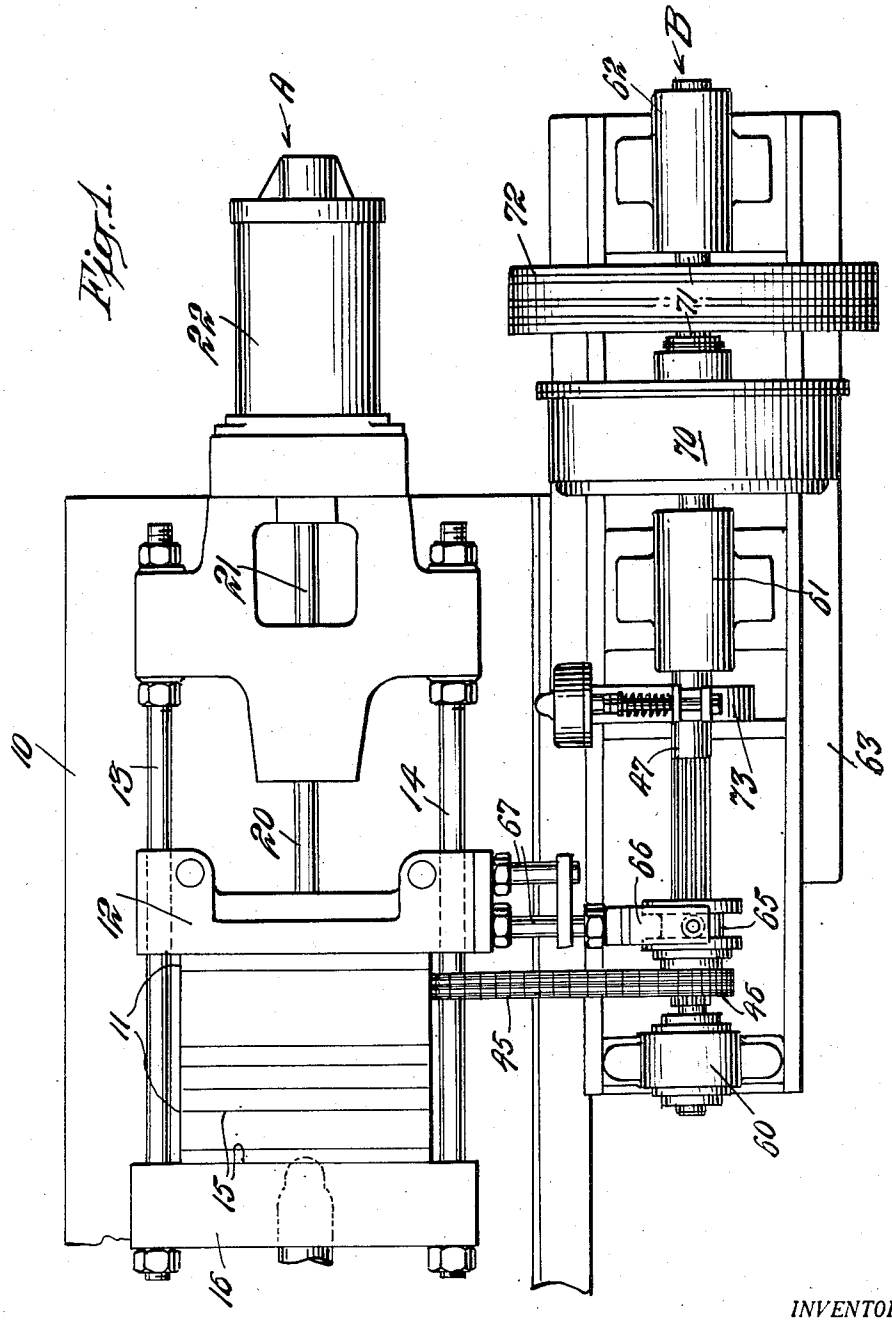
April 8, 1958 W. C. FROMMER 2,829,409

DIE CASTING APPARATUS

Filed Dec. 13, 1955 4 Sheets-Sheet 1

Fig. 1.



