

July 21, 1959

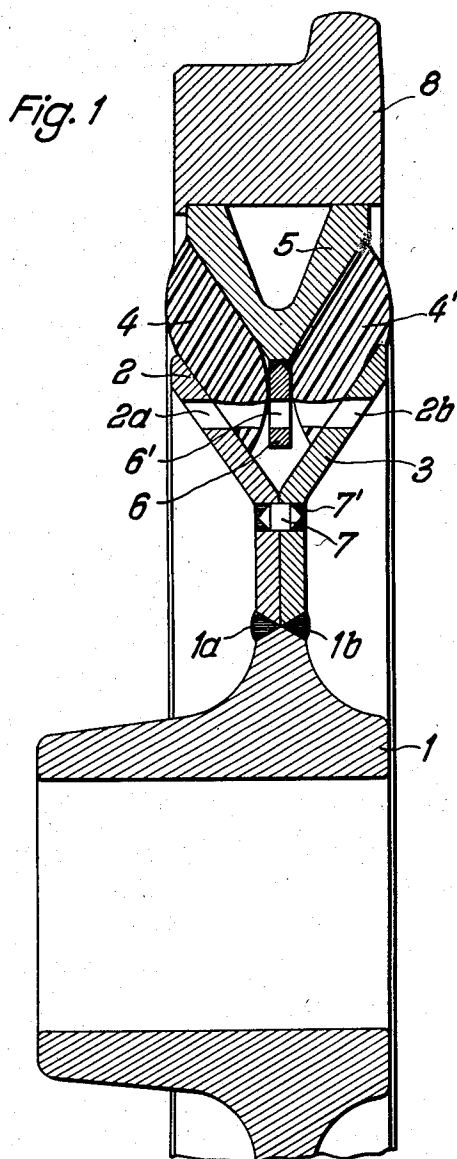
G. REUTER ET AL

2,895,175

METHOD OF CASTING RESILIENT CUSHIONING MEMBERS FOR WHEELS

Filed April 2, 1957

4 Sheets-Sheet 1



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