June 11, 1935. J. F. HINES 2,004,810

METHOD OF MAKING HINGES

Filed July 10, 1934

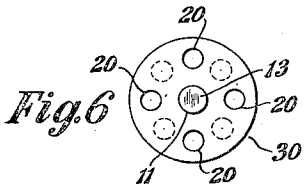


Fig. 6

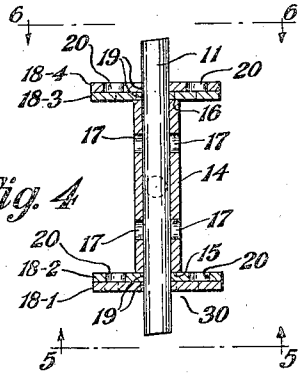


Fig. 4

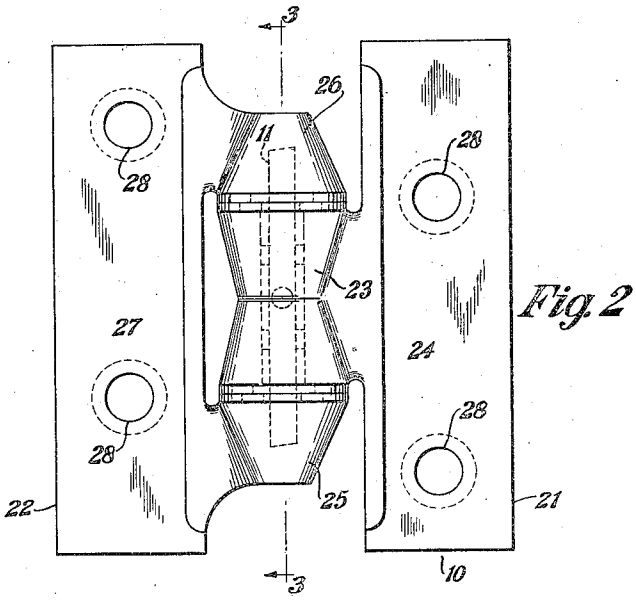


Fig. 2

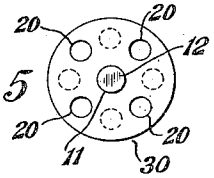


Fig. 5

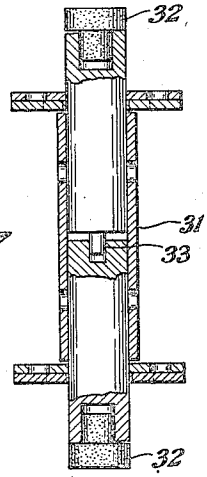


Fig. 7

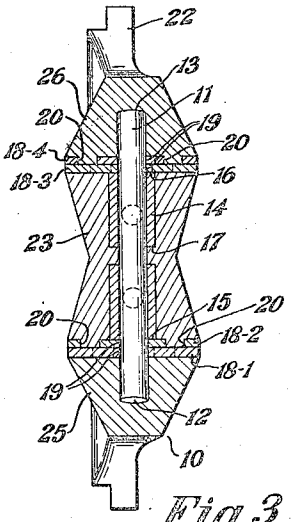


Fig. 3

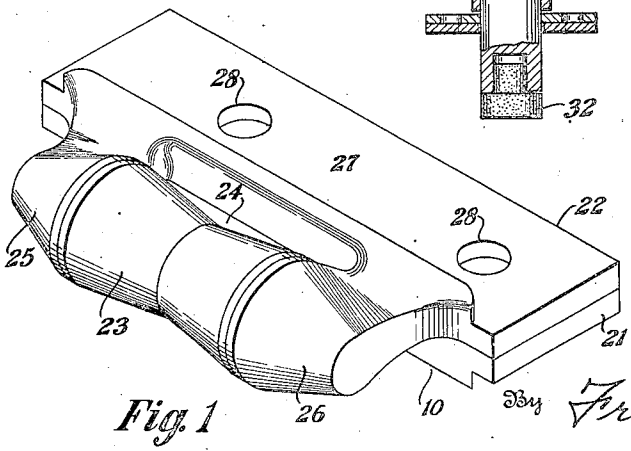


Fig. 1

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METHOD OF MAKING HINGES

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2 Claims. (Cl. 29—11)

The invention relates to hinges, and to methods for making the same.

