

June 13, 1933.

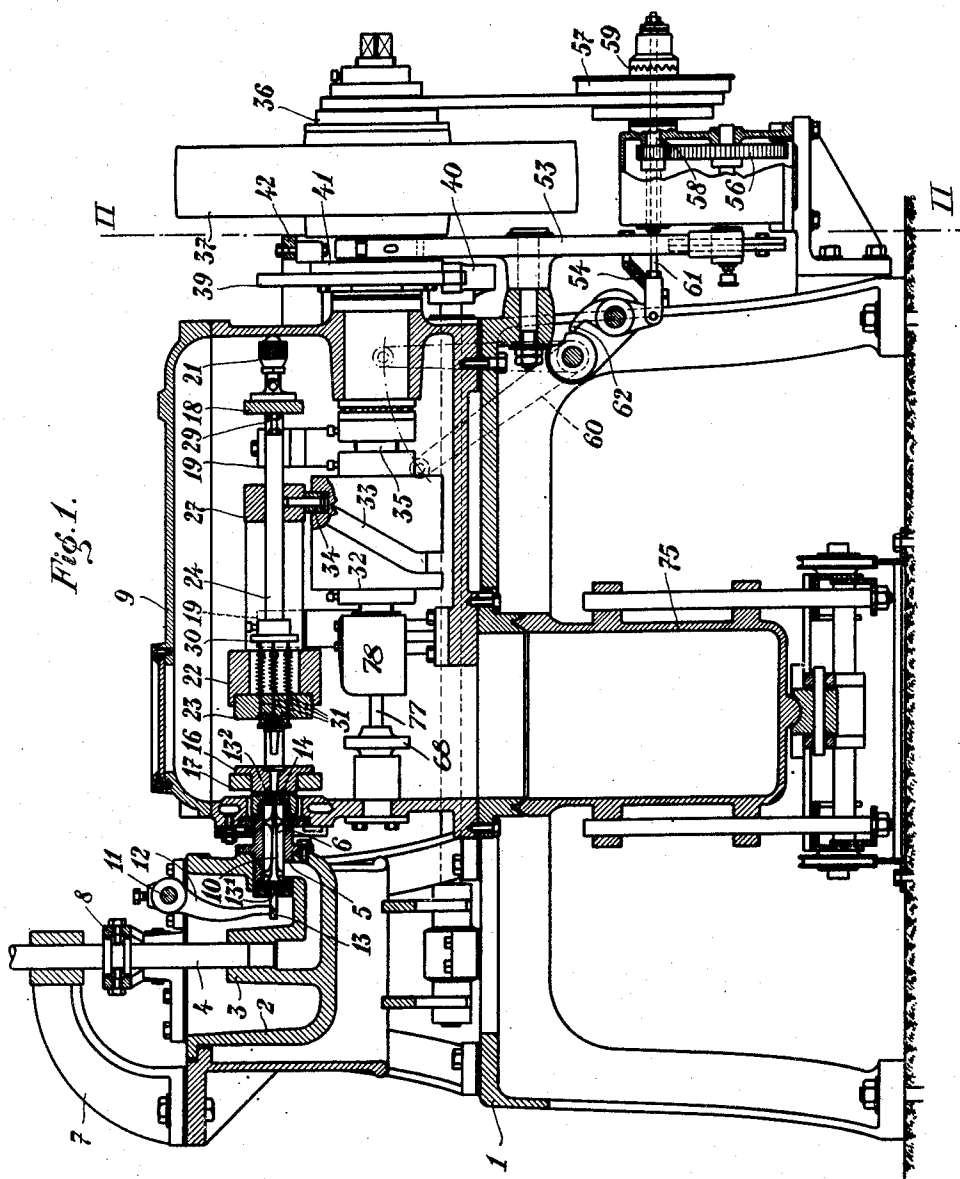
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1,914,031