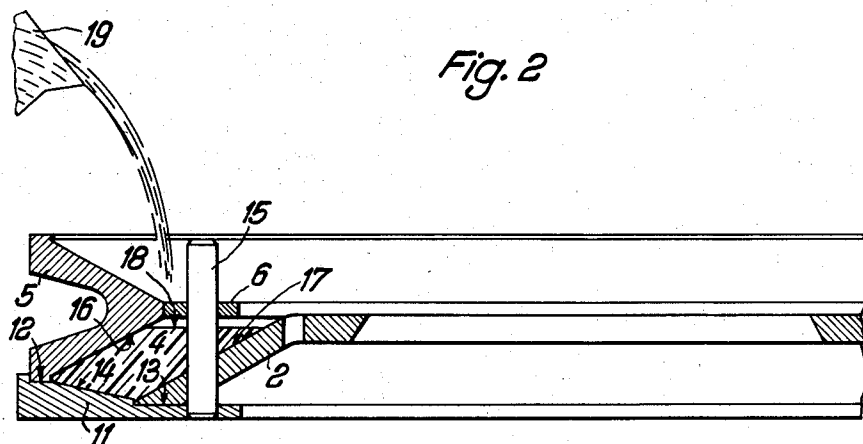
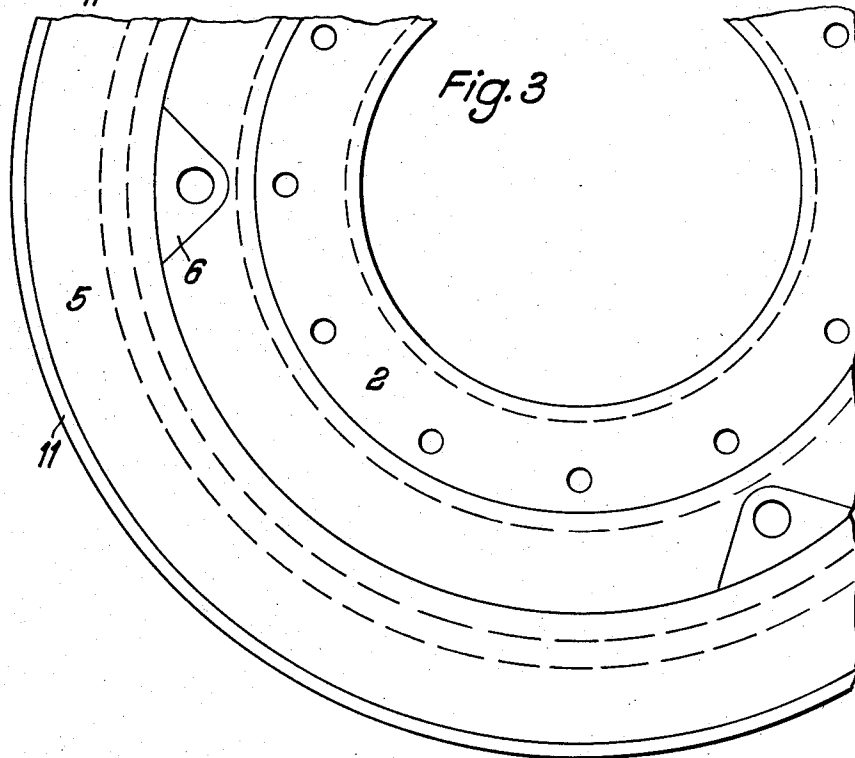
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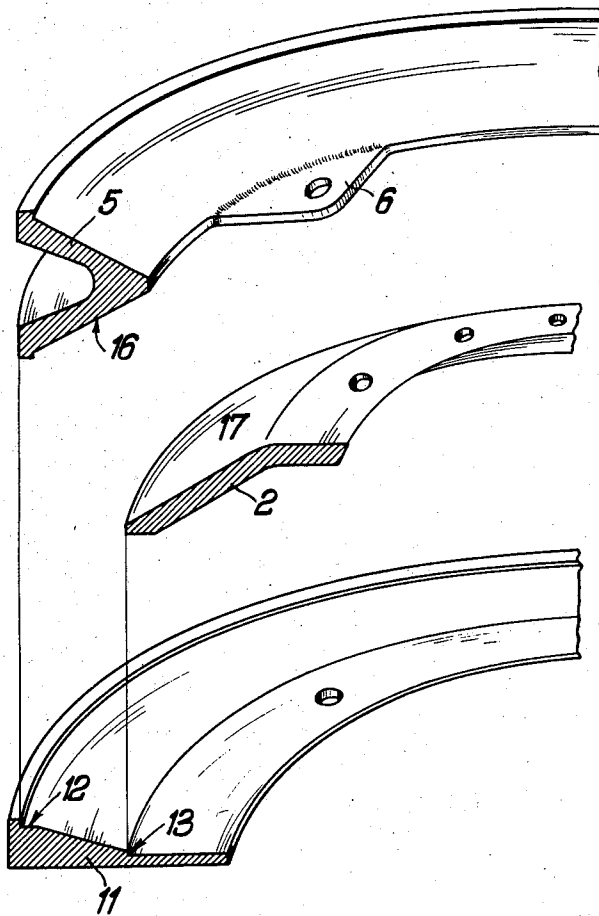
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Fig. 4



