a member adapted to extend into the matrix blank, the die block being fixed in connection with the member, a fluid pressure actuated power cylinder mounted in connection with the frame, and actuating means between the cylinder and member arranged to cause movement of the die block between a position free of the matrix blank to a position in positive contact therewith; said actuating means including a cross shaft, a sleeve radially mounted on the shaft, a rod slidable through the sleeve, the rod actuating said member, and means to adjust the relative position of the shaft and sleeve and correspondingly the working position of the die block, the power cylinder being attached between the shaft and the rod.

2. A machine for die casting tread designs on a preformed annular matrix blank comprising an upstanding frame, a matrix blank support and tread design casting assembly mounted on the frame, said assembly being adapted to support a circumferential portion of the matrix blank with the axis of the latter generally vertical, a die block included in said assembly, means mounting the die block for radial movement within the matrix blank between a retracted position free of said blank to an advanced position in positive contact therewith, and a fluid pressure actuated power cylinder operative to effect such movement; said mounting means including an actuating yoke extending radially away from the matrix blank below the same, said yoke having spaced, parallel side rods, a cross shaft supported from the frame, guide sleeves radially mounted on opposite ends of the shaft, the rods slidably projecting through the sleeves, a cross head between the rods in

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spaced relation to the shaft, the power cylinder being connected between the shaft and cross head, a post on the yoke extending into the matrix blank and supporting the die block, and means to adjust the rotative position of the shaft so as to correspondingly vertically adjust the die block.

3. A machine for die casting tread designs on a preformed annular matrix blank comprising an upstanding frame, a firebox mounted on the frame and enclosing a melting pot, a matrix blank support and tread design casting assembly mounted on top of the firebox, said assembly being adapted to support a circumferential portion of the matrix blank with the axis of the latter generally vertical, a die block included in said assembly, means mounting the die block for radial movement within the matrix blank between a retracted position free of said blank to an advanced position in positive contact therewith, and a fluid pressure actuated power cylinder operative to effect such movement of the die block; said mounting means including an actuating yoke extending radially away from the matrix blank below the same and straddling the firebox, the yoke having spaced, parallel side rods, a cross shaft supported from the firebox, guide sleeves radially mounted on opposite ends of the shaft, the rods slidably projecting through the sleeves, a cross head between the rods in spaced relation to the shaft, the power cylinder being connected between the shaft and cross head, a post on the yoke extending into the matrix blank and supporting the die block, and means to adjust the rotative position of the shaft so as to correspondingly vertically adjust the die block.

4. A power operated means for moving a die block into conformity with the inner face of an annular matrix blank, such means comprising in combination with the die block a substantially vertical post, a shank fixed on the upper end of the post, the block being engaged by the outer end of the shank, a pair of diverging arms rigidly attached to the lower end of the post, guide rods connected with the outer ends of the arms, a support, a pair of spaced sleeves secured on the support, the guide rods being slidably mounted through the sleeves, a cross head on the outer end of the guide rods, a power operated power jack connected to and extending between the support and cross head means mounting the support for rotation and means to controllably rotate the support.

5. A structure as in claim 4, in which said last named means comprises a worm gear fixed on the support concentric with the axis of rotation thereof, a worm engaging the gear and a shaft on which the worm is mounted journaled in a fixed position and having a hand wheel thereon.

EDWIN A. GLYNN.

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