PUBLISHED JUNE 15, 1943. BY A. P. C.

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MANUFACTURE OF MOLDED REINFORCED OBJECTS

Filed April 30, 1941

Serial No. 391,198

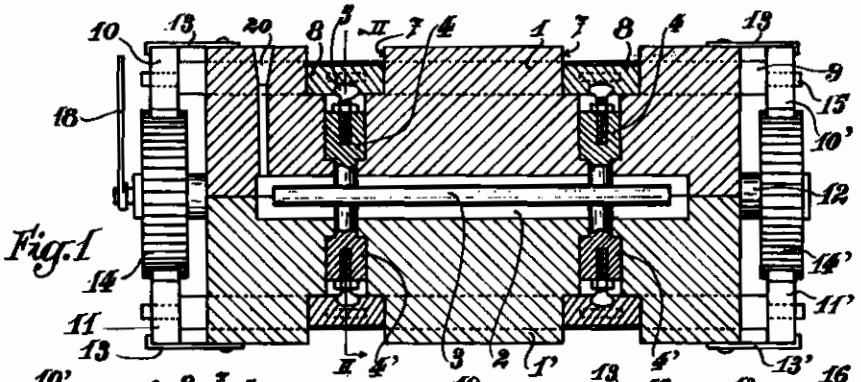

Fig. 1

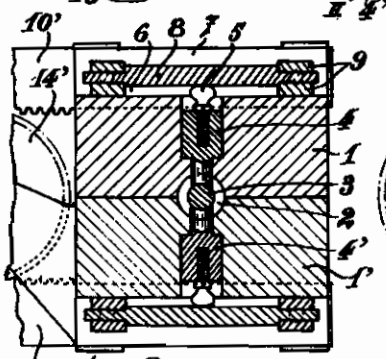

Fig. 2

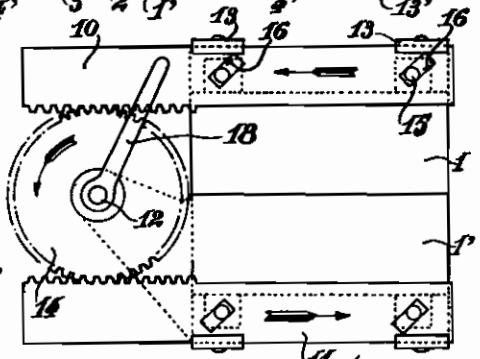

Fig. 3

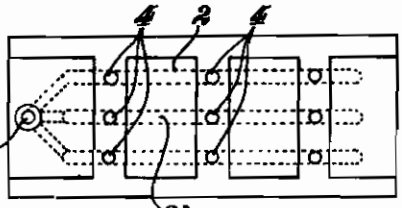

Fig. 4

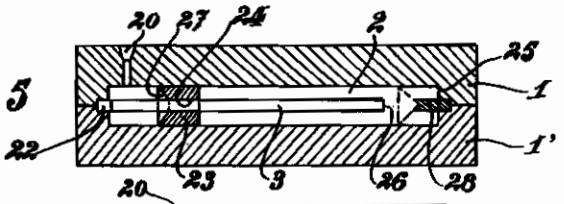

Fig. 5

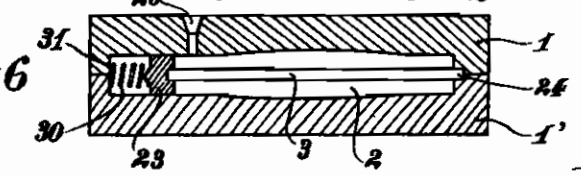

Fig. 6

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Published June 15, 1943 Serial No. 391,198

ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF MOLDED REINFORCED OBJECTS

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Application filed April 30, 1941

My invention relates to the manufacture of moulded objects by injection under pressure of plastic compounds such as synthetic resins, thermo-plastic materials, rubber and rubber derivatives, etc. and it refers more particularly to the manufacture of such objects which are re-inforced by a core or armature.

One object of my invention is a moulding process of re-inforced objects wherein the core or armature is secured within the mould by means which are removed from contacting with said core when a substantial mass of the moulding compound has been forced into the mould, the void space left by the said means being filled by a further supply of moulding composition under pressure.

A further object of my invention is a mould provided with movable core supporting means.

Still a further object of my invention is a mould with movable core supporting means wherein the latter are automatically displaced by the moulding compound injected into the mould; the said core supporting means, in the case of an at least partial cylindrical or toric or the like object, being preferably formed by a piston provided with a core receiving hole and slidable within the corresponding part of the moulding recess proper.

The support may be so shaped as to form the end of the moulded object, such as the tip of a knitting needle.

The support may be loaded by a spring in such a manner as to be displaced by the injected compound only when the mould is nearly filled.

Other features of my invention will be apparent from the foregoing description in reference to the annexed drawing wherein:

Fig. 1 is a sectional elevation of a mould established in accordance with my invention.

Fig. 2 is a partial section taken along line II—II of Fig. 1.

Fig. 3 is the corresponding end view.

Fig. 4 is a diagrammatic view of a multiple mould.

Fig. 5 is a sectional elevation of a modification.

Fig. 6 shows a further modification.

