

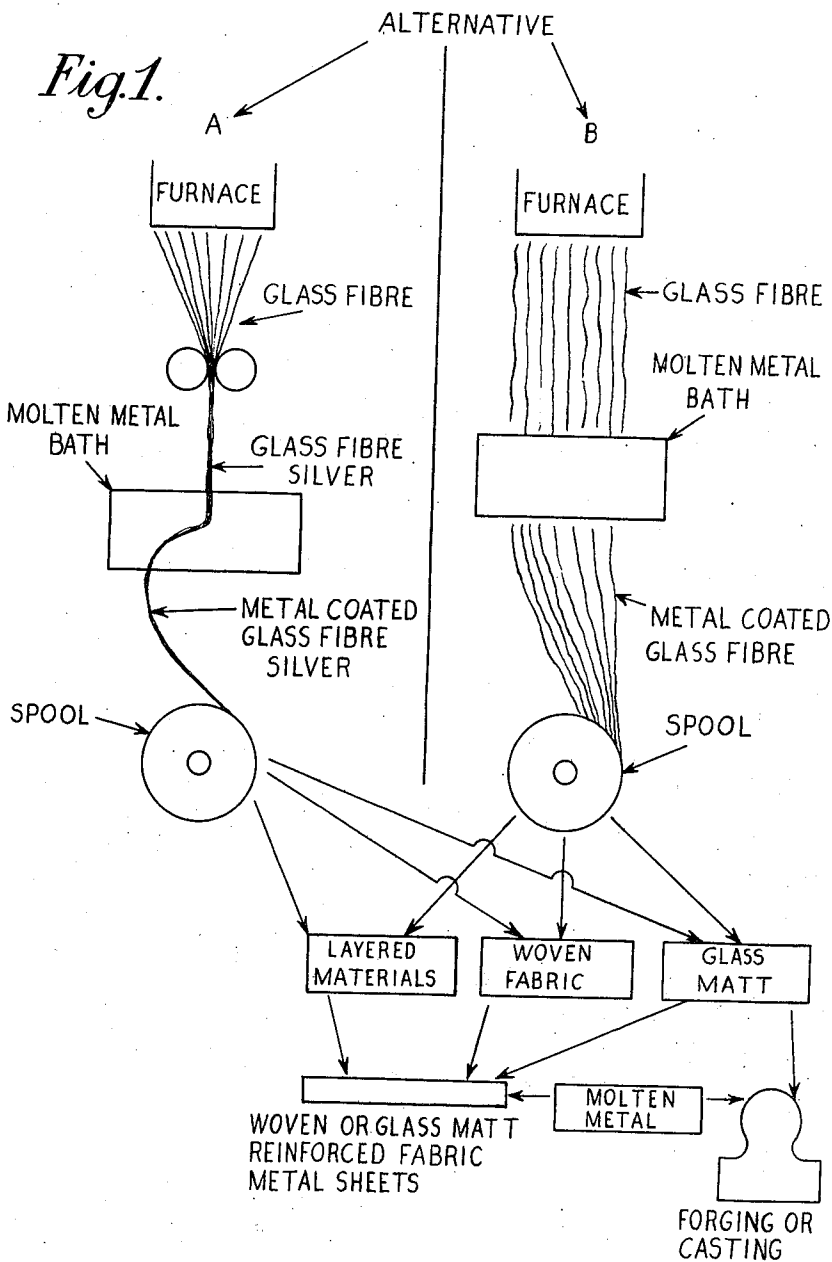
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H. KREMER
STRENGTHENING OF METAL