INVENTOR.
WILLIAM C. FROMMER
BY
Luther W. Hawley
ATTORNEY

April 8, 1958 W. C. FROMMER 2,829,409

DIE CASTING APPARATUS

Filed Dec. 13, 1955 4 Sheets-Sheet 2

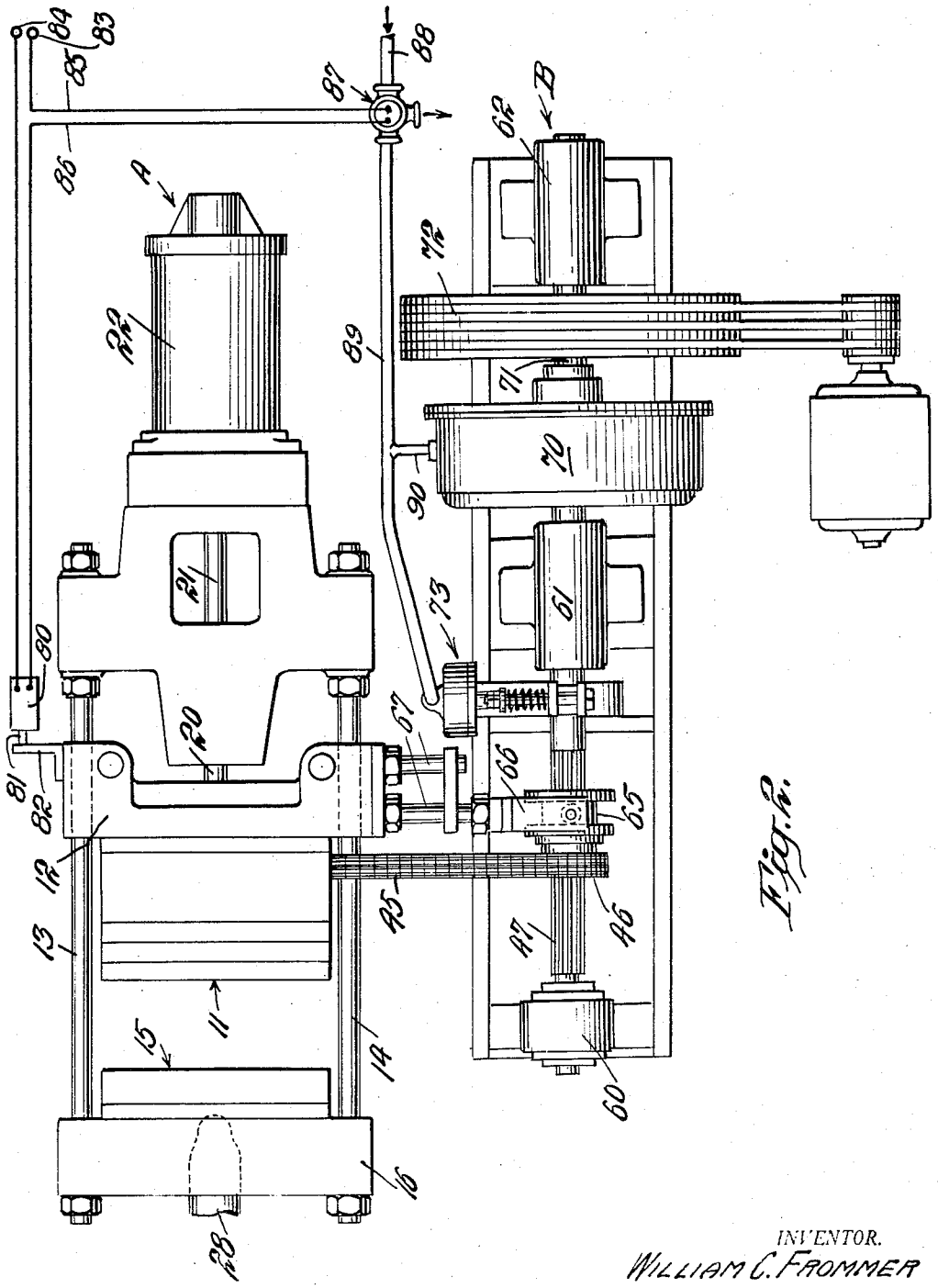


Fig. 2.

