

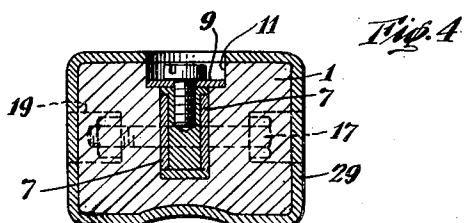
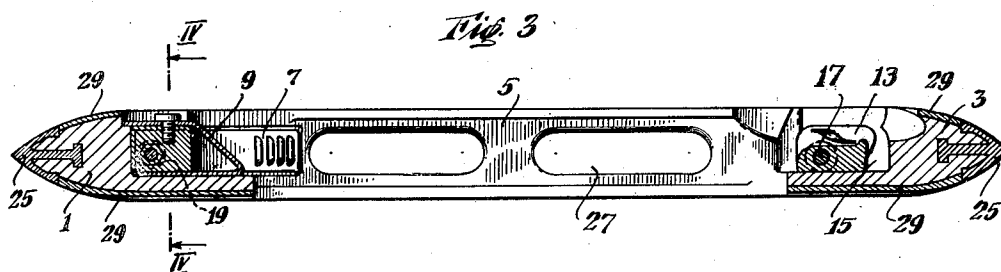
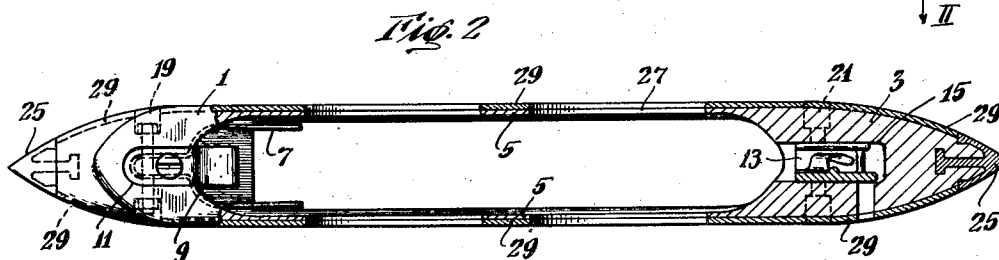
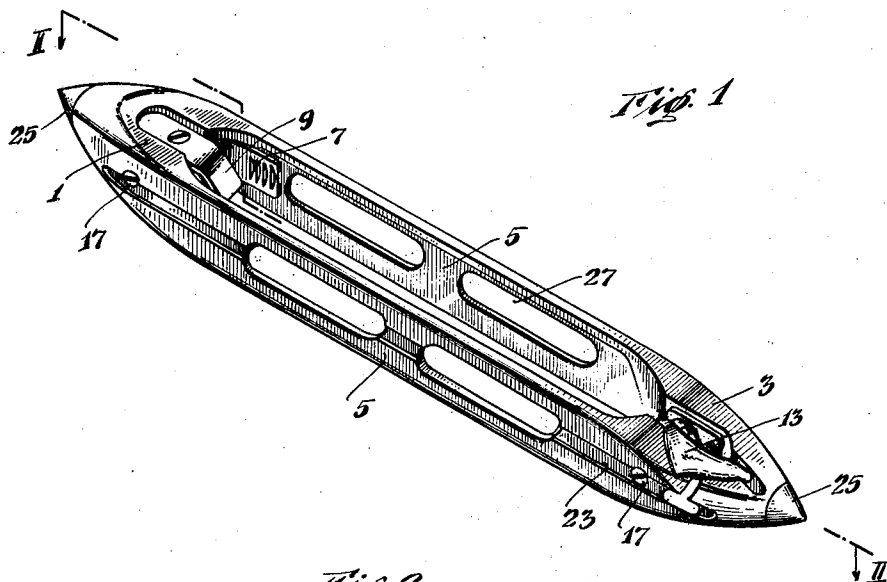
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SHUTTLE

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SHUTTLE

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9 Claims. (Cl. 139—196)

This invention relates to shuttles made of metal, especially magnesium and the alloys in which it predominates, and preferably the alloys containing at least 80 per cent magnesium by weight. The term magnesian metal, however, will be used hereinbelow to designate both commercially pure magnesium and the alloys in which it is the base metal.

Shuttles employed in the textile industry have generally been made of wood with spurs, eyes, spring clamps, filling bobbin, and other parts pertaining to the holding and paying off of the yarn being attached to or inserted in the wooden frame. While wooden shuttles are light of weight, they are subject to splitting, particularly at the eye portion, splintering, roughening, and considerable wear, especially on the shoulders. Difficulty is also encountered from loosening of the spurs, eyes, and spring clamps. A split or splintered shuttle can cause damage to the loom, the warp, the cloth being woven, and to the loom operator. Because of these shortcomings of wooden shuttles, the period of their useful life is uncertain and limited.

