United States Patent

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[54] **CASTING APPARATUS**
10 Claims, 6 Drawing Figs.

[52] U.S. Cl. **164/265,** 164/131, 164/316, 164/327
[51] Int. Cl. **B22d 31/00,** B22d 5/02
[50] Field of Search 164/262, 265, 269, 270, 284, 303, 306, 312, 131

[56] **References Cited**
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2,023,040	12/1935	Adams	164/262
2,848,770	8/1958	Schuchardt	164/265
3,328,853	7/1967	Pekrol	164/262
3,333,628	8/1967	Canner	164/269

Primary Examiner—J. Spencer Overholser
Assistant Examiner—John E. Roethel
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ABSTRACT: A die casting machine having a rotatable turntable structure containing a plurality of spaced apart cast article supporting spud members extending generally radially outwardly from the turntable to cooperate with a pair of cooperating dies. The cast article is cast onto and supported by the spud member which is moved to selective positions away from the dies and is also rotated about the axis of the spud member subsequent to its movement away from the casting station.

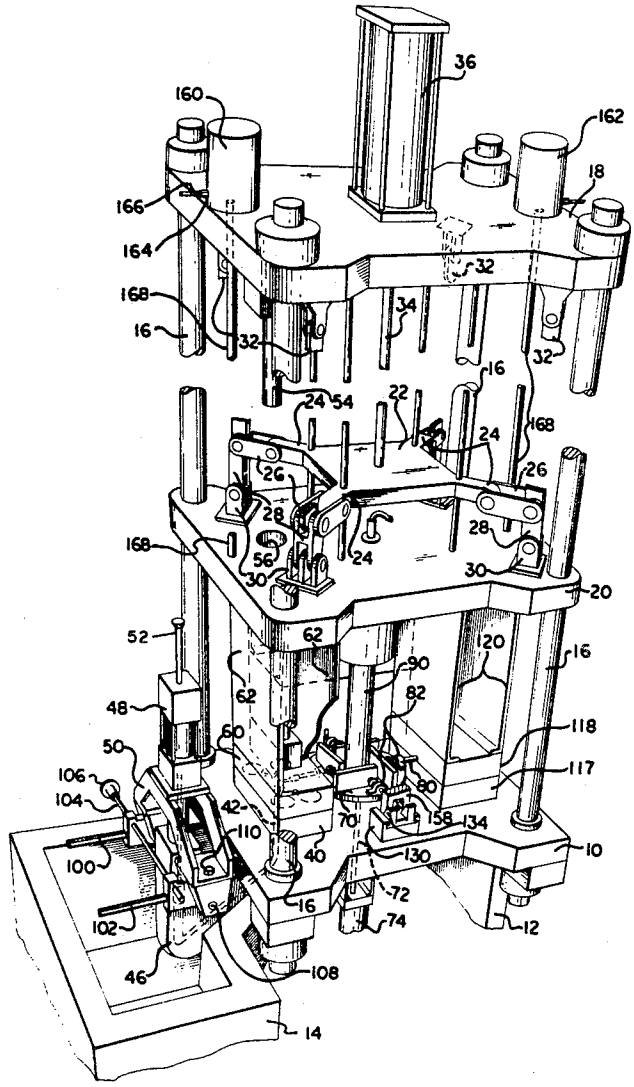
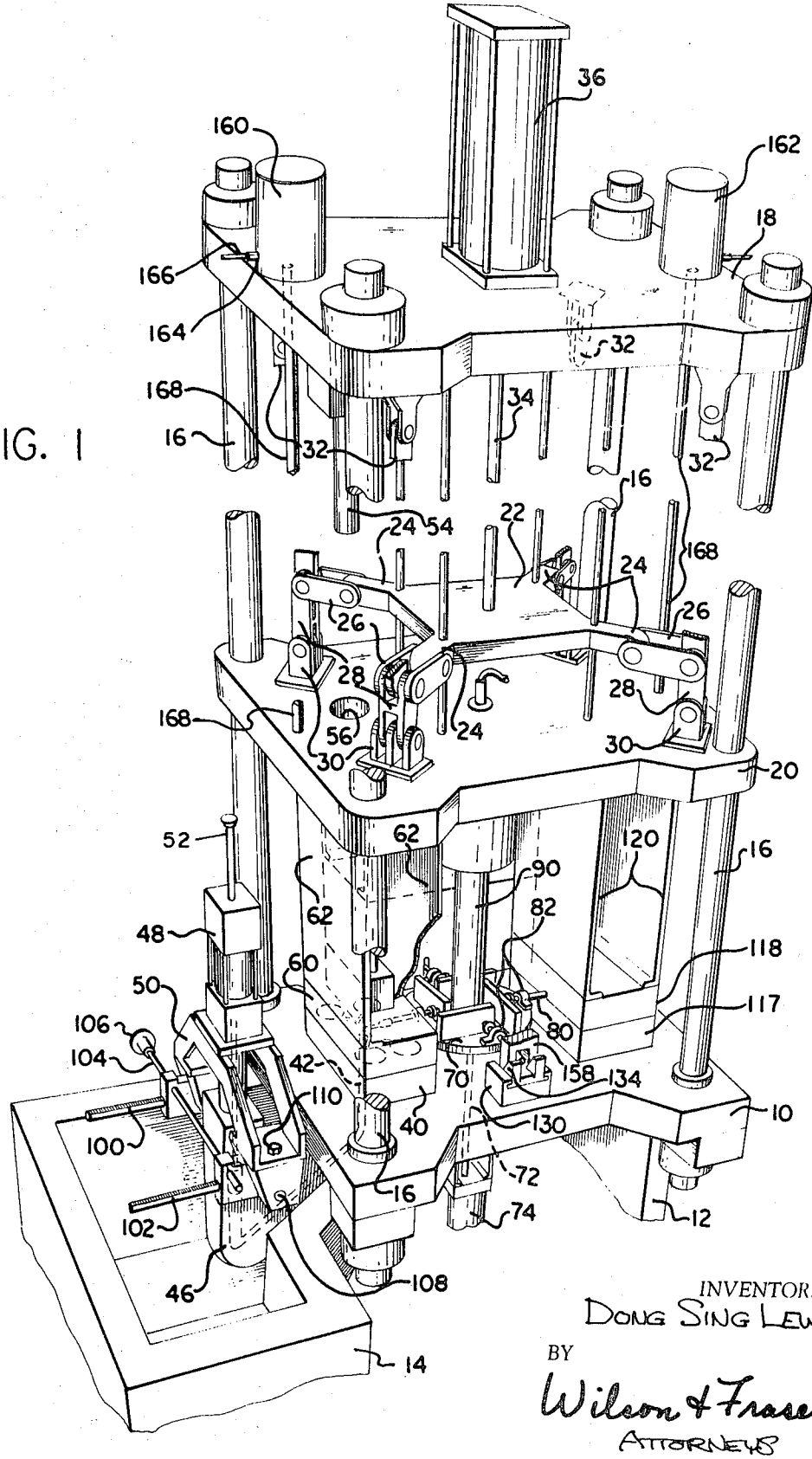