DIE CASTING MACHINE

Filed Oct. 29, 1932

4 Sheets-Sheet 1



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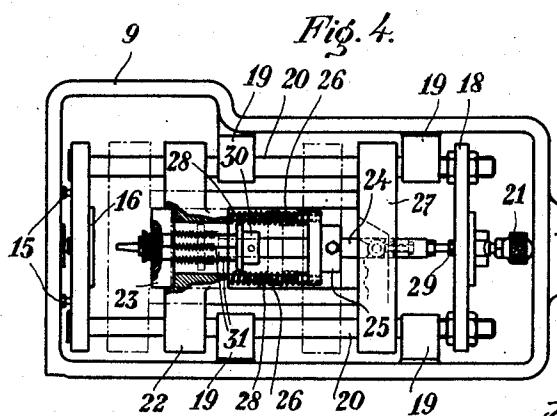
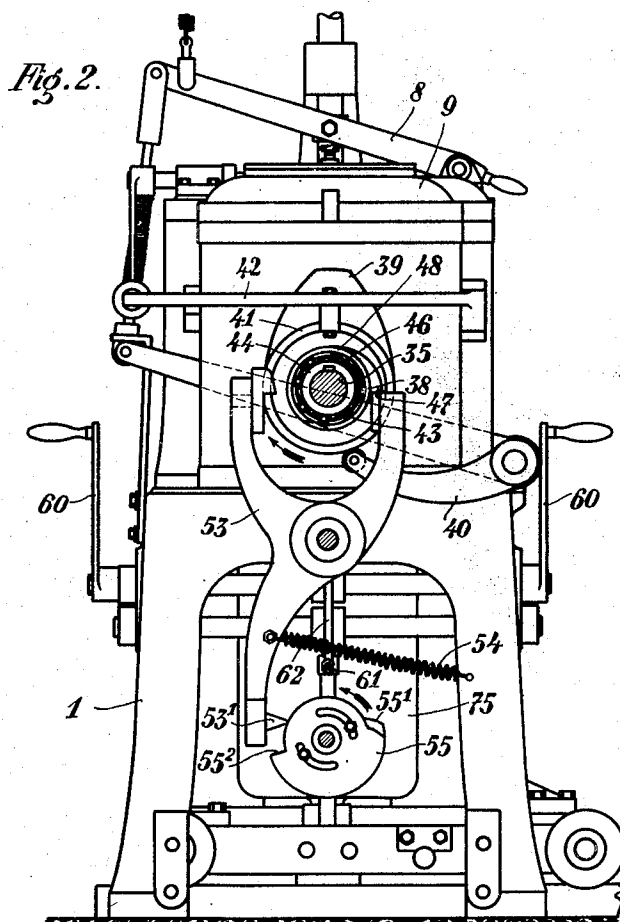
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DIE CASTING MACHINE

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4 Sheets-Sheet 2



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DIE CASTING MACHINE

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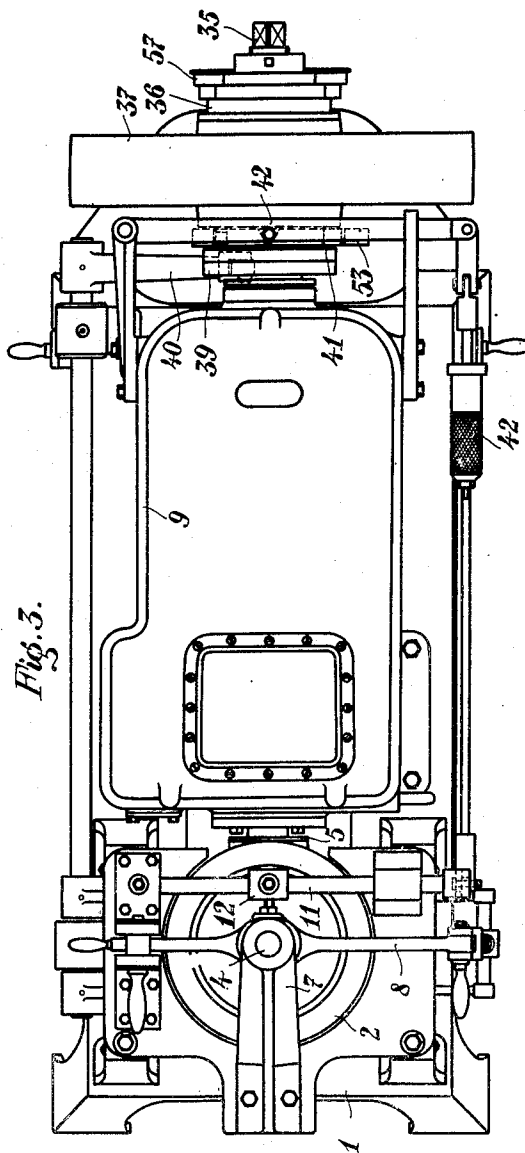


