

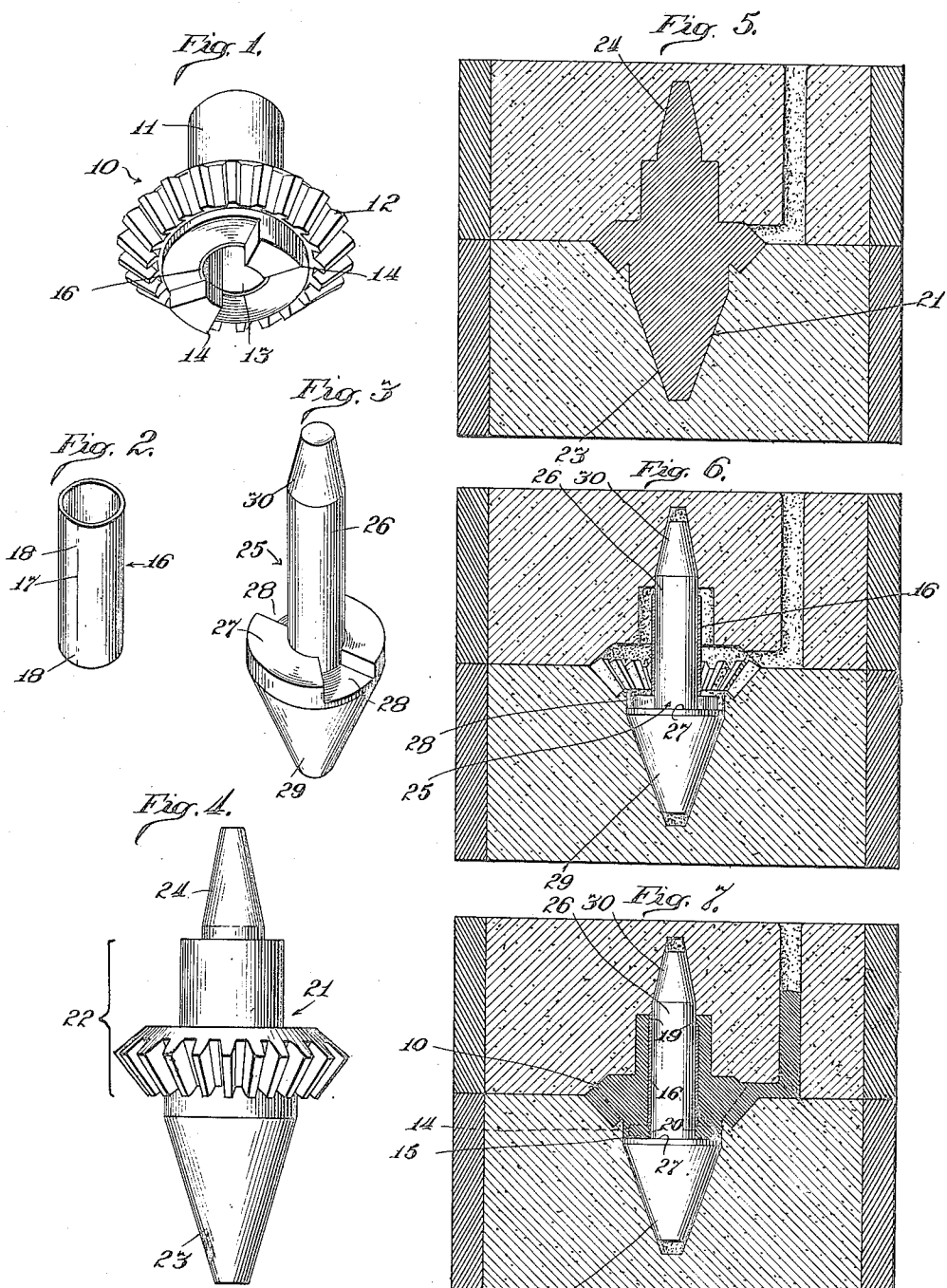
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MEANS FOR MAKING MACHINE ELEMENTS

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MEANS FOR MAKING MACHINE ELEMENTS.

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To all whom it may concern:

Be it known that I, ALVA J. FISHER, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Means for Making Machine Elements, of which the following is a specification, this application being divisional of an application filed by me on October 18, 1918, Serial No. 258,718.

