March 31, 1931. R. ARDELT 1,799,076

RAMMING MACHINE FOR FORMING PIPE MOLDS

Filed Oct. 23, 1928 2 Sheets-Sheet 1

Fig. 1.

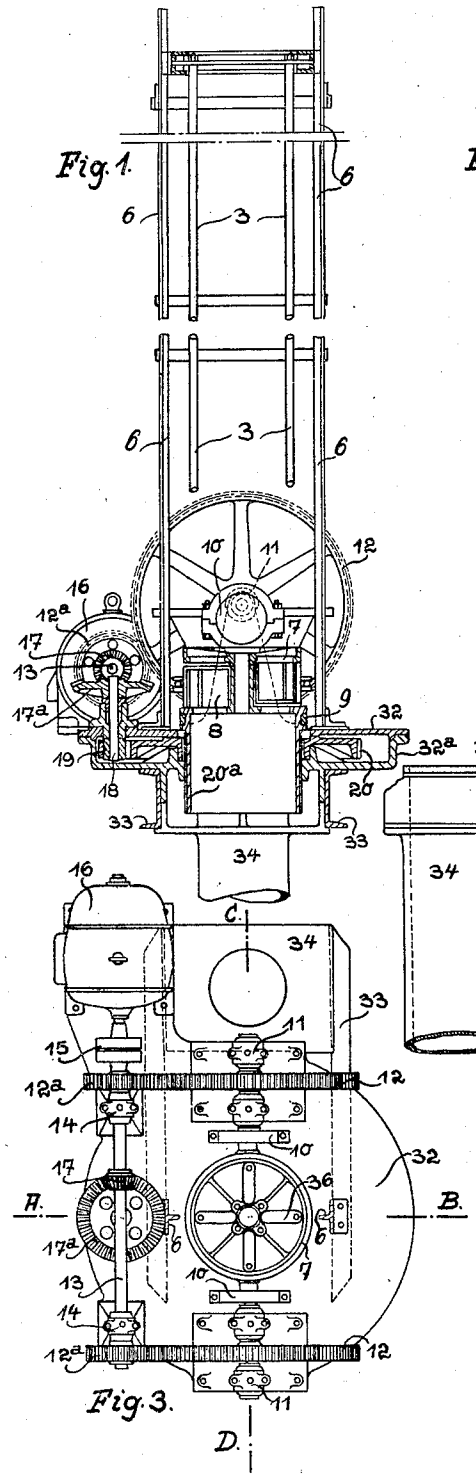
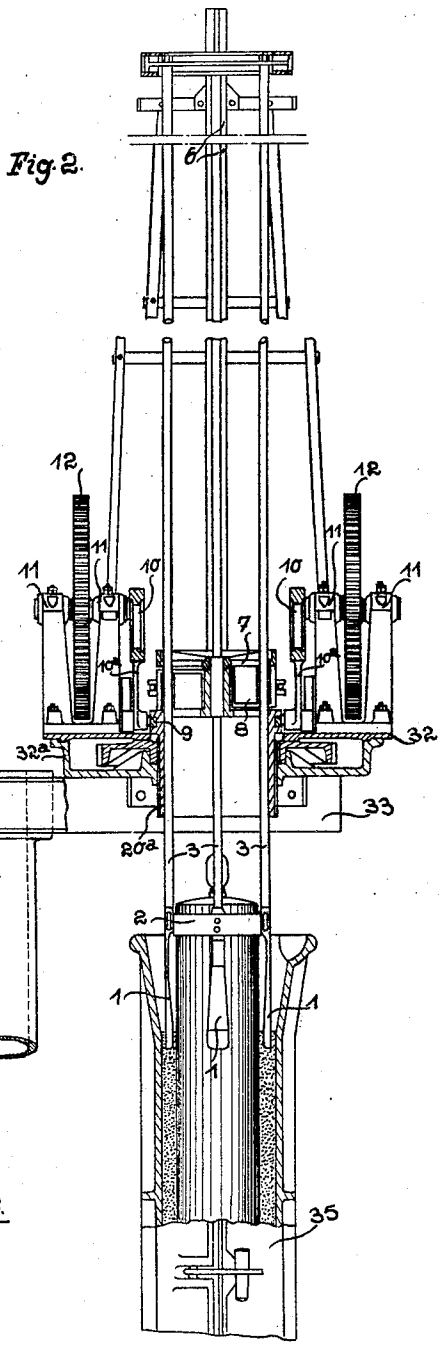


Fig. 2.