Hinges available prior to the present improvements sag in use, squeak, rust, and their joints fill up with water and/or dust, because of imperfect fitting and excessive clearance between the hinge leaves and pins.

The imperfect fitting and excessive clearance between the leaves and pins of usual hinges arises from the fact that the cost of and the time required for manufacturing usual hinges according to usual methods so as to attain precision fitting and clearance between the hinge leaves and pins would be prohibitive.

The objects of the present improvements include the provision of an improved hinge which is sagless, squeakless, rustless, and proof against the accumulation of water and/or dust in its joints, and which is adapted for economical and rapid manufacture.

Further objects of the present improvements include the provision of an improved method of making the improved hinge of the invention.

The foregoing and other objects are attained by the improvements, apparatus, parts, combinations, sub-combinations, and methods which comprise the present invention, and the nature of which is set forth in the following general statement, and preferred embodiments of the improvements, apparatus, parts, combinations, and sub-combinations, together with their mode of use, and a preferred method of making the same, are set forth in the following description, and the improvements, apparatus, parts, combinations, sub-combinations, and methods of the invention are particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

The nature of the improved hinge of the present invention may be described in general terms as including a hinge pin which may be made of a length of round steel rod, preferably of a stock size, the ends of the pin being formed out of square. A shorter sleeve of preferably seamless tubing is rotatably located on the pin and may be of brass or bronze, and pairs of brass or bronze washers are located with the pin rotatably fitting in their central apertures, each pair being located at one end of the sleeve with one of the washers in abutment with the adjacent end thereof.

The sleeve and washers are preferably provided, as by means of apertures formed in their walls, with engaging surfaces, and the hinge leaves are cast of metal which may be aluminum alloy about the pin, sleeve, and washers so that one leaf engages the sleeve and the inner washers and the other leaf engages the pin and the outer washers.

The nature of the improved method for making the improved hinge of the present invention may be described in general terms as pre-assembling the pin, sleeve, and washers in their desired permanent locations with respect to each other, placing the pre-assembled pin, sleeve, and washers as a core unit in a mold having leaf forming cavities, and then pouring molten material having a lower melting point than that of the pin, sleeve, and washers into the mold cavities and about the pin, sleeve, and washers, and on cooling the cast material shrinks wax tight on the pin, sleeve, and washers, and forms the improved hinge.

For many purposes the material of the several parts of the hinge may be metallic, and the cast metal forming the hinge leaves preferably has a lower melting point than that of the metal of the pin, sleeve, and washers.

In the case of relatively large hinges, in order to attain proper cooling of the leaf material about the ends of the hinge pin, it is desirable to associate cores with the opposite ends of the hinge pin and to cast the hinge leaf engaging the outer ends of the hinge pin about the cores as well as the outer ends of the hinge pin; or to provide telescoping means in the hinge pin intermediate its ends, to permit it to contract endwise with the cast material.

Preferred embodiments of the improved hinge and of the pin, sleeve, and washer unit thereof, are illustrated in the accompanying drawing forming part hereof, in which

Figure 1 is an isometric view of one embodiment of the improved hinge with the leaves in closed position;

Fig. 2, a plan view thereof with the leaves in open position;

Fig. 3, a longitudinal sectional view thereof as on line 3—3, Fig. 2;

Fig. 4, a detached view of the pin, sleeve, and washer unit, with the sleeve and washers shown in longitudinal axial section;

Fig. 5, an end view thereof looking in the direction of the arrows 5—5, Fig. 4;

Fig. 6, an end view thereof looking in the direction of the arrows 6—6, Fig. 4; and

Fig. 7, a view similar to Fig. 4 illustrating a pin, sleeve, and washer unit for a large hinge, with cores applied to the opposite ends of the hinge pin, and also telescoping means in the hinge pin, for permitting proper cooling and shrinking of the cast material forming the leaf engaging the outer ends of the hinge pin.