My invention relates to the manufacture of machine elements, such as gears, clutch-elements and the like, and has for its object to provide advantageous means for ready and economical production of such elements.

Gears intended to be mounted on shafts, where accuracy of fit with the shaft is important, are usually machine made, but it is desirable, for economy to cast such gears if possible, and in many classes of mechanisms cast gears will perform satisfactorily in lieu of machine-cut gears. One of the objects of my invention is to provide for the making of a cast gear that will accurately fit, and secure proper bearing upon its receptive shaft, with its shaft apertured initially so that no tooling or drilling of the shaft hole is necessary to condition the gear for use.

Furthermore in many situations, a gear element may beneficially be supplemented with clutch parts—either projections or indentations, the surfaces of which should be hard, and an object of my invention is to provide means for making a unitary gear-and-clutch element having hardened clutch surfaces.

A further object of my invention is to accommodate a simple and effective method of casting such gears or unitary gear-and-clutch elements or kindred articles of manufacture, insuring the existence in the product of the characteristics above referred to and to provide apparatus for the simple and efficient production of the gears.

To these ends, and others that will become apparent to those skilled in the art, from the following description, my invention consists in the novel features of structure and method hereinafter more fully described, and claimed.

In the drawing Fig. 1 is a perspective view showing the unitary gear-and-clutch element illustrative of one machine-element suitable to be made by the practice of my

invention; Fig. 2 is a detail of a sleeve; Fig. 3 is a detail of a chill block and core; Fig. 4 is an elevation of a pattern; Fig. 5 shows a mold with pattern embedded therein; Fig. 6 shows the mold with the pattern removed and replaced by the chill block, carrying a sleeve; and Fig. 7 shows, sectionally, completion of the casting operation.

The specific gear 10, shown in Fig. 1, is of a construction that I use in washing machine gearing, and is of the beveled type, provided with crown clutch projections; but it will be understood that in the broader aspects of my invention I do not limit myself in these matters of detail, as my invention may be practiced in the production of many forms of gear elements and clutch elements and other machine parts intended to interfit with shafts and of character suitably produced by casting operations.

In the particular article shown the hub 11 and beveled gear teeth 12 may, for many uses, ordinarily be of the relatively soft quality of said-cast metal, and in many instances they have unfinished surfaces, although for finer work more or less surface machining may be desirable and obviously employed if necessary, with some consequent increase in expense. It is, however, usually important that the shaft hole 13 be accurately sized and centered, and difficulty in meeting this requirement is an important objection to the casting of gears and other shaft-fitting articles with pre-formed shaft holes. Clutch elements, such as the lugs 14, may best be of harder material than sand-cast iron or steel, but in many instances must be unitary with the gear element. One may fulfill both requirements by chilling the clutch surfaces in such a unitary gear clutch element, as diagrammatically suggested by the shading at 15, Fig. 7.

To meet the important requirement of shaft hole sizing, one may mold axially in the gear or kindred element a sleeve 16 of the appropriate internal diameter, such sleeve, as indicated in Fig. 2, being preferably a true cylinder pre-formed of relatively thin metal, drawn or rolled. In practice satisfactory and economical use may be made of sleeves formed up of sheet steel into a seamed tube, the seam 17 being closed by welding 18 only at the ends of the cylinder.

The cylinder is preferably slightly shorter than the full length of the shaft hole so that, in the casting operation, the cast metal may overlies the cylinder inner ends, at certain spots, or throughout the circumference of the sleeve, as the mold configuration may provide. Thus in the particular construction illustratively shown the sleeve may be completely overlain by the cast metal lip 19, as shown in Fig. 7 at its upper end, and at its lower end it is overlain at spots 20 by lips of the clutch projections 14.

In the production of such an article of manufacture, wherein it is requisite that the sleeve shall accurately define the shaft hole diameter, and shall be centered very accurately with respect to the gear-periphery or gear-toothed portion of the element, I employ the apparatus and method of production that I will now describe.