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RAMMING MACHINE FOR FORMING PIPE MOLDS

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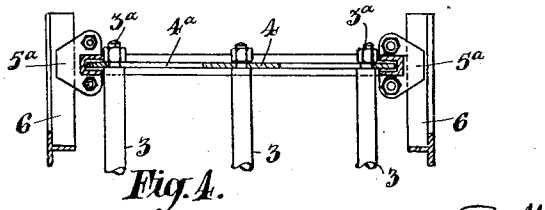

Fig. 4.

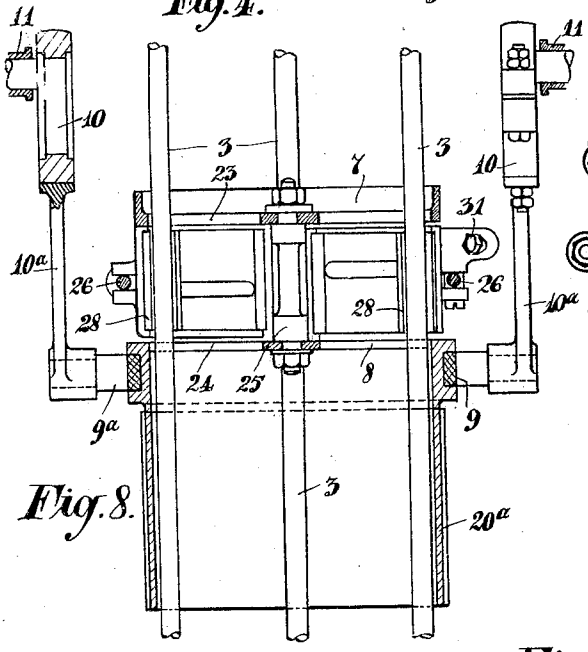

Fig. 8.

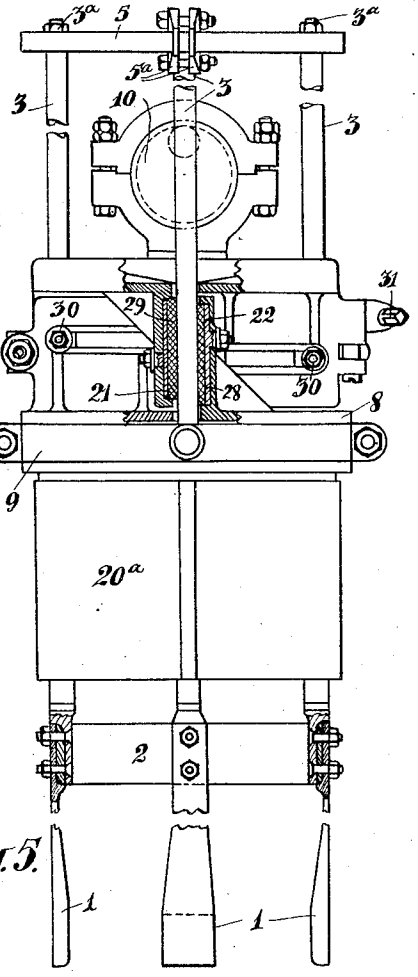

Fig. 5.

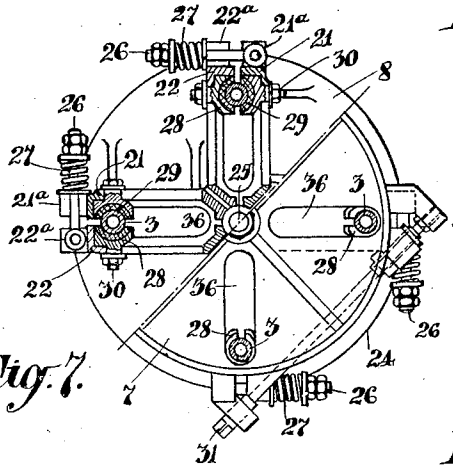

Fig. 7.

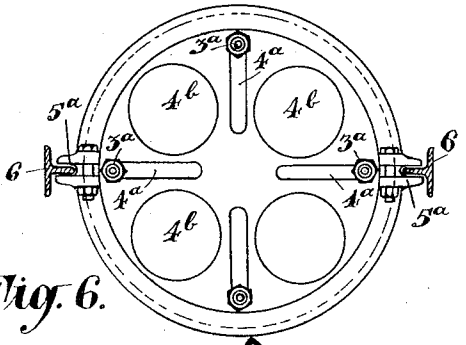

Fig. 6.

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UNITED STATES PATENT OFFICE

ROBERT ARDELT, OF EBERSWALDE IN THE MARK, GERMANY

RAMMING MACHINE FOR FORMING PIPE MOLDS

Application filed October 23, 1928, Serial No. 314,450, and in Germany October 29, 1927.