FIG. 1



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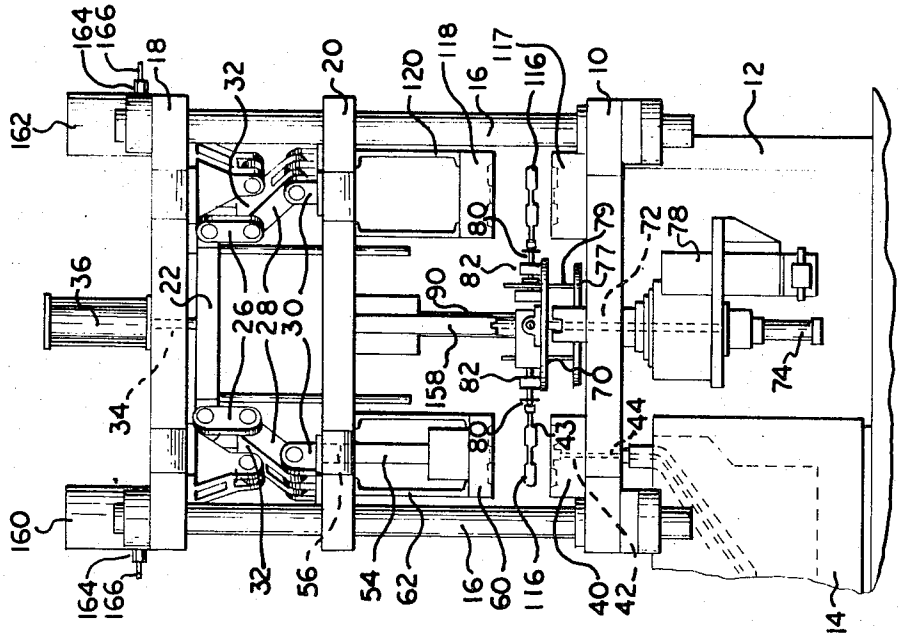