Fig. 3.

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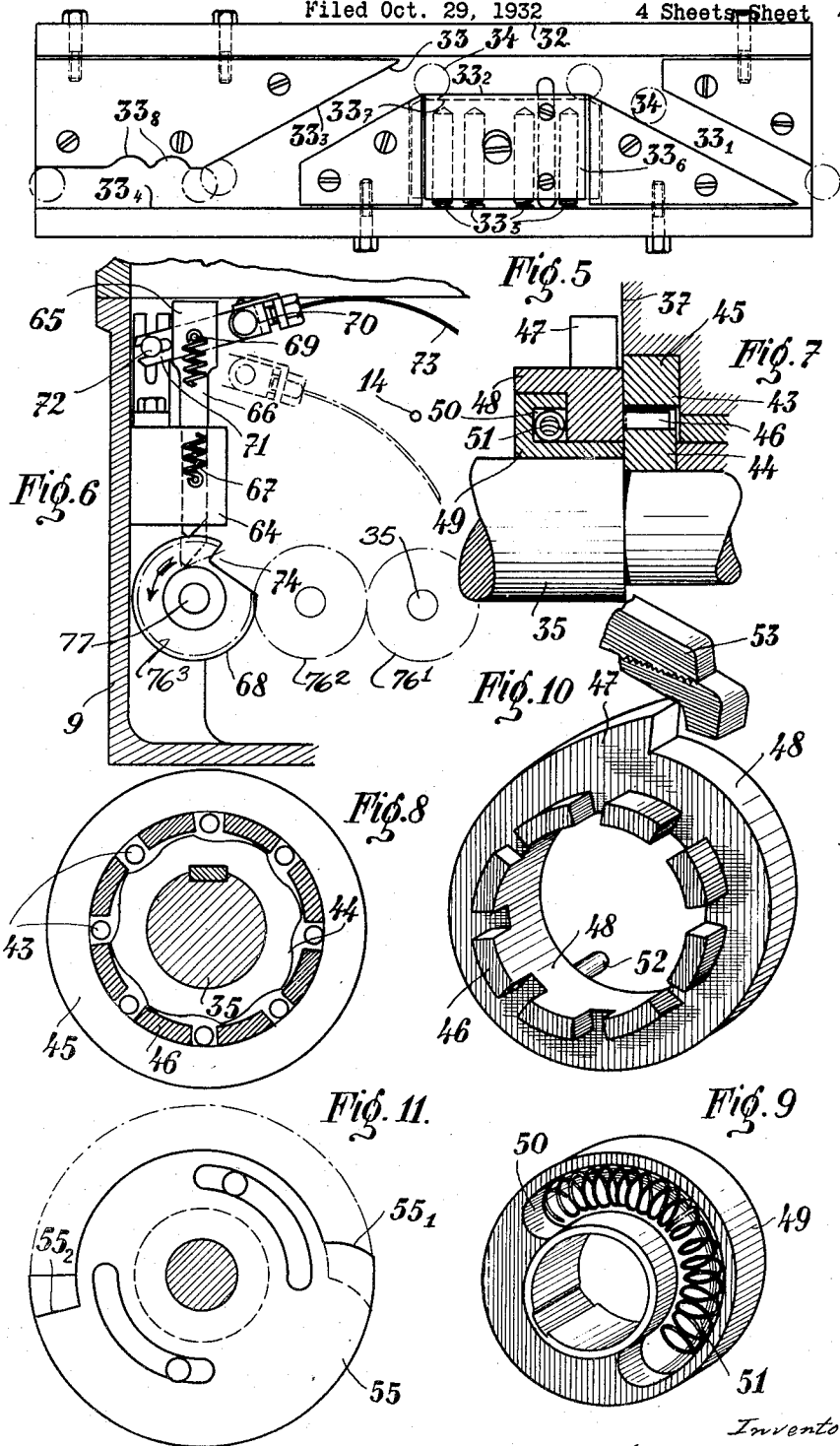
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DIE CASTING MACHINE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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DIE-CASTING MACHINE