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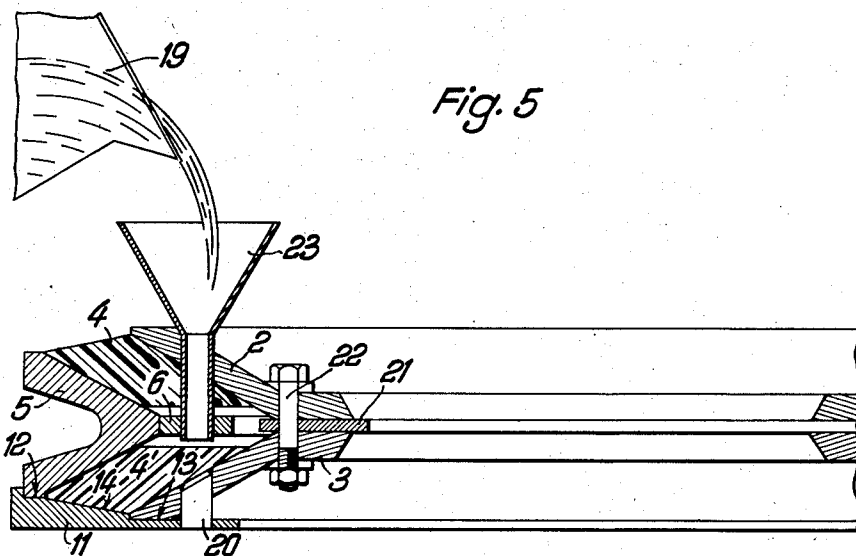
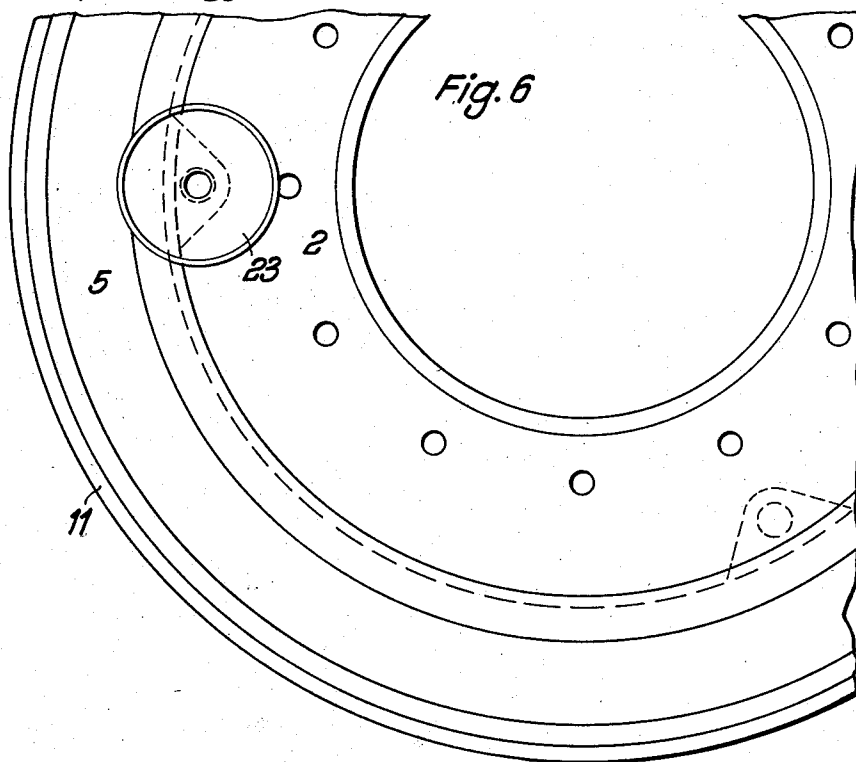
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METHOD OF CASTING RESILIENT CUSHIONING MEMBERS FOR WHEELS

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Claims priority, application Germany April 5, 1956

3 Claims. (Cl. 18—59)

The present invention relates to disc wheels and has for an object to provide a method of producing disc wheels intended more particularly for railway vehicles, the said disc wheels incorporating resilient rubber or rubber-like insertion interposed in the line of transmission of the load between the boss of the wheel and the tyre thereof. The present invention is an improvement in or modification of the invention claimed in our co-pending patent application Ser. No. 592,872 and provides a method whereby the production of disc wheels of the kind therein described and more particularly the provision of the resilient insertions can be effected in a particularly efficient manner without the need of complicated and structurally involved tools and implements. By means of the present invention the employment of presses and the like equipment, both expensive to provide and to operate, is avoided although such equipment has heretofore been indispensable for the production of known types of resilient insertions of natural or synthetic rubber which, in known manner require vulcanisation to create the necessary bond between the natural or synthetic rubber and metal.

According to the invention the desired result is achieved by employing a polyurethane or like synthetic material that has been converted into a castable state, casting the same between the previously carefully cleaned metal surfaces of the parts of the wheel intended for the reception of the resilient insertion, and by the thermally treating the wheel until the resilient insertions have acquired the desired rubber-like structure. It is preferred to proceed by separately casting and thermally treating each one of the above mentioned resilient members (insertions).

The performance of the novel method as well as the construction of the appropriate moulding equipment is substantially simplified by carrying out the process of moulding with the wheel placed in the horizontal position. To this end and according to a feature of the invention the process of moulding is effected by placing upon a base plate the wheel rim and the annular sheet metal disc upon which it is desired to mould the resilient insertion, the said base plate conforming in shape with the external surface of the uncompressed insertion; centrally locating the rim and disc on the base plate by means of dowel pins and then filling the space between the base plate, and the rim of the annular disc, by pouring liquefied polyurethane into the space until the desired level for forming the resilient member is reached, and finally submitting the thus cast polyurethane to heat treatment in an oven until it sets.