FIG. 3

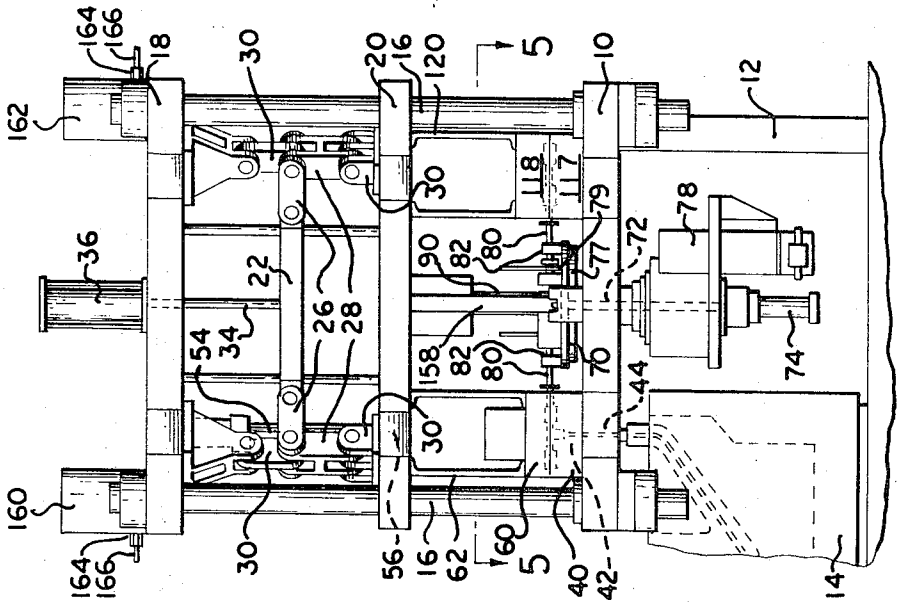

FIG. 2

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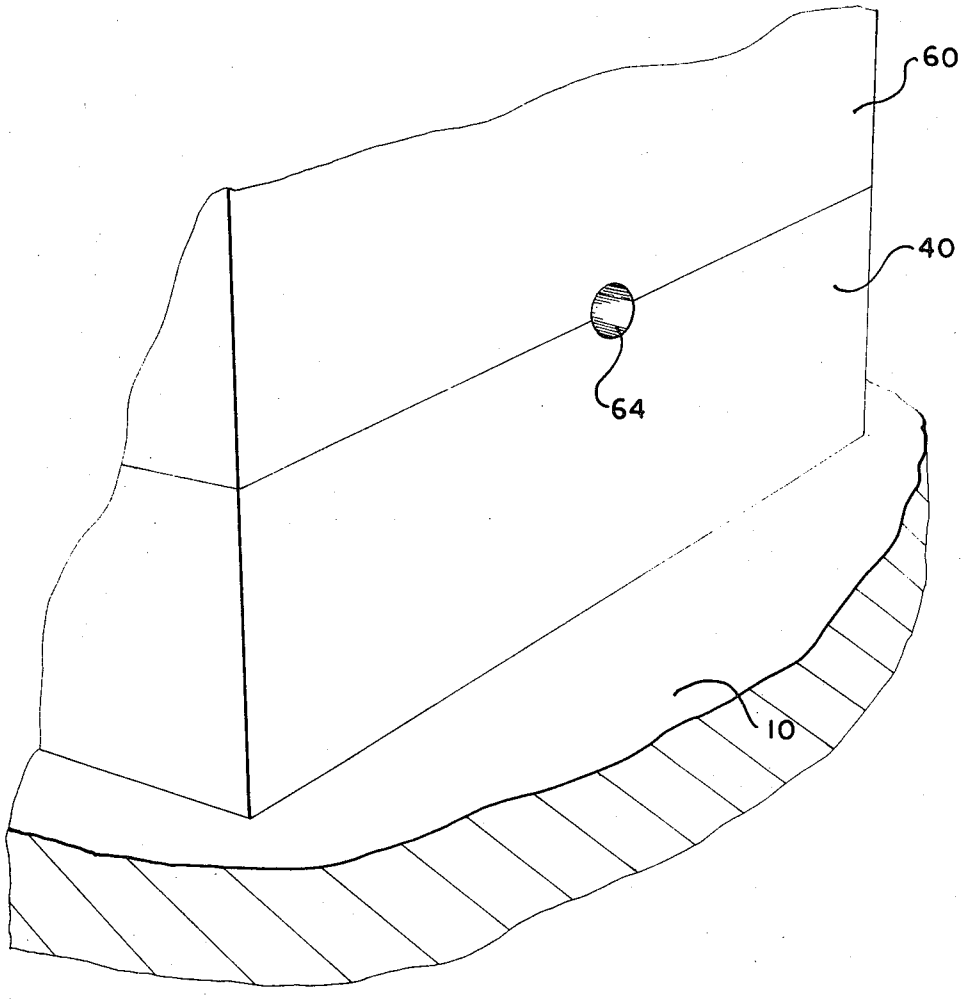

FIG. 4

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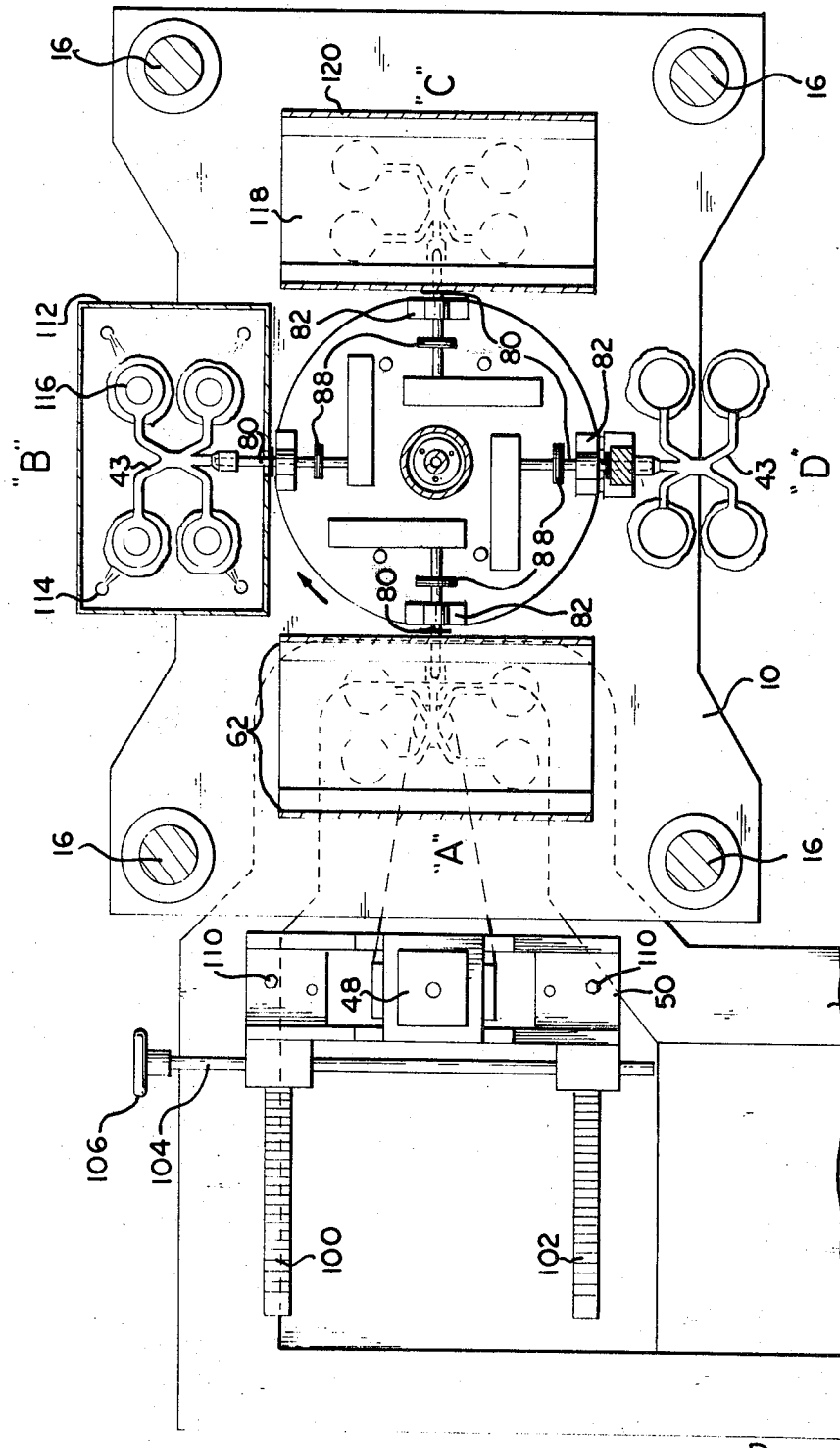