Application filed October 29, 1932, Serial No. 640,303, and in Switzerland October 7, 1931.

The present invention relates to die-casting under pressure and more particularly to an automatic die-casting machine in which the casting is delivered from the horizontally separated moulds into a receptacle.

One object of the invention is to provide means for imparting a shaking movement to the mould section carrying the casting still clinging thereto and another object of the invention is to provide means for giving a kick to the casting itself at the opening of the mould.

Means are already known for separating the casting from the mould compulsorily. As such means pusher pins were used for evacuating the form, but the risk was connected therewith that the casting would stick to the pusher pins at least long enough for giving trouble at the closing of the moulds.

By the present invention it is intended to procure all security for a safe working of the machine.

A working example of the machine is represented in the accompanying drawings. There is

Fig. 1 a longitudinal section of the machine,

Fig. 2 a side elevation partly in section on line II—II of Fig. 1,

Fig. 3 a top view,

Fig. 4 a top view of the mechanism for handling the mould,

Fig. 5 a development of a grooved cylinder,

Fig. 6 a side elevation of a kick device,

Fig. 7 a longitudinal section and

Fig. 8 a cross section of a roller coupling,

Figs. 9 and 10 are perspective views referring to this coupling and Fig. 11 is a side elevation of an adjustable cam disc.

The machine comprises as other machines of this character a furnace arrangement with the metal ejecting device and a mechanism for handling the mould in cooperation with the metal ejecting device. Both parts are arranged alongside each other upon a common frame 1. (See Figs. 1 to 4).

The furnace arrangement possesses a crucible 2 combined with a centrally arranged vertical pressure pump communicating with the content of the crucible and consisting of

the cylinder 3, the pressure piston 4 and the pressure pipe 6 leading to a pressure valve 5. The piston of this pump is guided by a standard 7 and is operated by means of a forked arm 8 attached to the piston underneath the guide of the same. The valve body 5 forms the connection between the crucible and the air tightly closed casing 9 enclosing the mentioned mechanism. The valve 5 possesses a slide 10 which extends with one end into the melting chamber and is engaged there by an arm 12 fast on an axis 11 rotatably held on top of the crucible. Said end comprises also a valve disk 13¹ shown in its open position. The other end 13² of the slide is blunt and adapted to periodically block and clear an ejecting nozzle 14. The clearing occurs when the end 13¹ has closed the inlet from the melting chamber, while the blocking occurs when the inlet 13¹ has been opened. The slide 10 is rocked to and fro.

The mould is made in two halves. The first half forms the cover piece and the second half has to receive the casting.

The mould held within a frame is tightly pressed against the nozzle outlet while two spacing bolts 15 prevent any damaging pressure upon the nozzle as shown in Fig. 4. Said frame consists of a head cross-bar 17 unto which is fixed the first half 16 of the mould and of a back cross-bar 18 and of two rods 20 guided in lugs 19 and connecting said bars to form a stiff frame. The back cross-bar carries an adjusting screw 21 which leans against the casing 9 to establish the tight fit between mould and nozzle.