Similar numerals refer to similar parts throughout the several views.

The embodiment of the improved hinge illustrated in the drawing is indicated generally by 10 and includes a hinge pin 11 which is made of a length of round rod, which may be a steel rod and is preferably of a stock size, and the end faces 12 and 13 of the pin 11 are for the purposes of the invention preferably formed out of square with the cylindric longitudinal outer surface of the pin, as by diagonally cutting the rod from which the pins 11 are formed.

A sleeve 14 rotatably fits on the pin 11, and the sleeve 14 is substantially shorter in length than the pin 11 and the end faces 15 and 16 of the sleeve 14 are square with its cylindrical inner and outer longitudinal surfaces.

The sleeve 14 has a plurality of engaging apertures 17 formed in its tubular wall.

Sets of washers 18—1 and 18—2, and 18—3 and 18—4 rotatably fit on the outer ends of the pin 11, the washers having the same external diameters, and having central circular apertures 19 of the same diameters for rotatably fitting on the pin 11, and opposite faces of the washers 18—1 and 18—2 thrust abut against each other and the inner face of the washer 18—2 abuts against the end face 15 of the sleeve 14, and similarly the opposite faces of the washers 18—3 and 18—4 thrust abut against each other and the inner face of the washer 18—3 abuts against the end face 16 of the sleeve 14.

Each washer has a plurality of engaging apertures 20 formed therein.

The sleeve 14 and washers 18—1, 18—2, 18—3, and 18—4 may be made of bronze in the hinge 10, and the sleeve 14 is preferably a length of seamless tubing.

The hinge 10 furthermore includes one-piece leaves 21 and 22 which may be made of cast aluminum alloy, and the one-piece leaf 21 includes a tubular portion 23 which surrounds the sleeve 14 and engages the apertures 17 of the sleeve 14, and the opposite ends of the tubular portion 23 abut the inner faces of the washers 18—2 and 18—3 and engage the apertures 20 thereof.

The hinge leaf 21 furthermore includes a connector plate 24 which extends from one side of the tubular portion 23.

The one-piece hinge leaf 22 includes end caps 25 and 26; and the end cap 25 surrounds and engages the outer end of the hinge pin 11 beyond the washer 18—1, and abuts the outer face of the washer 18—1 and engages the apertures 20 thereof; and similarly the end cap 26 surrounds and engages the other end of the hinge pin 11 beyond the washer 18—4, and abuts the outer face of the washer 18—4 and engages the apertures 20 thereof.

The hinge leaf 22 furthermore includes a connector plate 27 extending from one side of the end caps 25 and 26.

The connector plate 24 of the hinge leaf 21 and the connector plate 27 of the hinge leaf 22 are provided as illustrated with apertures 28 whereby the hinge leaves may be connected as by bolts or screws with the members or parts (not shown) to be hinge connected by the hinge 10.

The improved hinge 10, (in the smaller sizes) is preferably made by forming a core unit indicated generally by 30 in Figs. 4, 5, and 6, and which includes the pin 11 with the sleeve 14 and the washers 18—1 and 18—2, and 18—3 and 18—4 positioned thereon in the desired permanent locations with respect to one another, each set of washers being arranged so that the engaging apertures 20 thereof do not register with one another, as best shown in Figs. 5 and 6.

The core unit 30 is then placed as a core in mold cavities of a mold, not shown, the cavities being formed to make the hinge leaves 21 and 22.