FIG. 5

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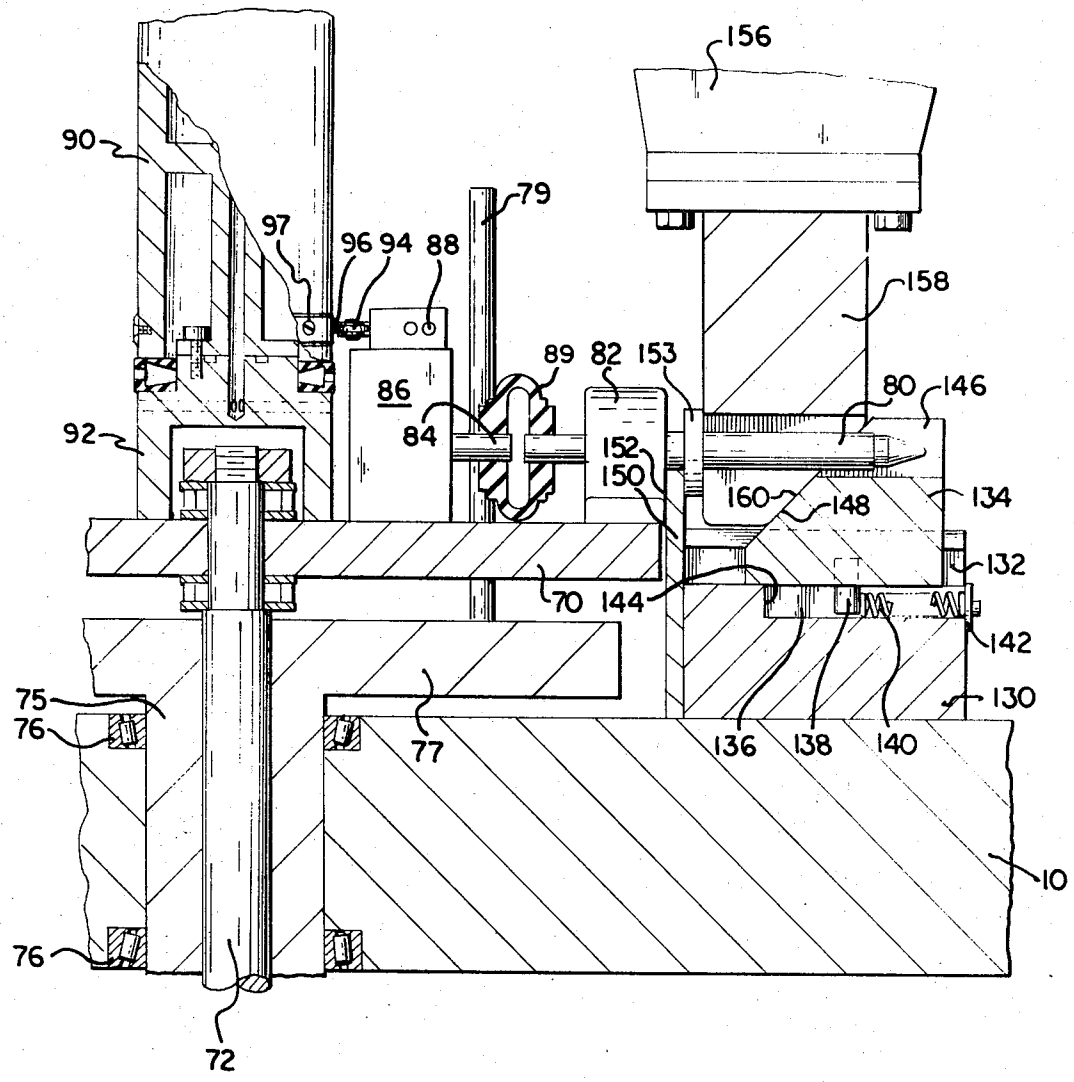

FIG. 6

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CASTING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention pertains to a die casting machine wherein there is provided a structure for supporting the cast article after being ejected from the dies. The supporting structure is capable of moving the cast article away from the dies and rotating the article subsequent to moving away from the casting station.

2. Description of the Prior Art

Die casting machines are known wherein the cast article is automatically moved from the dies to a trimming station. The U.S. Pats. to J. R. Schuchardt No. 2,848,770 entitled "DIE CASTING AND TRIMMING APPARATUS," and G. G. Pekrol No. 3,328,853 entitled "DIE CASTING AND TRIMMING MACHINE" each disclosed apparatus wherein an article is cast in one position and then is rotated by means of a turntable-like apparatus to a circumferentially displaced trimming station. The U.S. Pat. to H. M. Canner No. 3,333,628 entitled "DIE CASTING APPARATUS" discloses an apparatus wherein an article is cast on a supporting mechanism at one situs and is thereafter moved longitudinally to quenching and trimming stations.

SUMMARY

One of the primary objects of the present invention is the production of a die casting machine which will improve the die casting operation by the provision of a machine in which the casting, quenching, trimming and stripping stations cycle automatically and simultaneously. The operations performed by the machine of the invention will effectively and automatically produce finished die cast articles with a relatively low scrap and reject factor.