After one of the two resilient insertions has been thus moulded the wheel rim and the said one sheet metal annular disc to which the insertion is adhered, is removed from the metal base plate, inverted and replaced on the base plate, with the already moulded resilient insertion uppermost, in engagement with the second sheet metal annular disc which has been located on the base

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plate. The two annular discs are bolted together with a spacing ring, interposed therebetween and a pouring funnel is inserted through one of the holes provided in the already moulded insertion by the dowel pins and the polyurethane is poured through the funnel and into the space between the base plate, and the rim and the second annular sheet metal disc, until the desired level has been reached, and is finally subjected to heat treatment until it sets.

Both resilient insertions having been moulded and firmly adhering to the adjacent metal surfaces, the resilient members are subjected to a comparatively small amount of precompression, this being effected by removing the above mentioned spacing ring, the thickness of which determines the amount of pre-compression to which the resilient insertions will be subjected, and by then directly connecting the annular sheet metal discs associated with the wheel boss by means of the respective bolts.

The invention will now be described with reference to the accompanying drawings illustrating one manner in which the method according to the invention can be performed and a means suitable for carrying out the method.

In the drawings:

Fig. 1 is a part longitudinal section of a disc wheel according to the invention of our said co-pending patent application,

Fig. 2 is a cross section of a mould prepared for moulding one of the resilient insertions by the method of the present invention,

Fig. 3 is a plan view corresponding to Fig. 2,

Fig. 4 is an exploded perspective view of the principal elements of the mould shown in Fig. 2,

Fig. 5 is a cross section of the mould prepared for moulding the second resilient insertion, and

Fig. 6 is a plan view corresponding to Fig. 5.

A body of a disc wheel constructed according to the invention of our co-pending application Ser. No. 592,872 and illustrated in Fig. 1, consists of a wheel boss 1 and a disc portion of the wheel which comprises two similar annular discs 2 and 3 connected together by dowels 7 welded thereto as at 7', the discs being joined to the boss along two welded seams 1a and 1b. Associated with the tyre 8 of the wheel is a V-sectioned annular rim 5 with three lugs 6 each having a hole 6' drilled therethrough, and corresponding holes 2a and 2b are provided in the respective two discs in alignment with the respective holes 6' so that when it is desired to mount the wheel for turning the tyre thereof, the resilient insertions 4 and 4' which in the present instance are assumed to consist of polyurethane or a like rubber-like mouldable synthetic substance can be bridged by means of bolts inserted through the holes 2a, 6' and 2b so that the rim 5 is rigidly secured to the discs 2 and 3.

The resilient insertions are moulded on to the adjacent metal surfaces by means of a simple mould, part of which is formed by the portions of the wheel to which the insertions are to adhere, the moulding process being performed in two consecutive stages.

In the first stage only, one of the two resilient insertions is moulded. The equipment required is illustrated in Figs. 2, 3 and 4, and it will be seen more particularly by reference to Fig. 2 that the mould comprises an annular base plate 11, provided at 12 and 13 with recessed shoulders which positively retain in position the V-sectioned wheel rim 5 and one of the two annular sheet metal discs for example the disc 2. In this very simple way the rim 5 and the disc 2 are held in an accurately centralized position. The sloping surface of the base plate 11 shown at 14 corresponds to the outer surface of the resilient insertion 4 that is is desired to

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mould. To secure the base plate, rim, and disc against relative angular displacement, dowel pins 15 are provided which are temporarily inserted through the holes 6' in the lugs 6 and the holes 2a in the disc 2 and engage appropriately aligning holes in the base plate. These dowel pins which act as cores in the mould for forming the holes in the resilient insertion shown in Fig. 1 on the right and left hand sides of the hole 6'.

Before the moulding is done the surfaces 16 and 17 on the rim and the annular disc are very thoroughly cleaned, sand-blasted, and possibly—further to improve adhesion between metal and synthetic resin—treated with an adhesive such as for instance an isocyanate solution. The care with which this preparatory work is done will determine the durability and the reliability of the bond between metal and plastic.

After the mould has been preheated in an oven the polyurethane based synthetic plastic preferably a product offered is for sale under the trade name "Vulkollan," in liquid form is poured without creating bubbles into the mould with a ladle 19 until the plastic reaches the desired level indicated at 18. To prevent the plastic from adhering to the dowels 15 and to the surface 14 of the base plate it is advisable to dust these surfaces with a fatty medium before moulding commences. The entire mould is then transferred into an oven and maintained at the temperature determined by the nature of the plastic until the polyurethane "sets" and assumes the desired rubber-like consistency.