Also a second stiff frame is slidably arranged on the rods 20 the head cross-bar 22 of which carries the second half 23 of the mould. On an expelling shank 24 guided in the cross-bar 27 is fixed a yoke 25 carrying rods 26 guided in the head cross-bar 22. Helical springs 28 are sleeved on said rods between the yoke and the head cross-bar so that the whole expelling frame 22, 27 is under spring pressure. The expelling shank 24 leans by means of an adjusting nut 29 on the back cross-bar 18 of the frame which carries the first half of the mould and is provided at its fore end with a pusher plate 30 which

by a corresponding adjustment of the nut 29 is brought into contact with the expelling pins 31. These are slidingly guided under spring pressure by the cross-bar 22 as shown in Fig. 4.

According to the above the tight closing of the mould depends on the adjusting of the nut 21 and the length of the path travelled by the expelling pins 31 depends on the adjusting of the nut 29.

The working of the expelling members is effected by means of a grooved drum 32 rotatably arranged beneath the back cross-bar 27. A friction roller 34 held by a pin fast to the cross-bar 27 is guided within a groove 33 of said drum. The drum is mounted to a main shaft 35 extended to the outside of the casing 9 where it carries, besides a loosely mounted fly wheel 37 formed with a step pulley 36 on its outer face, a roller coupling 38 and a cam disk 39. The cam disk 39 is fast to said shaft and connects by a lever arrangement 40 with the piston 4 of the pressure pump and is provided on its side face with a cam groove 41 guiding a lever gear 42 to effect the intermittent opening and closing of the valves 13¹, 13² shortly after the working of the pressure piston of the pump.

The roller coupling arranged like the free wheel device of bicycles has to couple the fly wheel driven directly from the overhead transmission gear with the main shaft 35. To this end a ring 44 (Figs. 7 and 8) provided with carrier teeth 44¹ for the clamping rollers 43 is fast to the shaft 35 and an outer smooth ring 45 pressed into the fly wheel 37. Between both rings the clamping rollers 43 and carrier arms 46 are inserted, said carrier arms being integral with a ring 48 formed with a ratchet tooth 47 (Fig. 10).

Normally the coupling remains coupled because a ring 49 (Figs. 7 and 9), fast to shaft 35 and by means of a helical spring 51 placed within a groove 50 arranged concentrically to the shaft, acts constantly upon a pin 52 extended from the carrier ring 48 in an axial direction into said groove 50 and couples thereby the rings 44, 45. A release of the coupling can take place only when a pressure is exerted upon the tooth 47 rotated in a clockwise sense. This may be effected by means of a forked lever 53 pivotally mounted on a side of the machine frame and which is kept by means of a spring 54 in constant contact with the periphery of the ring 48 provided with said ratchet tooth 47. A third arm of said forked lever is kept in contact with a cam disk 55 consisting of two plates which are adjustable against each other (see also Fig. 11). This cam disk 55 is mounted on a shaft journaled in the bottom of the machine frame and driven by a train of gear wheels 56 from the shaft 58 which by a step pulley 57 is driven by the step pulley 36 of the main shaft.

While the fly wheel or main shaft runs at a speed of about 60 revolutions per minute the cam disk 55 runs only about at 15 revolutions because at each turn of the cam disk one casting is turned out and the solidifying of the castings requires a certain time. Now the step pulley 57 is mounted loose on the hollow shaft 58 and is driven by this shaft only by means of a tooth coupling 59 which is controlled by a crank lever 60 attached to a rod 61 passing through the hollow shaft 58.

When the machine is stopped only the fly wheel with the step pulleys and one part of the coupling 59 is running in a clockwise sense, then the tooth 53¹ of the forked lever 53 contacts with the portion of the disk 55 having the smaller radius.

If for starting the machine the crank lever 60 is swung from the left to the right a pivoted pawl 62 attached to the rod 61 snaps into a recessed part of the hub of said crank lever and connects the coupling 59. The cam disk 55 will be turned in an anti clockwise sense and when the tooth 53¹ has reached the portion with greater radius of the cam disk 55 the forked lever 53 will be rocked and the claw of the right hand prong of the forked lever will be relieved from the ratchet tooth 47 (Fig. 10) and the shaft 35 will be coupled with the fly wheel, and will together with the drum 32 turn in a clockwise sense.