Broadly, the above, as well as other objects of the invention may be achieved by a die casting machine which comprises a pair of cooperating die casting dies having facing cavities; means for moving the dies into and out of closed casting position; a turntable mounted in association with the dies; spud means mounted on the turntable and cooperating with the dies for supporting a cast article; means for rotating the turntable whereby selective ones of the spud means will align with the dies; and means for rotating the spud means about an axis which is substantially transverse to the axis of rotation of the turntable.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become readily apparent to those skilled in the art from reading the following detailed description of an embodiment of the invention when considered in the light of the accompanying drawings, in which:

FIG. 1 is a fragmentary perspective view of a die casting machine incorporating the concepts of the invention with portions broken away to more clearly illustrate the structure;

FIG. 2 is a fragmentary elevational view of the machine illustrated in FIG. 1 with the die casting dies in a closed casting position;

FIG. 3 is a fragmentary elevational view similar to FIG. 2 with the die casting dies in an open position and the turntable in an elevated position;

FIG. 4 is an enlarged fragmentary view of the cooperating cover and ejector die members;

FIG. 5 is a sectional view of the machine illustrated in FIG. 2 taken along line 5–5 thereof; and

FIG. 6 is a fragmentary sectional view of a portion of the machine illustrated in FIGS. 1 to 4, more specifically illustrating the cast article supporting structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, there is illustrated a die casting machine which includes a stationary platen 10 supported upon a floor engaging support frame 12 and a furnace structure 14 for melting and holding or containing the molten metal to be employed for producing metal die cast articles. Extending upwardly from each of the four corners of the stationary platen 10 are vertical guide rods or stanchions 16. The lowermost ends of the guide rods 16 are anchored to the stationary platen 10 in any suitable fashion, while the uppermost ends are likewise anchored to a stationary back plate 18.

Intermediate the stationary platen 10 and the stationary back plate 18 is a movable platen 20. The movable platen 20 is mounted for reciprocation on the guide rods 16 and is provided with suitably disposed apertures at the four corners thereof to enable a proper sliding fit on the guide rods 16.

A crossarm 22 having diametrically opposed outwardly extending portions 24 is positioned between the back plate 18 and the movable platen 20. The crossarm 22 is interconnected to the movable platen 20 by means of toggle linkages 26 and 28 pivotally interconnected and coupled between the outwardly extending portions 24 of the crossarm 22 and yoke members 30 affixed to the upper surface of the movable platen 20. Another linkage member 32 is provided between the linkage 28 connected to the movable platen 20, and the back plate 18.

The crossarm 22 is connected to a piston rod 34 of a hydraulic cylinder 36 which is secured to the stationary back plate 18. The hydraulic cylinder 36 is of any conventional type connected to a source of pressure fluid having suitable controls for the introduction and exhaustion of a pressure fluid. The pressure fluid source, lines, and associated controls for the hydraulic cylinder 36 are now shown for the sake of clarity and brevity. Suffice it to say that the hydraulic cylinder 36 is effective to selectively impart vertical movement of the crossarm 22 and the associated movable platen 20 as will be described in greater detail hereinafter.

It will be appreciated from an examination of FIGS. 1 and 2 that when the movable platen 20 is in its lowermost vertical position, the load thereof is carried by the stationary back plate 18 through the linkage members 28 and 30.

Mounted on the upper surface of the stationary platen 10 is a stationary cover die 40 having a molten metal conduit or gate 42 which is placed in communication with the molten metal within the furnace 14 by means of a nozzle 44 which is attached to the end of a hollow cylinder or gooseneck 46. The gooseneck 46 is disposed in part within the molten metal which is contained within the furnace 14 and is provided with port means, not shown, to permit the flow of molten metal into the hollow interior of the gooseneck 46. Molten metal is injected into the interior of the gooseneck 46 by a molten metal injecting system which includes a fluid pressure actuated cylinder 48 affixed to an A-frame supporting structure 50 and an associated metal plunger 52.

An ejector die 60 is mounted to the undersurface of the movable platen 20 by a depending support member 62 and is adapted to be supported in such a fashion that the cavities therein align and face the corresponding cavities in the stationary cover die 40. There must be precise alignment of the cover die 40 and the ejector die 60 so that the mating cavities of the separable die halves, including the gate 42, the runner 43, vents, and other essential die components may be properly positioned when the dies 40 and 60 are forced to a closed position for casting. The cover die 40 and the ejector die 60 must be in exact registry when they are in a closed position. To assure for proper registry dowel pins or the like may be mounted in the stationary cover die 40 in alignment with suitable receiving cavities in the ejector die 60.

Depending from the backup plate 18 is a downwardly extending shaft 54 which is aligned with and adapted to extend through an aperture 56 in the movable platen 20. The shaft 54 is of sufficient length to contact the ejector plate of the ejector die 60 to cause the ejector pins thereof to be depressed, as the movable platen 20 and the ejector die 60 moves upwardly. The ejector pins provide an adequate means for rapidly ejecting the casting from the ejector die without distortion. Typi-

cally, the ejector pins are retracted into a position preparatory to casting by means of a rack and pinion mechanism. Since the specific ejector pin and plate structure is not considered to be an integral portion of the invention, specific illustration thereof in the drawings has not been made.

The cavities of the cover die **40** and the ejector die **60** are suitably formed to provide a cavity **64** for the introduction of the distal end of a cast article transfer spud means includes a turntable **70** which is supported for vertical movement on a shaft **72** which extends generally upwardly from a pressure fluid actuated cylinder **74** mounted beneath the stationary platen **10**. The shaft **72** extends through a coaxially arranged hollow shaft **75** disposed to extend through the stationary platen **10** which is typically fitted with suitable bearing means **76**, shown clearly in FIG. **6** enabling relative rotational movement to be effected between the hollow shaft **75** and the stationary platen **10**. A secondary or lower turntable **77** is integrally affixed to the upper end of the collar **75** and is adapted to rotate therewith. The other or lower end of the collar **75** is connected to the output shaft of a gear reduction unit **78** which imparts rotating movement to the collar **75** and the associated turntable **77**. The lower turntable **77** has a plurality of upstanding guide rods **79** which are adapted to extend through suitably formed bearing lined apertures in the turntable **70**. It will be appreciated that upon suitable actuation of the pressure fluid actuated cylinder **74**, the shaft **72** and its associated turntable **70** may be selectively moved vertically up or down. The vertical movement of the turntable **70** is guided not only by the shaft **72**, but also by the upstanding guide rods **79**. Further, rotational movement may be imparted to the turntable **70** by suitable energization of the gear reduction unit **78** which causes the hollow shaft **75** and the turntable **77** to rotate therewith. When the turntable **77** rotates, simultaneous rotation is caused in the turntable **70**.