The invention has reference to a ramming machine, for forming pipe molds, of maximum stamping or ramming frequency. Known forms of ramming machines (see British Patent No. 3306/1906) have a coupling device, for the ram rods, operated by open link gear, the ram rods being connected with each other and individually and simultaneously operated, but this known form allows only a slow stamping rate, owing to the fact that the reciprocation mechanism, which is mounted on a rotary disc, and also the electric motor, participate in the rotary movement of the ramming tool and coupling device. The rotary disc thus has a diameter disproportionately large in relation to the pipe mold. The result of this is that the centrifugal force of all the parts carried by the rotary disc, such as the motor armature and all shafts for the gear wheels, in so far as they have their own axial rotation apart from a common rotary movement with the said disc, has such a disturbing influence that the rate of stamping has to be kept down to very low limits. Again the disc, which is not completely compensated by counterweights, gives a swinging motion to the rotary bracket, so that the centre of the stamping tool cannot, with certainty, be held over the centre of the pattern and molding box unless some particularly tedious verifying apparatus be fitted to the bracket. On the grounds stated, therefore, it has not hitherto been possible, with the known designs of stamping machines for pipe molds, in which the stamp is driven by an open link gear, actually to attain the maximum stamping rates of which such machines in themselves are capable. The invention makes it possible to obtain a maximum stamping rate, while maintaining the correct position of the coupling device, operated by open link gear, for the ram rods which are individually and collectively moved up and down and connected together, chiefly by virtue of the fact that the coupling device is disposed in a part of the machine which is rigidly supported on its bearing frame, whereby the bearing frame can be fitted to a bracket carried by the pillar or column as is hereinafter described. When the bracket is adjusted with the centre of the coupling device over the centre of the pattern and shaping box, such position is maintained and merely the coupling device itself rotates and is displaced axially with the stamping tool in relation to the bracket. The coupling device is fitted in such a manner that it can be used for pipes of various diameters, and such adjustment can be made without removing the coupling device, it being only necessary to adjust the clamping jaws which frictionally hold the ram rods and refit another ring which carries the base or legs of the stamping tool.

In the drawings one embodiment of a ramming machine for pipe molds is represented by way of example.

Figure 1 is a section along the line A—B, and

Figure 2 is a section from C—D of Figure 3.

Figure 3 is a plan.

Figure 4 is a sectional elevation of the connecting plate and guide at the upper end of the stamping or ram rods.

Figure 5 is an elevation partly in section, of the coupling device and ramming tool detached from the machine.

Figure 6 is a plan of the part shown by Figure 4.

Figure 7 is a plan view of the coupling device, half being in section, and

Figure 8 is a sectional elevation of the coupling device the section being taken at right angles to the view shown by Figure 5.

The ramming tool, having the ramming legs 1 and the ring 2, is provided, according to the size of the pipe molds to be rammed, with four, six, eight or twelve ram rods 3, which are held together at their upper extremities by a sheet metal disc 4 which, for the purpose of reduction in weight, is provided with cut-out portions 4*b* (Figure 6). The sheet metal disc 4 is further provided with longitudinal slots 4*a* (Figure 6) in which the rods 3 are fixed in such a manner that they can be adjusted for ramming tools of larger or smaller diameter. The disc 4 rotates with the ramming tool in a vertically divided U-shaped ring 5 having lat-

eral guides 5*a* (Figures 4–6). The ring 5 moves upward and downward with the ramming tool but is prevented from rotation with the ramming tool by the guides 5*a*. The said ring 5 slides with its guides 5*a* on two T-iron rails 6. The T-iron rails 6 are fixed to the hollow platform 32, 32*a*, which is fitted on the bracket 33 (Figures 1, 2) and the said rails are made rigid by stays which are likewise secured to the platform. The rods 3 are connected to the machine by means of coupling device 7, 8. The upward and downward movement of the ramming tool through the medium of the coupling device is effected through the medium of a ring 9 having trunnion pins 9*a*, and two eccentrics 10, the rods 10*a* of which engage the trunnion pins. The eccentrics 10 run in bearings 11 and are driven by spur wheels 12, 12*a*. The shaft 13 carrying the spur wheels 12*a*, (Figure 3) runs in the two bearings 14, and is connected direct through a flexible coupling 15 to the electric motor 16, by which it is driven.