INVENTOR.
WILLIAM C. FROMMER
BY
Luther W. Hawley
ATTORNEY

April 8, 1958 W. C. FROMMER 2,829,409

DIE CASTING APPARATUS

Filed Dec. 13, 1955 4 Sheets-Sheet 3

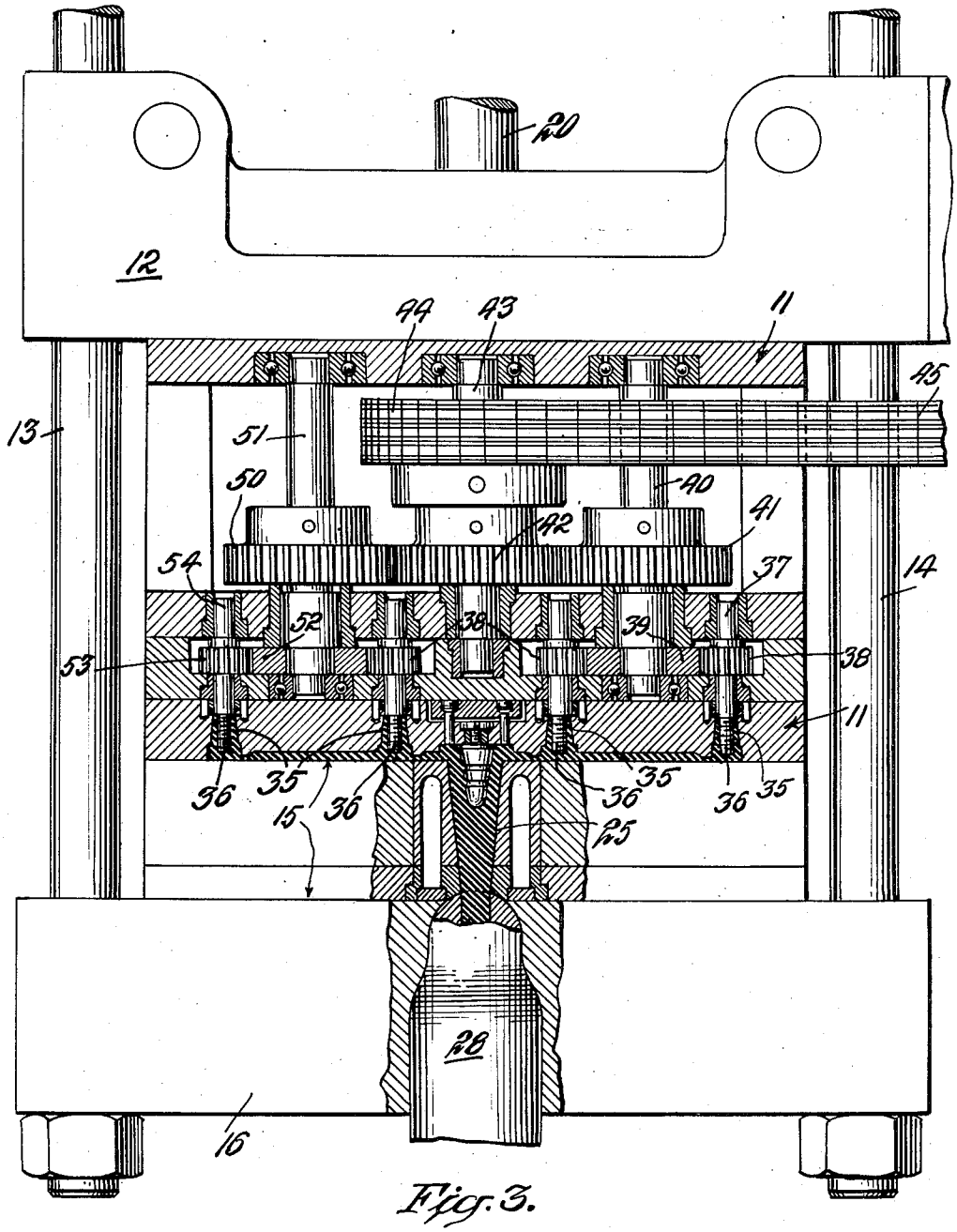


Fig. 3.