Quadrantly spaced on the upper surface of the turntable **70** is a plurality of cast article supporting spuds **80**. The spuds **80** are mounted for rotation about a horizontal axis within pillow block bearings **82**. The distal portions of the spuds **80** are adapted to be selectively positioned within the cavity **64** formed between the cover die **40** and the ejector die **60** when the same are in a closed relation as illustrated in FIG. **4**.

The innermost ends of the cast article supporting spuds **80** are coupled to the output shaft **84** of a pressure fluid actuated indexing mechanism **86** by a flexible coupling **88** which compensates for torque and axial alignment of the spuds **80** and their associated output shafts **84**. In effect, the flexible coupling **88** acts to cushion the torque applied to the spuds **80** by the mechanism **86**. The indexing mechanism **86** is effective to impart step-by-step rotational movement of the spuds **80** upon the introduction of pressure fluid from an appropriate source in a manner synchronized with the actuation of the other components of the machine, as will be explained in greater detail hereinafter. While the pressure fluid actuated indexing mechanism **86** is illustrated as being positioned with the longitudinal axis thereof disposed generally horizontally, it will be understood that the mechanism could likewise be disposed on the turntable **70** with the longitudinal axis being vertical. The pressure fluid for actuating the indexing mechanism **86** is typically introduced into the main cylinder thereof through ports **89** which are in communication with a source of pressure fluid through conduits which extend centrally of a depending stationary hollow shaft **90** and an extension thereof **92** which is affixed to the turntable **70** and rotates therewith. Of course, a fluidtight seal is provided between the stationary shaft **90** and the extension **92** thereof so that no pressure fluid is permitted to escape therefrom. A cam operated valve **94** is connected between the main cylinder of the indexing mechanism **86** and the conduits within the shaft **90** and extension **92**, and is actuated by a collar **96** having camming surfaces thereon. The collar **96** is mounted on the shaft **90** and is maintained by threaded fasteners **97**. Upon loosening the threaded fasteners **97**, the collar **96** may be rotated relative to the shaft **90** to reposition the associated camming surfaces thereon to thereby vary the position at which the turntable **70** and the spuds **80** are at the moment of actuation of the indexing mechanism **86**. Accordingly, as the turntable **70** is caused to rotate, relative movement is effected between the cam operated valve **94** and the camming surfaces of the collar **96**, so as to intermittently actuate the valve **94** to allow pressure fluid to be introduced into the indexing mechanism **86** periodically to impart rotation to the output shaft **84** and the associated spud **80**. In the preferred embodiment, the indexing mechanism **86** is set to rotate the spud **80** 180° in one direction upon the initial actuation thereof and then rotate the spud **80** 180° in the opposite direction to its initial position.

It will be noted from an examination of FIG. **5**, in particular, that the machine of the invention contains four separate stations; namely, a casting station generally indicated by letter A; a quenching station indicated by letter B; a trimming station indicated by letter C; and a stripping station indicated by letter D.

The foregoing description has been directed primarily to the mechanism for transferring the cast article from one station to another. At this point, more specific description will be made to each of the various stations. Initially, the casting station A which includes the stationary cover die **40** and the movable ejector die **60**, the gooseneck **46**, the molten metal injecting cylinder **48**, and the molten metal furnace **14** must have a provision for changing or replacing the nozzle **44** on the end of the gooseneck **46**. To accomplish this objective, there is provided an A-frame supporting structure **50** which is supported by a pair of spaced apart horizontally disposed rack arms **100** and **102**. The inner ends of the rack arms **100** and **102** are affixed to the stationary platen **10**. Suitable pinions, not shown, are rotatably secured within the A-frame supporting structure **50** and are further commonly coupled to a shaft **104** having an exteriorly positioned manually actuated drive wheel **106**. The pinions are adapted to mesh with the teeth on the respective racks **100** and **102** and cooperatively are effective to impart movement to the A-frame structure **50** toward and away from the stationary platen **10**, and more particularly, effect movement of the nozzle **44** of the gooseneck **46** relative to the gate **42** of the cover die **40**. Since the nozzle **44** extends upwardly beyond the lower surface of the stationary platen **10**, provision must be made to permit the nozzle assembly to be lowered beneath the platen **10**. Toward this end, the gooseneck **46** is pivotally mounted with the A-frame structure **50** as generally indicated by reference numeral **108**. The gooseneck **46** is held in a fixed position with the nozzle assembly **44** adjacent the gate **42** of the cover die **40** by threaded fastener means **110**, as illustrated in FIG. **1**. By loosening the fastener means **110**, the gooseneck assembly **46** may be pivoted about the pivot point **108** in such a manner that the nozzle **44** may be lowered to clear the bottom of the platen **10** and be moved away therefrom by manually operating the hand wheel **106**. Thereby, the nozzle **44** may be replaced with facility, and the gooseneck assembly **46** may thereafter be repositioned such that the nozzle **44** is adjacent the gate **42** of the cover die **40**.

The next adjacent station in a counterclockwise direction from the casting station A as viewed in FIG. **4**, is the quenching station B. The quenching station B. comprises a spray booth **112** having suitably arranged spray heads **114** for directing the application of an atomized coolant to the cast article **116** to conduct a sufficient amount of heat energy away from the cast article to enable the metal to cool, harden and set to be suitable for clean trimming.

The quenching station B functions to cool the cast articles a sufficient amount to assure that the metal has shrunk its full amount to set the dimensional characteristics thereof prior to trimming.

The following station is the trimming station C which typically includes trimming dies **117** and **118** which cooperate to effectively remove the cast article from the sprue, flashing, and runners.