The ramming tool coupling 7, 8, and also the ramming tool, is given a continuous uniform circular motion (Figures 1, 2 and 3) by the motor driven shaft 13, by means of a pair of bevel gear wheels 17, 17*a*, a shaft 18, and a pair of spur wheels 19 and 20, the spur wheel 20 co-acting with a guide cylinder 20*a* on the lower half 8 of the coupling.

The ramming tool coupling 7 and 8 (Figures 4, 5, and 7) consists of two groups of clamping jaws 21 and 22 displaceable in a horizontal plane in relation to each other and fitted over the diameter of the ram rods. These groups of clamping jaws are respectively on the discs 23, 24 (Figure 8), which discs are so disposed one above the other that they can be rotated round the bolt 25. The cylinder 20*a* (Figure 1) which serves to guide the lower half 8 of the coupling is slidably splined to the hub of the spur wheel 20 to be capable of a reciprocatory movement therein and also to be rotatably driven thereby, and such cylinder 20*a* is also slidably mounted in the lower portion 32*a* of the platform. The clamping jaws 21, 22, are suitably pressed together by tension springs 27, adjusted by eye bolts 26 which are held by the projecting lugs 21*a*, 22*a*, (Figure 7) provided on the said jaws. By tightening or releasing the nuts, the extent of the pressure can be regulated. The clamping jaws grip the hollow ramming rods 3, through the medium of a lining 28 of vulcanite fibre, hard wood or the like, which prevents undue wear of the rods and at the same time increases the required friction. The vulcanite fibre jaws are fitted in cast iron guides 29 which control the movement of the jaws in a radial direction and enable a rapid adjustment of the stamping rods for each required diameter of pipe, the nuts 3*a* on the upper extremity of the rods 3 being first released and the ring 2 detached together with the tool legs 1. It is thus possible by the use of this coupling to provide for the dealing with of large sets of tubes of varying diameters, and in such manner it is only necessary to change the ring 2 with the ramming tool legs 1.

The vulcanite fibre jaws 28 can also be so constructed that they extend the whole width of the slots 36 in the coupling, such jaws being then provided with several recesses to take the ram rods 3. In such case also the guides 29 are suitably formed and are provided with two tension screws 30 instead of one. For holding the groups of clamping jaws away from each other, in cases where it is required that the rods 3 should slide freely through them, a tension screw 31 (Figure 7) is provided. The double section dust-proof closed platform 32*a*, 32, is fitted to a bracket 33 (Figure 2) which is rigidly supported on a rotary mounted column 34. The molding boxes 35 are movably carried on a rotary frame (not shown) so that they can be placed in position underneath the machine.

The ramming device functions in the following manner:

The eccentrics 10 transmit their movement to the eccentric rods 10*a*, and through the slide ring 9 to the coupling 7, 8. The jaws 21, 22, of this coupling are so pressed towards one another that the frictional grip on the ram rods not only prevents these from falling down but also compels them to make the same upward and downward movement as the coupling, which upward and downward movement is given by the eccentrics. The ramming or stamping tool legs 1 simultaneously move around the axis of the pipe without interruption and so distribute in a uniform manner the sand to be firmly rammed. The sand is introduced to the molding box 35 in such quantities that the stamping tool legs 1, even when in their highest position, always remain in freshly heaped up sand. In this way, the same quantity of sand for each downward movement of the eccentrics is rammed firmly by each leg 1, so that its firmness and uniformity are ensured. The adjustment of the ramming tool must be so regulated that the ramming tool has firmly rammed the heaped-up sand into a definite mass, before the eccentrics have reached their lowest position. The resistance which the stamping tool meets from the firmly rammed layer of sand is so great that, on the further rotation of the eccentrics into the lowest position, the force is overcome with which the clamping jaws 21, 22 are pressed on to the ramming rods 3. Consequently, the ram rods slide through the coupling 7, 8, a distance in accordance with the movement of the eccentric rods 10*a* during such resistance. At each stamping operation the same process is repeated in that fresh sand is heaped up, and

compressed consequent upon the constant and equal pressure maintained by the jaws on the ram rods, and the ramming tool itself is given a gradual upward movement. Through the special construction of the coupling, the pressure exerted by the coupling on each stamping rod is always the same and for each stamping rod is proportional to the total amount of pressure exerted by the individual springs 27. In this way an absolutely uniform upward movement of the stamping rods is ensured, which is an essential requirement if a good shape is to be produced. This uniformity in the upward movement of the stamping rods is effected because each rod exercises the same ramming pressure, when its leg 1 presses against the layer of sand, so that the sand is uniformly pressed together in all places. In this way also the formation of corners or oblique surfaces in the ramming tool is avoided. When the full length of the mold is finished in this way, the bracket 33 is swung over another molding box by rotating its bearing column 34. When the tension screw 31 is turned so that the connection between coupling and ram rods is released, the ram rods are free to fall down. The ramming tool can therefore descend slowly over the pattern into the molding box standing beneath it, and for the checking of its movement any suitable brake device may be fitted, or the coupling itself can be used as a brake, in that, by means of the tension screw 31, the pressure of the coupling jaws against the ram rods may be only reduced and not completely released.