INVENTOR.
WILLIAM C. FROMMER
BY
Luther W. Hawley
ATTORNEY

April 8, 1958 W. C. FROMMER 2,829,409

DIE CASTING APPARATUS

Filed Dec. 13, 1955 4 Sheets-Sheet 4

Fig. 4.

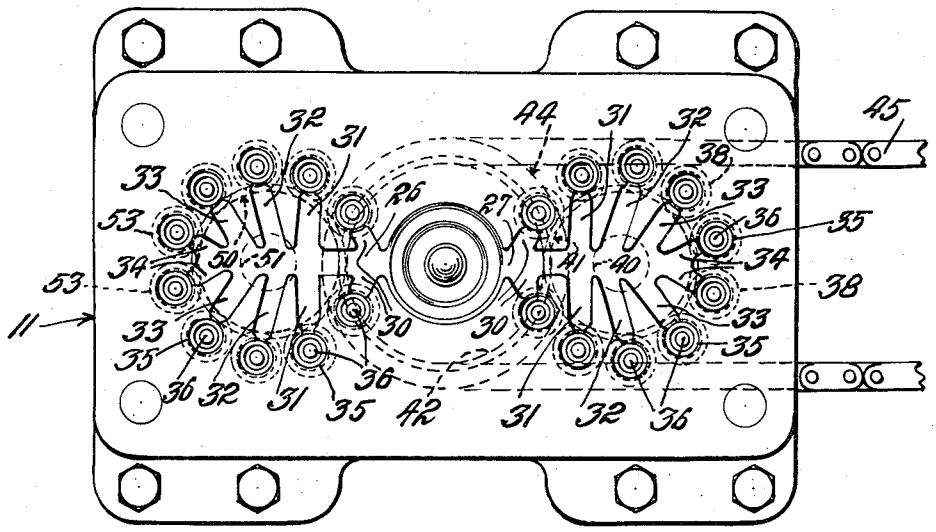


Fig. 5.

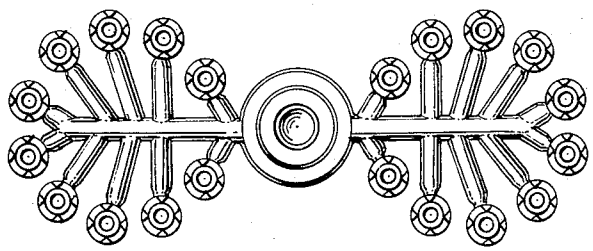


Fig. 6.

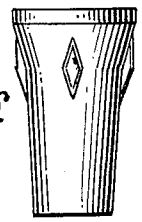
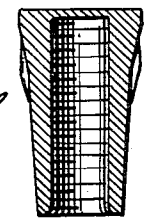


Fig. 7.



INVENTOR.
WILLIAM C. FROMMER
BY
Luther W. Hawley
ATTORNEY

United States Patent Office 2,829,409 Patented Apr. 8, 1958

2,829,409

DIE CASTING APPARATUS

William C. Frommer, Elizabeth, N. J., assignor to Star Expansion Industries Corporation, New York, N. Y., a corporation of Delaware

Application December 13, 1955, Serial No. 552,799

1 Claim. (Cl. 22—93)

This invention relates to die casting apparatus and particularly to apparatus for casting a plurality of groups of multiple units of articles having internal threads therein.

The die casting unit comprises a movable die and a closure or stationary die, the die member in which the threaded articles are to be cast having threaded cores therein, and means for rotating the cores when the dies have been separated whereby the castings will be ejected from the mold cavities in the die.