Any die casting has a parting line at the point where the two die halves of the casting dies **40** and **60** meet. This parting line is identified by a thin flash of metal that is formed where the molten metal is forced under pressure between the mating die surfaces. The flash and parting lines, together with the gate **142** and runners **143** must be removed before the die casting is usable. This is accomplished by trimming dies of the type typically referred to as a push-through trimming die which employs a trimming plate **117**, and a punch or pusher die **118**. The punch **118** is secured to the under surface of the movable platen **20** by depending support member **120**. The trimming plate **117** is provided with an aperture of the shape of the casting so that when the die casting is placed in between the trimming plate **117** and the punch **118** and the punch **118** forces the casting through the trimming plate **117**. The flash is pinched off between the edges of the punch **118** and the edges of the trimming plate die **117**.

The trimmed cast article, or articles, in the case of multipart casting, is caused to drop onto a conveyor or chute and typically travels from there to a suitably disposed receptacle for shipping or later handling.

The final station is the stripping station D which is specifically illustrated in FIG. **6**. The mechanism of the stripping station D is effective to remove the metal forming the sprues, flashing, and runners from the supporting spuds **80**, causing the material to fall onto a chute or conveyor, whence it is delivered to a suitable receptacle from which it is available for remelting and subsequent casting operations. The stripping mechanism includes a base **130** suitably affixed to the stationary platen **10**. A slideway **132** is formed to extend longitudinally along the upper surface of the base **130** and is adapted to receive a cam actuated stripping slide **134**. Beneath the slideway **132**, there is an elongate cavity **136** which is formed to guide a peg **138** depending from the bottom of the stripping slide **134**. A compression spring **140** is disposed within the cavity **136** and has one end secured to the base **130** by a fastener **142** and the other end acting against the peg **138**. The spring **140** functions normally to apply sufficient force to urge the peg against the innermost shoulder **144** of the cavity **136**, thereby maintaining the stripping slide **134** in a position to the left of that illustrated in FIG. **6**. The stripping slide **134** is provided with a channel **146** at the upper surface thereof and a camming surface **148** formed at the left-hand side of the slide as viewed in FIG. **6**.

At the innermost side of the stationary base **130** is an upstanding backup plate **150** having a generally U-shaped yoke portion **152** formed at the upper end thereof. In the relative position of the components of the machine as illustrated in FIG. **5**, it will be seen that the portion of the spud **80** between the pillow block bearing **82** and the collar **153** is positioned within the space or zone defined by the yoke portion **152** of the backup plate **150**, and the inner surface of the collar **153** is in engagement with the outer surface of the backup plate **150** thereby to millitate against any inward movement of the spud during a stripping operation.

Depending from the lower surface of the movable platen **20** is a supporting member **156** having a camming attachment **158** at the distal end thereof provided with a camming surface **160** for camming engagement with the camming surface **148** of the stripping slide **134**. It will be appreciated that when the movable platen **20** is in a raised position, the stripping slide is caused to be moved by the spring **140** to a position at the left of the position illustrated in FIG. **5** and is then cammed to the position illustrated in FIG. **5** upon the lowering of the platen **20** and associated support member **156** and the camming attachment **158** whereupon the cooperation of the downwardly moving camming surface **160** acts against the camming surface **148** of the slide **134** to move the slide **134** against the bias of the spring **140**.

Once again referring specifically to FIGS. **1**, **2**, and **3**, there is illustrated a mechanism for providing a counterbalancing characteristic to the heretofore described apparatus. More specifically, a pair of air cylinders **160** and **162** is affixed to the upper surface of the back plate **18**. Each of the cylinders **160** and **162** is provided with an inlet **164** which, through suitable lines **166**, is in communication with a source of pressure fluid. An associated piston rod **168** projects downwardly from each of the cylinders **160** and **162** and extends through a suitable aperture in the back plate **18**. The free ends of the piston rods **168** are respectively attached to the movable platen **20**. In operation, a constant air pressure is maintained at the inlets **164** which tends to urge the piston rods **168** and the movable platen **20** upwardly. On the downward movement of the platen **20**, typically a quick dump valve means is utilized in the inlet **164** to maintain regulated air pressure within the cylinders **160** and **162** and to vent to atmosphere during the downward cycle. On the upward movement of the platen **20**, the upper end of the cylinders **160** and **162** are suitably vented to atmosphere. However, since there is a constant pressure admitted to the cylinders **160** and **162**, they act to counterbalance the weight of the platen **20** during its downward movement. In the preferred embodiment, at neither of the terminal positions, either fully up or completely down, of the platen **20**, will the piston and piston rods **168** be permitted to reach a fully stopped position with the piston against any internal stops.

In a typical duty cycle of the apparatus described above, the machine is initially in the position illustrated in FIGS. **1** and **2** wherein the dies **40** and **60** are in a closed position preparatory to casting. The shot cylinder **48** is actuated causing the plunger **52** to forcefully inject molten metal from the furnace **14** through the gooseneck **46** into the nozzle **44**. From the nozzle **44**, the molten metal is injected into the mating impressions of the dies **40** and **60**. The molten metal flows into the impressions of the dies **40** and **60** and also around the distal end of the spud **80** which is positioned to project into the cavity **64**. Then the hydraulic cylinder **36** is energized to move the crossarm **22** and the movable platen **20** into the position illustrated in FIG. **3**. The upward movement of the movable platen **20** is, of course, assisted by the constant counterbalancing pressure exerted by the cylinders **160** and **162** between the back plate **18** and the platen **20**. As the platen **20** is moved upwardly, the ejector die **60** is carried upwardly therewith. During the upward movement of the platen **20**, the shaft **54** extends through the aperture **56** thereof and contacts the ejector plate of the ejector die **60** causing the ejector pins to be depressed and thereby force the casting away from the ejector die **60**.

Simultaneously with the upward movement of the platen **20** and the ejector die **60**, the turntable **70** and the associated spuds **80** are caused to be moved upwardly through the action of cylinder **74**. Upon energization of the cylinder **74**, the shaft **72** if is forced upwardly through the collar **75**. It will be appreciated that upon being released from the ejector die **60**, the upward movement of the casting and the associated turntable **70** and spuds **80** is halted and the ejector die continues its upward travel to permit movement of the casting in a horizontal plane.