According to Fig. 5 the groove 33 of the drum 32 which controls the opening and closing of the mould 16, 23 possesses a groove portion 33¹ ascending from the right which joins a horizontal portion 33² joined to a descending groove 33³ unto a horizontal portion 34¹ of the same height as the starting point. When the friction roller 34 of the drum 32 which controls the frame 22, 27 has passed the portion 33¹ the mould will be closed and the roller enters into the portion 33². Now the pressure side of the groove 33² is formed by a slide 33⁴ supported by the springs 33⁵. As soon as the mould is closed this slide will have receded to an amount corresponding to the difference between line 33² and the mixed line 33⁷ so that the mould has been closed in a resilient way. The distance from 33¹ to the end of 33² corresponds to the first half revolution of the shaft 35 plus about the first fourth part of the higher portion of the periphery of the cam disk 55 between the steps 55¹ and 55². This time of rest may be changed according to need by adjusting the disks 55, but it depends on the time needed for the solidifying of the castings.

As soon as the tooth 53¹ has reached the step 55² and travels through the lower part of the periphery 55 the ratchet tooth 47 will be relieved from the left prong of fork 53 and the drum will further rotate for half a revolution until the ratchet tooth 47 is again caught by the tooth of the right prong. The second half turn of the drum opens the mould

so that each turn of the disk 55 produces one casting.

When the mould opens the roller 34 runs on the solid border on the crucible side of groove 5 33 and reaches at the end of part 33^a the part 33^b. There the border of the groove is waved at 33^a so that the spring-pressed frame 22, 27 carrying the casting withdrawn from the first half of the mould is subjected to a shaking 10 to and fro movement over the expelling pins 31 which are bearing on the casting. This shaking movement will loosen the casting from the second half of the mould. This casting already loosened by the pins 31 will 15 be dropped into a collecting basket 75 on a railway arranged crosswise to the machine.

Now as it is also possible that a casting remains sticking to the expelling pins there is according to Fig. 6 also provided a kicking 20 device in the space between the two halves of the mould inside of a recess of the casing 9. A vertical slide bar 66 provided with a loop 65 at its upper end is guided in lugs 64 cast to the inside of the casing 9 and is held by 25 means of a strong tension spring 67 in contact with the surface of a cam disk 68. A swiveled lever 70 held by trunnions 69 within said loop is held with its one forked end 71 on a pin 72 and carries at its other free 30 end a whip like wire 73 which during the vertical rocking movement of the bar 66 into the recess 74 of the cam disk 68 strikes between the two separated halves of the mould and hits thereby the casting. This hit is suffi- 35 cient to overcome the resistance opposed by the casting sticking to the expelling pins.

The cam disk 68 (see also Fig. 1) is keyed to a shaft 77 which is driven by a train of 40 gear wheels 76¹, 76², 76³, from an extension of the main-shaft 35. The gear wheels are protected from the dropping castings by a cast iron hood 78 seen in Fig. 1.

By the described arrangements the undis- 45 turbed working of the machine is greatly assured so that a stop will only be required when the filled basket 75 has to be changed.

What I claim as new is:

In a die-casting-machine of the kind de- 50 scribed and in combination, two horizontal frames each formed of two cross bars connected by two lateral rods, one frame slidably arranged on the other and each frame carry- 55 ing a part of the mould, a kicking device arranged next to the space between the opened mould and comprising a spring pressed vertical sliding bar, guide lugs of this bar cast to the machine frame, a pivoted lever mount- 60 ed to the top of said bar, a stationary pin engaging the one forked end of said lever and a whip like wire rod attached to the other end of this lever, a recessed cam disk rotatably mounted to the machine frame and sup- 65 porting said spring pressed bar and driving

means to operate this cam disk and said slidably arranged frame.

In testimony whereof I affix my signature.

JAMES MAHNY. 70

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