The invention has for its salient object to provide apparatus of the character described in which the mold cavities are disposed in the movable die and the threaded cores can be rotated to eject the castings when the movable die is opened or moved away from the stationary die or closure.

Another object of the invention is to provide apparatus of the character described so constructed that a plurality of groups of units can be cast simultaneously.

Another object of the invention is to provide apparatus of the character described so constructed that a plurality of groups of units can be cast simultaneously and can thereafter be ejected simultaneously.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which

Fig. 1 is a plan view of apparatus constructed in accordance with the invention;

Fig. 2 is a plan view of the apparatus showing the movable die in open position and illustrating diagrammatically the means whereby the driving connections between the core driving mechanism and the threaded cores will be set in operation when the movable die is opened;

Fig. 3 is a view, partly in plan and partly in section, showing the movable die and the driving connections for the threaded cores therein;

Fig. 4 is a face view of the movable die, parts being omitted for the sake of clearness, and illustrating the driving connections for the threaded cores;

Fig. 5 is a plan view of the multiple unit casting made in the apparatus;

Fig. 6 is an elevational view of one of the units cast; and

Fig. 7 is a sectional elevation of the casting shown in Fig. 6.

The invention, briefly described, consists of die casting apparatus comprising a die casting unit and mechanism connected thereto for rotating the threaded cores in the die to eject the castings from the mold cavities. The die casting unit comprises a movable die which is movable toward and away from a stationary die, the mold cavities being formed in the movable die and the molten metal being introduced through a gate in the stationary die into the mold cavities under pressure when the movable die is closed upon the stationary die or closure. The gate is disposed centrally in the movable die and the mold cavities and passages thereto for forming the groups of unit are disposed laterally of the gate.

The apparatus further comprises core driving mechanism which is so operated and so connected to the threaded cores in the movable die that when the movable die is opened the connections to the core driving mechanism are closed, thereby operating the driving connections and rotating the cores in a direction to eject the groups of cast units from the movable die.

Further details of the invention will appear from the following description.

In the particular embodiment of the invention illustrated in the drawings, the die casting apparatus is shown at A and the core driving mechanism is shown at B, these parts of the apparatus being disposed side by side.

The die casting apparatus A is mounted on a base **10** and comprises a movable die **11** carried by a block **12** slidably mounted on rods **13** and **14**. The die casting apparatus further comprises a stationary die **15** which is carried by a stationary block **16** mounted on the rods **13** and **14**.

The block **12** and the movable die **11** are moved toward and away from the stationary die by means of a rod **20** which is connected by suitable toggle mechanism, not shown, to a plunger rod **21** which extends into a pneumatic cylinder **22**. This cylinder has a piston therein which is operated pneumatically in the usual manner and moves alternately in opposite directions by a suitable control mechanism to close and open the movable die. It will be understood that the rod **20** and piston rod **21** are slidable through suitable bearings.

The construction of the movable die is shown particularly in Figs. 3 and 4. As shown in Fig. 3, the stationary die **15** has a central opening or gate **25** therethrough, and the molten metal under pressure is introduced into the gate **25** through a suitable conduit or nipple **28**. As shown in Fig. 4, the gate **25** communicates with conduits **26** and **27** extending laterally from the gate and each of these conduits has a series of branch conduits **30, 31, 32, 33** and **34** which extend laterally from the conduits **26** and **27** and communicate with mold cavities **35**. In each of the mold cavities there is disposed a threaded core pin **36** which is carried by a spindle **37**. On each of the spindles **37** on one side of the gate there are mounted gears **38** which mesh with a gear **39** mounted on a spindle **40**, which also has mounted thereon a gear **41** which meshes with a gear **42** carried by a spindle **43**. The spindle **43** has a sprocket **44** which is driven by a chain **45**, which is also mounted on a sprocket **46** splined to a shaft **47** of the core driving mechanism B.

The gear **42** also meshes with a gear **50** mounted on a spindle **51**, which has also mounted thereon a gear **52** which corresponds to the gear **39** on the spindle **40**. Gear **52** meshes with gears **53** on spindles **54** which carry the threaded core pins in the unit at the other side of the gate **25**.