3,038,248

Filed Nov. 3, 1955

2 Sheets-Sheet 1



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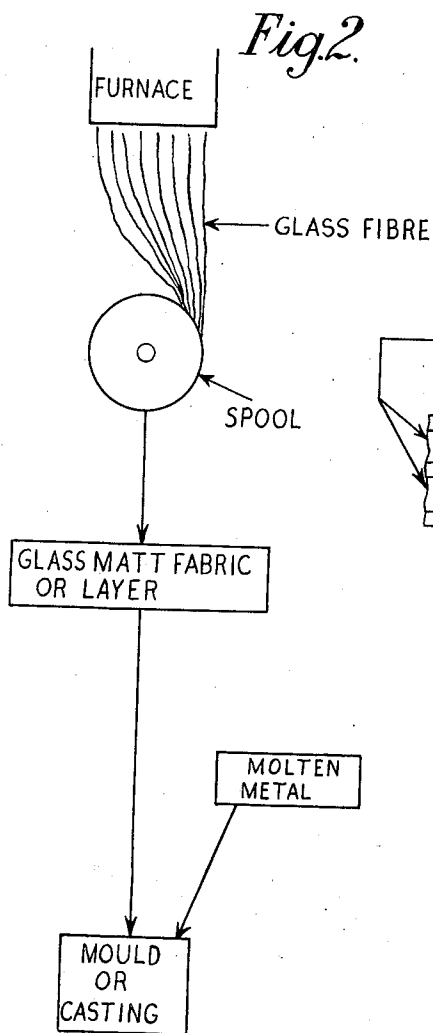
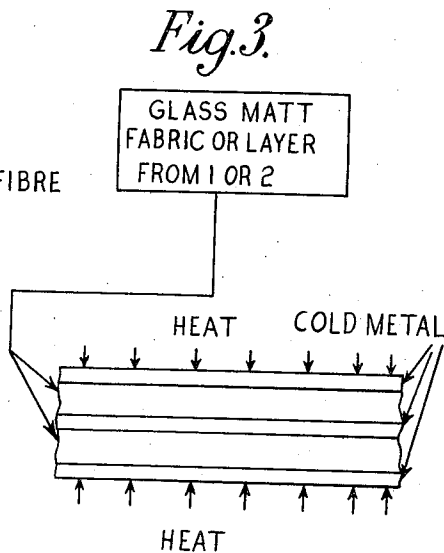
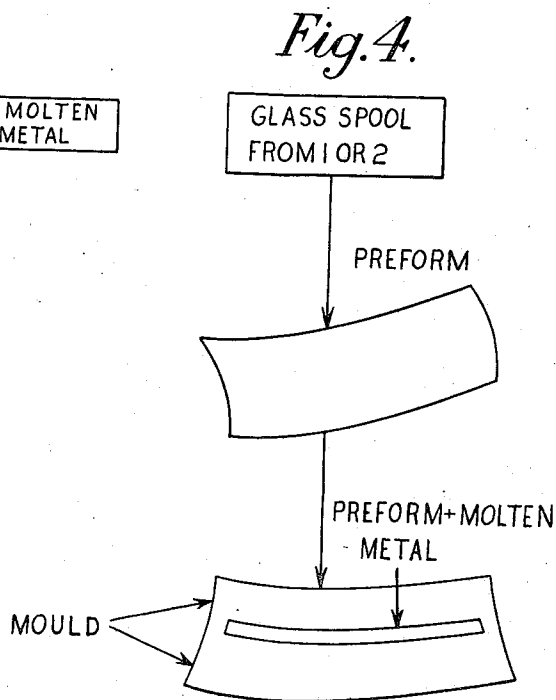
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STRENGTHENING OF METAL

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This invention relates to the strengthening of metals and metallic objects to give greater resistance to fatigue, rupture, breakage or elongation.

It is known that most metals deteriorate due to over-stress, ageing and fatigue and it is an object of this invention to reduce these defects.

I have found that the above-mentioned object may be achieved by the incorporation of mineral fibres (and particularly glass and asbestos fibres) in the metal.

Thus according to this invention, a metal body is characterised in that mineral fibres are incorporated in the metal. It will be understood that the term "metal" includes metal alloys.