Molten metal, as aluminum alloy in the hinge 10, is then poured into the mold cavities, casting the leaves 21 and 22, and as the metal of the leaves cools, the leaves contract and wax tight engagement of the tubular portion 23 of the leaf 21 is effected with the sleeve 14 and the inner washers 18—2 and 18—3, and similar wax tight engagement of the end caps 25 and 26 is effected with the end portions of the hinge pin 11 and their out of square end faces and with the end washers 18—1 and 18—4, the apertures 17 and 20 providing engaging surfaces for the cast material.

In the hinge 10 the aluminum alloy forming the leaves 21 and 22 has a lower melting point than the hinge pin 11 and the bronze sleeve 14 and the round washers 18—1, 18—2, 18—3, and 18—4; and in any of the improved hinges of the present invention, the melting point of the cast material for forming the leaves may be lower than the melting point of the hinge pin, sleeve, and washers. Accordingly, when it is desired to cast steel leaves, a pin, sleeve, and washers of nickel iron may be used; and for malleable iron leaves, the pin, sleeve, and washers may be made of steel.

It will be understood, however, that the body of the metal in the hinge pin and in the respective washers, is so considerable, as compared with the amount of cast material which may contact through the apertures with the bearing surfaces; that the cast material will chill and freeze so quickly that it will not adhere to the bearing surfaces, even though the melting point of the cast material may not be lower than the melting point of the hinge pin, the sleeve, or the washers.

In making hinges having pins not exceeding six inches in length, it may not be necessary to make any provisions for accommodating the shrinking of the material which is cast to form the leaves; but in hinges having pins of longer lengths, it is desirable if not necessary to provide cores for crushing at the ends of the pin, or telescoping means interposed between the ends of the pins to permit a shrinking of the cast material, as illustrated in the modified pin, sleeve and washer unit 31 shown in Fig. 7.

In hinges having pins from six inches to some twelve inches in length, mushroom headed cores 32 may be used at the ends of the hinge pin, which will crush when the cast material shrinks; and in hinges having pins with a length of from twelve inches and upwards, the washers may be spaced slightly from the ends of the pin and the pin may be made in two slightly spaced sections with a central telescoping pin and socket connection 33 intermediate the ends, which will accommodate the shrinking of the cast material; as illustrated in Fig. 7.

The invention has been described more particularly with reference to hinges having all the parts made of metal, and the hinge pin will usually be made of steel. Steel tubing and steel washers of proper thickness are preferably used when the leaves are cast of grey or malleable iron or steel. Copper, brass or bronze washers, however, are preferably used when the leaves are cast of non-ferrous materials, such as hard rubber, glass, bakelite and the like.

It is also desirable to carbonize or coat the

sleeve, pin, and washer unit with shellac, soapstone, or the like, to produce a tight fit when the leaves are cast upon the unit.

I claim:

1. The method of making a hinge and the like which includes assembling a core unit including a pin, a sleeve rotatably located on the pin, the pin being longer than the sleeve and having ends extending beyond the opposite ends of the sleeve, and pairs of abutting washers provided with central apertures rotatably fitting on the pin, each pair being located at one end of the sleeve and one of the washers of each pair abutting the adjacent end of the sleeve, placing the core unit in a mold having one piece leaf forming cavities, and casting one piece leaves in the mold cavities, one leaf engaging the sleeve and the washers abutting the ends thereof, and the other leaf engaging the outer ends of the pin and the other washers.

2. The method of making a hinge and the like which includes assembling a core unit including a pin, a sleeve rotatably located on the pin, the pin being longer than the sleeve and having ends extending beyond the opposite ends of the sleeve, and pairs of abutting washers provided with central apertures rotatably fitting on the pin, each pair being located at one end of the sleeve and one of the washers of each pair abutting the adjacent end of the sleeve, the pins, sleeves, and washers being made of metal, placing the core unit in a mold having one piece leaf forming cavities, and casting one piece leaves in the mold cavities of metal having a lower melting point than the metal of the pin, sleeve, and washers, one leaf engaging the sleeve and the washers abutting the ends thereof, and the other leaf engaging the outer ends of the pin and the other washers.

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