The mould illustrated in Figs. 1 to 3 comprises two parts 1 and 1' with a moulding recess 2 and an inlet passage 20 provided through part 1. Within the moulding recess 2 there is arranged a core or armature 3 generally of metal which is to become embedded in the finished object, the said core or armature being held by a plurality of pairs of supports 4, 4'. The two supports of each pair are slidably carried by opposed holes provided in parts 1 and 1', respectively, the said holes opening into recess 2. Supports 4, 4' are thus movable with respect to core 3 between an active position shown in which they bear against core 3, and an inactive position in which their inner end, suitably shaped, are flush with the walls of recess 2.

Supports 4, 4' may be cylindric or prismatic. Their section is larger in the portion which does not project into recess 2 in order to simplify their machining and to improve their mechanical strength.

Supports 4, 4' may be controlled manually. In the example illustrated, each support terminates outwardly into a spherical end 5 which is engaged into a groove 6 provided in a transverse bar 8. There is provided one bar 8 for each support 4 or 4' and each bar is guided within a groove 7 on the outer surface of the mould. All the bars 8 on one and the same face of the mould are secured to two parallel longitudinal rods 9.

The mould also supports a rotatable shaft 12 carrying two toothed wheels 14 and 14' and each wheel 14 or 14' meshes with two racks 10 and 11, respectively 10' and 11', said racks being parallel to bars 8 and slidable within guides 13. Racks 10, 11, 10' and 11' are formed with oblique elongated openings 16, arranged in parallel relation and adapted to coact with fingers 15 formed at the ends of rods 9. A hand actuating lever 18 is keyed on shaft 12.

The operation is as follows:

The mould is closed, the core or armature 3 being secured within the moulding recess 2 and coaxially to the same by supports 4 and 4' at their active position. The plastic compound is then injected under pressure into the mold through passage 20. Towards the end of this operation, lever 18 is actuated. Wheels 14 and 14' are thus rotated and racks 10, 11, 10' and 11' slide in the respective directions indicated by arrows in Fig. 3. Fingers 15 are displaced along openings 16, and supports 4, 4' operatively connected with said fingers are brought from active to inactive position, their inner ends forming parts of the walls of the moulding recess, as explained, the core being maintained by the compound in which it is embedded.

A further supply of compound is then injected into the mould to fill the void spaces left by the supports 4, 4'. The object is then finished and may be removed from the mould when the compound is set. The removing of supports 4, 4' may take place before the mould is wholly filled and as

soon as there is a sufficient quantity of compound to support the core, in which case the supply of mouldable compound is uninterrupted.

Fig. 4 diagrammatically shows a multiple mould comprising a plurality of moulding recesses 2, 2', etc., into which the moulding compound is forced by the same passage 20 which communicates with all the recesses. All the supports 4, 4' cooperating with the successive recesses are simultaneously actuated by a common gearing similar to the gearing described with reference to Figs. 1 to 3.

The modification shown in Fig. 5 relates to the moulding of elongated objects such as knitting needles. The moulding recess is cylindrical or prismatic or toric or the like. Core 3 is formed of a rod smaller in length than the recess, said core being held by one of its ends 22 in a housing formed between parts 1 and 1' of the mould. A piston 23 is slidably mounted within the moulding recess 2. Piston 23 is provided with an axial bore 24 for core 3 and its length is somewhat smaller than the space available between the free end 26 of rod 3 and the corresponding end 25 of the moulding recess 2.

There is also provided within recess 2 a rod 28 projecting from end 25 and adapted to obturate the bore 24 when the piston 23 abuts against the end 25 of the recess 2, at the end of its stroke (position shown in chain dotted lines on Fig. 5). The end surface of the rod 28 cooperates with the end surface 27 of the piston, and said surfaces are suitably shaped to form the end surface of the object to be moulded i. e., in the example illustrated the tip of the knitting needle.

Passage 20 opens in the vicinity of end 22 and piston 23 is placed near passage 20, as shown, when the core 28 is placed in position within the mould. The moulding compound is injected into the mould through the passage 20. It is understood that said compound fills the space situated between the end 22 and the piston 23 and then pushes the piston 23 towards the end 25. The various parts of the core are thus maintained in the proper axial position by the piston until they are embedded in the compound and thus immobilized. When the piston 23 abuts against the end 25, the mould is filled and the surface 27 forms with the end of the rod 28 the tip of the needle which is thus obtained in a single operation.

In the modification illustrated in Fig. 6, which also relates to the manufacture of elongated objects, the core 3 is secured by one end 24 clamped between parts 1 and 1' of the mould, while its other end is housed in a blind hole provided in a piston 23 loaded by a spring 30 resting against the corresponding end 31 of recess 2. The latter is cylindrical, prismatic or toric or of like shape at least on a certain length starting from end 31, in such a manner that it may work as a cylinder for piston 23.

When the moulding compound is forced into the mould through the passage 20, it fills the recess 2 around core 3 and then pushes piston 23 against the action of spring 30. Since the core is then held by the compound, it retains substantially its axial position notwithstanding the movement of piston 23. As in the case of Fig. 5, the latter may be so shaped as to form the corresponding end of the object.

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