Preferably the melting point of the mineral fibres should be higher than the melting point of the metal. This should particularly be borne in mind when the mineral fibres are glass fibres, which soften and flow at comparatively low temperatures compared with asbestos. It is advantageous that the glass and metal should have specific gravities in close relation to each other.

The invention also provides a process for making a metal body in which mineral fibres are incorporated in the metal when the metal is molten.

The mineral fibres are preferably in coherent form, e.g. in the form of a matt, woven fabric or rovings.

The following is a description, by way of example, of different methods of carrying out the invention, reference being made to the accompanying schematic drawings in which:

FIGURES 1A and 1B illustrates two methods of making strengthened metal sheets, castings and forgings,

FIGURE 2 illustrates an alternative method of making a strengthened metal casting,

FIGURE 3 illustrates an alternative method of making a strengthened metal sheet, and

FIGURE 4 illustrates a further method of making a strengthened metal casting.

Referring to FIGURES 1A and 1B, molten glass from a furnace is formed into fibres which are passed through a bath of the molten metal, thereby coating the surfaces of the fibres with metal, the coated fibres passing onto a spool. In the method of FIGURE 1A, the glass fibres before passage through the molten metal are formed into a sliver, this step being omitted in the alternative method of FIGURE 1B.

In each case, the coated fibres from the spool are processed into a matt, woven fabric, or layered material and incorporated in molten metal to form sheets, or in the case of matt to form castings or forgings.

In the method of FIGURE 2, glass fibre is led from the furnace onto a spool and fibre from the spool is processed into a matt, woven fabric or layered material. It may suitably be processed into short lengths of specially woven glass fibre roving or open weave cloth. The glass fibre is then introduced into a mould and molten metal is poured in to form a casting. If desired the fibre may be introduced directly into the molten metal prior to pouring.

In the method of FIGURE 3, a pre-metallised or non-metallised glass fibre matty fabric or layered material is sandwiched between cold metal sheets and intimately in-

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corporated therein by the subsequent application of heat or of heat and pressure.

FIGURE 4 illustrates a method in which a premetallised or non-metallised glass fibre matt, fabric or layered material is preformed to a desired shape, the preform then being located within a mould and enclosed or enclosed and impregnated with molten metal.

In the methods illustrated in FIGURES 1 to 4, asbestos fibres may be used instead of glass fibres. If desired, both asbestos and glass fibres may be used.

I claim:

1. In a method of reinforcing metal articles of predetermined size and form, such as sheets, castings, forgings and the like, the improvement which comprises coating mineral fibers selected from the group consisting of glass fibers and asbestos fibers with a metal in molten condition which metal is capable of wetting the surface of the said fibers, assembling the fibers into coherent form, incorporating the coherent assembly of fibers into a body having the predetermined size and shape of the article while the metal thereof is in molten condition and allowing said body of metal to solidify while retaining substantially the size and form of the said article.

2. In a method of reinforcing metal articles of predetermined size and form such as sheets, castings, forgings and the like the improvement which comprises incorporating into a body having the predetermined size and shape of the article, a coherent assembly of mineral fibers selected from the group consisting of glass fibers and asbestos fibers, by placing the fibers within a mold in which the body is to be formed, filling the mold with molten metal and allowing said body of metal to solidify while retaining the size and form of the said article said fibers being coated with a metal in molten condition which metal is capable of wetting the surface of said fibers, prior to their incorporation into the molten metal of said body.

3. In a method of reinforcing metal articles of predetermined size and form such as sheets, castings, forgings and the like the improvement which comprises incorporating into a body having the predetermined size and shape of the article, a coherent assembly of mineral fibers selected from the group consisting of glass fibers and asbestos fibers, by placing the fibers between metal sheets and forcing the sheets around the fibers by application of heat and pressure to incorporate said fibers into said body while the metal thereof is in molten condition and allowing said body of metal to solidify while retaining the size and form of said article, said fibers being coated with a metal in molten condition which metal is capable of wetting the surface of said fibers, prior to their incorporation into the molten metal of said body.

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