After the movable die has been closed by being moved to position against the stationary die, the molten metal is introduced through the conduit or nipple **28** into the gate **25** and is forced laterally through the conduits or grooves **26** and **27** and into the branch conduits from which the metal passes into the mold cavities. After this operation has been completed, the movable die is moved away from the stationary die and, in a manner hereinafter described, the driving connections for the core rotating mechanism are closed and the cores are rotated in a direction to eject the castings from the mold cavities.

The core driving mechanism will now be described. The shaft **47** is mounted in suitable bearings **60, 61** and **62** on a base **63**. The sprocket **46** on the shaft **47** is mounted on or carried by a grooved collar **65**. A forked

yoke 66 engages the collar 65 and is connected by pins 67 to the block 12. Thus, as the block and the movable die are moved toward and away from the stationary die along the rods 13 and 14, the shaft 47 will remain in driving connection with the sprocket 46. The shaft 47 has mounted thereon a pneumatic clutch 70, one side of this clutch being connected to the shaft 47 and the other side being connected to a shaft 71 which has mounted thereon a pulley 72 driven from any suitable source of power. Shaft 47 also has mounted thereon a brake 73.

The driving connections for operating the clutch and the brake are shown diagrammatically in Fig. 2. A switch 80 has a switch operating pin 81 disposed in the path of movement of an abutment 82 carried by the block 12. As the movable die 11 moves to open position, as shown in Fig. 2, the abutment 82 will cause the pin 81 to close the switch 80, thereby connecting the power line shown at 83 and 84 to leads 85 and 86 which are connected to a solenoid valve 87. This valve is connected to an air pressure conduit 88 and when the switch 80 is closed the solenoid is operated to cause the valve to open, permitting the air from the air presure line 88 to enter a conduit 89 from which air is conducted through a branch conduit 90 to the clutch 70. Moreover, the conduit 89 is connected to the brake 73.

Thus, when the movable die opens, the switch 80 is closed, energizing the solenoid valve 87 and causing this valve to connect the air pressure line 88 to the conduit 89 and branch conduit 90, closing the clutch 70 which is normally open, and releasing the brake 73 which is normally closed. Since the chain 45 which drives the connections for the threaded core pins is mounted on a sprocket 46 which is splined to the shaft 47, and since this sprocket is carried by the collar 65 which in turn moves with the movable die, the chain 45 can drive the core pins to eject the castings when the movable die is opened.

Although one specific embodiment of the invention has been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claim.

What I claim is:

Die casting and operating apparatus comprising a pair of units, one a die casting unit and the other an operating unit for operating the die casting unit, said die casting unit comprising a movable die having mold cavities therein, rotatable threaded core pins in the mold cavities, and a stationary die closure, said operating unit having a splined drive shaft and being positioned alongside said die casting unit, a sprocket splined to said shaft, means on said movable die for connection by a chain to said sprocket for rotating said core pins, and bracket means connected to the movable die for moving said sprocket along the splined shaft on the operating unit as the movable die moves away from the die closure to maintain the driving connection between said units in any position of said movable die.

References Cited in the file of this patent

UNITED STATES PATENTS

2,137,539	McIntosh	Nov. 22, 1938
2,154,745	Hedgpeth	Apr. 18, 1939
2,217,661	Anderson	Oct. 15, 1940
2,327,665	Peat	Aug. 24, 1943
2,384,809	Bullard et al.	Sept. 18, 1945
2,391,527	Tracy	Dec. 25, 1945
2,441,525	Zesbaugh	May 11, 1948
2,454,561	Lester	Nov. 23, 1948
2,483,094	Harvey	Sept. 27, 1949
2,513,216	Sullivan et al.	June 27, 1950
2,579,952	Morin	Dec. 25, 1951
2,583,093	Emmert et al.	Jan. 22, 1952

FOREIGN PATENTS

510,668	Great Britain	Aug. 4, 1939
979,960	France	Dec. 20, 1950