The turntable **77** is then caused to rotate by means of the gear reduction unit **78** which drives the collar **75** affixed to the lower turntable **77**. The upstanding guide posts **79** effect simultaneous rotary movement of reciprocating turntable **70** and the associated spuds **80**. Manifestly, as the turntable **70** is rotated, the indexing units **86** also are rotated therewith. As the turntable **70** is rotated relative to the depending shaft **90**, the cam actuated switches **94** which control the admission of pressure fluid into the indexing units **86** are cammed by the camming collar **96** affixed to the shaft **90**. If the collar **96** is adjusted to cause the actuation of the switches **94** before the spud **80** reaches the quenching station B, the spud **80** carrying the part cast at the casting station A will rotate the entire casting through 180° about a horizontal axis. The point at which the casting is to be rotated by the indexing units **88** will depend upon the nature of the casting.

Suffice it to say, the casting is then moved to the quenching station B where the spray heads **114** direct a spray of coolant

on the casting. The quenching action at station B occurs simultaneously with a casting operation which is being accomplished at station A. It will be understood that prior to the commencement of each casting operation, the pressure fluid in the cylinder **36** is allowed to escape, permitting the movable platen **20** and the associated ejector die **60** to move downwardly until it is properly positioned on the cover die **40**. Simultaneously with the aforementioned downward movement of the platen **20**, the turntable **70** is caused to be lowered to its initial position as clearly illustrated in FIGS. **2** and **5**. The casting operation is then accomplished in the aforedescribed manner. At the conclusion of the casting operation, the platen **20** and the turntable **70** are raised, and the turntable **70** is rotated about the axis of the shaft **72** and the initial casting is moved to trimming station C. It will be observed that at the trimming station C the trimming dies **117** and **118** are separated thereby permitting the casting to be properly located therebetween. The cycle is continued whereupon the trimming dies **117** and **118** closed by the lowering of the platen **20** which effectively removes the cast article from the gate, runners, and flashing. The cast article thus removed typically falls to a chute or conveyor therebeneath.

Finally, the cycle is repeated and that portion of the casting which includes the gate, runners, and flashing is moved to the stripping station D where the remaining metal scrap is stripped off from the spud **80**. When the turntable **70** is lowered, spud **80** is disposed within the channel **146** of the stripping slide **134** such that the metal to be removed is on the outer side of the slide and the collar **153** abuts against the outer surface of the backup plate **150**. Upon the downward movement of the platen **20**, the camming surface **160** of the camming attachment cams the camming surface **148** of the stripping slide **134** to move the same against the metal attached to the end of the spud **80** to remove the same therefrom. Typically, the metal thus removed falls downwardly onto a chute or conveyor and is returned to the furnace **14** for remelting.

While mention has been made heretofore that the trimming station C employs a push through type trimming die, it will be apparent to those skilled in the art that the apparatus of the invention is adaptable for incorporation of a number of different types of trimming die arrangement such as a positive knockout type or other types well known in the art. Suffice it to say that the apparatus readily adopts itself to many types of trimming dies.

Also, the description of the machine has made reference to there being four spuds **180**. Manifestly, the number of spuds **180** may be varied to suit the particular application desired.

It will be appreciated that the apparatus described hereinabove provides a means for producing castings with great efficiency, continuity of parts, and minimal amount of labor necessary to satisfactorily perform the operation.

In accordance with the provisions of the patent statutes I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that the invention may be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope.

I claim:

1. A vertical die casting machine comprising:

a casting station including a stationary lower die member and a moveable upper die member;

means for vertically moving said die member into and out of closed casting relation;

means for injecting molten metal into said die members when said die members are in closed casting relation for producing a cast article having associated flashing;

a plurality of cast article and flashing supporting means cooperating with said die members of said casting station onto which the cast article and associated flashing are formed;

a quenching station circumferentially spaced from said casting station for cooling the cast article and associated flashing;

a trimming station circumferentially spaced from said quenching station for removing the cast article from the associated flashing;

a stripping station circumferentially spaced from said trimming station for removing the residual flashing from said supporting means, including means for applying a force to said residual flash to strip said flash from said cast article supporting means;

means for sequentially moving said cast article and flashing supporting means to each of said casting, quenching, trimming and stripping stations; and

means for rotating said supporting means about a horizontal axis through at least 180° between said casting and trimming stations to properly position the cast article in said trimming station.

2. The invention defined in claim **1** wherein said means for sequentially moving said cast article and flashing supporting means includes a turntable which is rotatable about a vertical axis.

3. The invention defined in claim **2** wherein said turntable is mounted on a vertically extending shaft.

4. The invention defined in claim **3** wherein said shaft is provided with means to impart selective vertical movement thereto.

5. The invention defined in claim **1** wherein said means for vertically moving said die members includes a vertically movable platen member connected to one of said die members.

6. The invention defined in claim **5** which further includes a stationary back plate having depending linkage means interconnected to said movable platen member.

7. The invention defined in claim **6** including a stationary shaft depending from said back plate for selective engagement with the movable one of said dies for ejecting the cast article therefrom upon the upward movement of said movable platen and said die member.

8. The invention defined in claim **1** wherein said stripping station consists of a cam actuated stripping means for removing the flashing from said supporting means.

9. The invention defined in claim **8** wherein said cast article and flashing supporting means include an integral collar, and said stripping station includes a fixed support which cooperates with said collar positively retaining said supporting means against outward axial movement upon actuation of said cam actuated stripping means.

10. The invention defined in claim **2** wherein said means for sequentially moving said supporting means includes a second rotatable turntable, said second turntable disposed beneath said first mentioned turntable, and second turntable having upstanding linkage means which imparts rotary movement to said first mentioned turntable and permits vertical displacement therebetween.