In carrying out the second stage of the moulding process in which the other resilient insertion is moulded in position (insertion 4') the mode of operation is very similar.

As illustrated by Figs. 5 and 6 the wheel rim 5 together with the disc 2 and the resilient insertion 4 already adhering thereto are turned upside down and replaced on the base plate 11. The second annular disc 3 has been previously located in the shoulder 13 and secured in this position against angular displacement with respect to the base plate by means of the dowel pins 20. A spacing ring 21 is first inserted between the two annular discs 2 and 3 to hold the two discs apart by an amount which later determines the amount of pre-compression to which the resilient insertions 4 and 4' will be subjected. Relative angular displacement of the two annular sheet metal discs is prevented by bolts 22. As soon as all the members which comprise the mould have thus been fixed in their correct relative and properly centralized positions a pouring funnel 23 is inserted into one of the holes in the annular disc 2 and in the hole in the corresponding lug on the rim 5.

Again the surfaces that are to bond with the plastics are previously carefully cleaned and sand-blast and the surfaces to which the plastic is not to adhere are treated with a fatty medium. The mould is then ready to receive the liquid plastic.

The moulding as such proceeds exactly as has been explained with reference to the first stage of the process, the pouring ladle 19 being again used. After the removal of the funnel 23 the mould is re-transferred into an oven or stove and kept there until the plastic has set.

After the removal of the base plate 1, the dowel pins 20, and the spacing ring 21, the wheel can be completed by tightening and pinning together the sheet metal annular discs 2, 3, welding the seams 1a and 1b, and finally by the shrinking on of the tyre, as has been described in greater detail in the specification of the aforementioned patent application Ser. No. 592,872.

What we claim is:

1. A method of forming resilient cushioning members

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for wheels comprising placing a rim and one annular sheet metal disc of smaller diameter than the rim upon a base plate having a surface which conforms in shape with the external surface of an uncompressed resilient insertion to be moulded, centrally locating the rim and disc on the base plate by means of a dowel pin and then filling the space between the base plate and the rim and the annular disc and around the dowel pin with a heat settable plastic material until the desired level of liquid plastic for forming the resilient insertion is reached, submitting the plastic material to heat treatment until the plastic material has set and adheres to the rim and disc, removing the rim and the sheet metal disc from the base plate and removing the dowel pin out of the plastic material, positioning another annular disc on the base plate, inverting the rim and the said first-mentioned disc so that the plastic material insertion lies uppermost and engaging the said first-mentioned disc with a spacing ring supported on the other annular disc, securing the discs and the spacing ring together, pouring a heat-settable plastic material into the space between the base plate and the rim and said second-mentioned disc through the hole formed in the set plastic insertion left by the dowel pin as a second insertion until the level of the plastic material reaches the desired level, subjecting the wheel again to heat treatment until the plastic material has set to adhere to the second-mentioned disc and the rim, and finally removing the base plate.

2. A method according to claim 1, in which upon completion of the heat treatment the spacing ring interposed between the two annular discs is removed and the resilient insertions are then pre-compressed by securing the two metal annular discs together in engagement one with the other.

3. A method of forming resilient cushioning members for wheels comprising placing a rim and one annular sheet metal disc of smaller diameter than the rim upon a base plate having a surface which conforms in shape with the external surface of an uncompressed resilient insertion to be moulded, centrally locating the rim and disc on the base plate by means of a dowel pin and then filling the space between the base plate and the rim and the annular disc and around the dowel pin with a heat settable plastic material until the desired level of liquid plastic for forming the resilient insertion is reached, submitting the plastic material to heat treatment until the plastic material has set and adheres to the rim and disc, removing the rim and the sheet metal disc from the base and removing the dowel pin out of the plastic material, positioning another annular disc on the base plate, inverting the rim and the said first-mentioned disc so that the plastic material insertion lies uppermost and engaging the said first-mentioned disc supported on the other annular disc, securing the discs together, pouring a heat-settable plastic material into the space between the base plate and the rim and said second-mentioned disc through the hole formed in the set plastic insertion left by the dowel pin as a second insertion until the level of the plastic material reaches the desired level, subjecting the wheel again to heat treatment until the plastic material has set to adhere to the second-mentioned disc and the rim, and finally removing the base plate.

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