The dimensions of the springs 27 or their adjustment through the nuts of the screws 26 will permit of the ramming pressure being regulated over wide limits.

It should be expressly pointed out that the stamping machine need not necessarily be fitted directly to the rigid arrangement of a swinging column. The machine may, with its bearing frame, rest on a portable underframe which runs on a trestle frame, or the frame bearing the machine can be built into an overhead crane.

The only important point is that the machine should be fixed rigidly in position in its bearing frame, while the bearing frame itself may be oscillating, travelling or otherwise displaceable.

Naturally two such ramming machines, built closely side by side, can also run in a double molding box, in which case the separate machines could, of course, still be used independently.

Claims:

1. A machine for ramming pipe molds, comprising a frame stationary during the ramming operation, a ramming tool having a plurality of ram rods, mechanism carried by the said stationary frame for reciprocating and rotating the ramming tool, a coupling device connecting the said mechanism to the plurality of ramming rods which coupling device rotates and reciprocates with the ramming tool, pairs of gripping jaws carried by the coupling device, one jaw of each pair being carried by one rotatably adjustable member and the other jaw of each pair being carried by another rotatably adjustable member, and spring means for adjustably pressing the pair of jaws together.

2. A machine for ramming pipe molds, comprising a frame stationary during the ramming operation, a ramming tool having a plurality of ram rods, mechanism carried by the said stationary frame for reciprocating and rotating the ramming tool, a coupling device connecting the said mechanism to the plurality of ramming rods which coupling device rotates and reciprocates with the ramming tool, pairs of gripping jaws carried by the coupling device, one jaw of each pair being carried by one rotatably adjustable member and the other jaw of each pair being carried by another rotatably adjustable member, spring means for adjustably pressing the pair of jaws together, and means for simultaneously releasing the jaws from the ramming rods to allow the ramming tool to fall.

3. A machine for ramming pipe molds, comprising a frame stationary during the ramming operation, a ramming tool having a plurality of ram rods, mechanism carried by the said stationary frame for reciprocating and rotating the ramming tool, a coupling device connecting the said mechanism to the plurality of ramming rods which coupling device rotates and reciprocates with the ramming tool, jaws carried by the coupling device for frictionally gripping each ramming rod separately and with an equal pressure and for allowing the ram rods to slide therethrough as the ramming process proceeds, and a disc connecting together the upper ends of the ram rods, a ring in which the disc is rotatably mounted, and slides on which the ring is non-rotatably and slidably mounted.

4. A machine for ramming pipe molds, comprising a frame stationary during the ramming operation, a ramming tool having a plurality of ram rods; mechanism carried by the said stationary frame for reciprocating and rotating the ramming tool, a coupling device connecting the said mechanism to the plurality of ramming rods which coupling device rotates and reciprocates with the ramming tool, jaws carried by the coupling device for frictionally gripping each ramming rod separately and with an equal pressure and for allowing the ram rods to slide therethrough as the ramming process proceeds, and a disc having radial slots in which the upper ends of the ram rods are adjustably

fixed, a ring in which the disc is rotatably mounted, and slides on which the ring is non-rotatably and slidably mounted.

5. A machine for ramming pipe molds, comprising a frame stationary during the ramming operation, a ramming tool forming a complete unit and comprising a plurality of ram rods, a ring rigidly connecting and moving with the ram rods near their lower ends, and a member rigidly connecting and moving with the ram rods at their upper ends, mechanism carried by the said stationary frame for reciprocating and rotating the ramming tool, a coupling device connecting the said mechanism to each of the plurality of ram rods, which coupling device rotates and reciprocates with the ramming tool.

6. A machine for ramming pipe molds, comprising a frame stationary during the ramming operation, a ramming tool having a plurality of ram rods connected together to be incapable of acting independently, mechanism carried by the said stationary frame for reciprocating and rotating the ramming tool, a hollow coupling device passing through an opening in the said frame and connecting the said mechanism to each of the plurality of ram rods which pass through the hollow coupling, which coupling device rotates and reciprocates with the ramming tool, and stationary means for guiding the ramming tool carried by the top of the said frame.

In witness whereof I have signed this specification.

ROBERT ARDELT.