The pattern 21, shown in Fig. 4, is suitably shaped in its central zone 22 to give the desired form to the gear teeth and hub. It is, however, supplemented by axially tapering projections 23 and 24 to form guide cavities in the sand. Such a pattern, placed in the sand as shown in Fig. 5, produces a cavity that gives suitable guide extensions axially beyond the central zone. The diagrammatic illustration and common knowledge of the casting art are suitable to give adequate information as to convenient construction and parting of the flask, etc., without specific description. The corepiece 25, Fig. 3, having a stem 26 neatly interfitted with and supporting the sleeve 16 and preferably to project slightly above the upper end thereof, and having a lower chill block 27 recessed as at 28 to give shape to the clutch projections 14 of the casting, and having axial guide extensions 29 and 30 identically corresponding to portions (or whole) of the pattern portions 23 and 24, is fitted in the flask as shown in Fig. 6, with the sleeve in place thereon. It will be observed that the guidance of the parts 29 and 30 in identically shaped portions of the mold cavity insures absolute precision in the centering and alignment and axial positioning of the sleeve with respect to the mold cavity.

When the mold cavity is metal-filled, as shown in Fig. 7, the casting obviously takes the requisite form (due shrinkage allowance in the tooth dimensions being made in accordance with known skillful practice). The chill block is effective in chilling the surfaces with which it contacts to harden the active surfaces 15 of the clutch projections 14, as heretofore referred to. The sleeve plays an important part in the matter. When it is invested with the molten metal its thinness enables it to expand rapidly, and then to shrink sufficiently with the cooling metal to resume substantially

its original diameter, its cylinder-form making it strongly resist over-compression or reduction to a diameter less than its initial size. The sleeve gives the inner surface of the completed element a uniform and desirable texture and finish, and, importantly, it insures easy removability of the article from the corepiece and without scoring or otherwise injuring the stem of the latter.

It will be apparent that the method and apparatus described are available in casting of parts other than the gear-and-clutch element described, and while I have herein set forth the details of one satisfactory practice and embodiment of my invention, it will be understood that I do not thereby limit myself to such details in the broader aspect of my invention but that many changes and adaptations may be made within the spirit of my invention and within the scope of the appended claims.

I claim:

1. Apparatus for casting machine elements having shaft-fitting apertures, comprising a pattern-member shaped to define peripheral portions of a suitable mold-cavity and guide-surfaces extraneous to said portions at both ends thereof; a metal core-piece affording end guide-portions congruent with the guide surface portions of the pattern member and having an intervening stem smaller than and forming a shoulder with one of said guide-portions of said core-piece; and a sleeve adapted to interfit with said stem and be positioned by said enlargement of the core-piece and axially removable over the other end of the core-piece without injury to the stem.

2. In apparatus for casting machine elements having shaft-fitting apertures and hardened exterior portions, a mold having a cavity providing a metal receptive space and guide extension space, and a core piece having a metal stem extending through the metal receptive space and a metal block congruent with the guide-extension space and disposed to form a wall-part of the metal-receptive space.

3. In apparatus for casting machine elements having shaft-fitting apertures and hardened exterior portions, a mold having a cavity providing a metal receptive space and guide extension space, a core piece having a metal stem extending through the metal receptive space and a metal block congruent with the guide-extension space and disposed to form a wall-part of the metal-receptive space, and a liner-sleeve surrounding the stem and removable therefrom.

4. In apparatus for casting machine-elements having a shaft-fitting aperture and a hardened end-portion, a horizontally-divided mold having a cavity providing a metal receptive space and also having in its

- lower section a downwardly-tapered guide-extension space, a metal core piece having a stem extending vertically through the metal receptive space and, a chill-block portion congruent with and fitted in the guide-extension space to define an end-portion of the metal receptive space, and a liner-sleeve surrounding the core-stem and endwise-removable therefrom.
- 5 15 20
- 10 5. Apparatus for casting a shaft-fitting lined gear with a hardened clutch end, comprising a mold, horizontally split, providing a gear-shaping metal receptive space and at both ends thereof guide-extension spaces tapering away from the metal receptive space, a metal core piece having a stem to extend axially through the gear-shaping space with its two ends shaped to fit in the guide-extension spaces, one of said ends being a chill-block shaped to form the end of the casting into a toothed clutch-part, and a liner-sleeve surrounding the stem and endwise-removable therefrom.

ALVA J. FISHER.