To overcome the deficiencies of wooden shuttles a variety of metallic shuttles have been proposed. In substituting metal for wood it has been difficult to obtain an article which is as light as the wooden shuttle and yet is strong and resilient enough to withstand the blows given by the picker stick. Still another difficulty which has often been encountered, particularly where light metal shuttles have been tried, is the tendency of the metal to soil the yarn with which it comes in contact. The action of such metals on the yarn is known in the art as "crocking." Metallic shuttles have at times exhibited still another disadvantage, namely, a tendency to become heated while operating in a loom. The temperature of the metal shuttle sometimes becomes high enough to injure the yarn, and to make handling difficult by the loom operator, and may even interfere with proper boxing because of thermal expansion of the shuttle.

Magnesian metal is particularly adapted for use in a shuttle because of its light weight combined with adequate strength and high resilience. The last named property is of special value in making the shuttle withstand the impacts incident to its operation. In spite of these advantages of magnesian metal, it has not been commercially employed for shuttle material because of its relatively low resistance to wear.

My invention is directed to overcoming the foregoing deficiencies of metallic shuttles, and

taking advantage of the beneficial properties of magnesian metal, the primary object being the provision of a durable, lightweight magnesian metal shuttle that has a high resistance to wear. One of the particular objects of my invention is to provide a magnesian metal shuttle which does not crock or heat up to an undesirable extent. These and other objects will be apparent from the following description and appended claims.

My invention consists in providing a synthetic non-metallic coating over at least that portion of the external surface of a magnesian metal shuttle where wear occurs due to contact with the yarn, the reed, and the shuttle box. The best construction, however, is to cover substantially the entire external surface of the shuttle with the desired coating material. The coating must be thick enough to resist wear, and must be capable of receiving and retaining a smooth finish, thus minimizing frictional resistance. It should also be capable of undergoing the degree of bending incident to the operation of the shuttle, especially the deflection of the side walls which occurs under impact, without cracking or breaking away from the metal base. I have found that a number of substances are suitable for this purpose but the class of substances known as the synthetic resins, particularly the thermosetting resins, such as one of the group consisting of the phenol formaldehyde, urea formaldehyde, melamine formaldehyde, and phenol furfural types, are especially adapted to this use because of their superior resistance to wear, strength, flexibility, and smoothness at operating temperatures. Other synthetic resins of the thermoplastic type exhibit the same characteristics though in lesser degree, and silicon-containing resins, porcelain type materials, and resin bonded plywood are also suitable under less severe operating conditions. All of these substances, however, are comprehended by the term "synthetic non-metallic coatings" inasmuch as they are not natural products such as wood or leather, and are greatly superior to these materials in respect to the characteristics mentioned above. The term "synthetic non-metallic coatings" also includes mixtures of the foregoing materials and other substances as more fully explained hereinbelow. The synthetic non-metallic coatings may be molded or cast in place over the external surface of a shuttle, except at the spur points, or they may be applied as strips to the shuttle body, or they may be applied in liquid form and allowed to dry. However, any manner in which the non-metallic coating is applied to the shuttle is satisfactory in so far as

this invention is concerned provided the coating is well attached and possesses the desired surface condition.

The coatings may cover the entire external surface of the shuttle or only a portion of the surface, but in any case the synthetic non-metallic substance should cover the edges and faces of the shuttle where there is continued contact with the yarn, the reed, and the shuttle box, such as the side facing the reed, the shoulders, the bottom, and the two edges contacting the warp. In a preferred form of the invention, a unitary, relatively thick (as compared to the thickness of a paint film, for example), molded coating covers substantially the entire external surface of the shuttle, with the exception of the spurs.

In referring to the above mentioned synthetic non-metallic coatings, it is to be understood that these materials need not constitute the entire body of the coating but that other substances may be admixed with them either as a filler, for example, or to improve certain properties of the coating. For example, it may be advantageous to employ a mixture of asbestos and a resin, or graphite and a resin, or glass cloth and a resin, or a mixture of all of these added substances and a resin. It is to be understood also that the coatings need not be of the same thickness on all external surfaces of the shuttle but may vary according to the wearing conditions encountered in service. Furthermore, different kinds of coatings may be used on different parts of a shuttle to meet different conditions.

The construction of a magnesic metal shuttle made in accordance with my invention may be better understood by referring to the accompanying figures where

Fig. 1 is a perspective view of the shuttle;

Fig. 2 is a broken plan view taken on line II—II of Fig. 1;

Fig. 3 is a longitudinal cross section in a vertical plane, at a right angle to the section shown in Fig. 2; and

Fig. 4 is a transverse cross section, taken on line IV—IV of Fig. 2.

The shuttle body, which is made of magnesic metal, consists of end portions 1 and 3 connected by side wall members 5. The filling bobbin, which is not shown, is accommodated in the space between the end portions and side walls of the shuttle. Bobbin holding means 7 and bobbin guide 9 in recess 11 are located in end portion 1, while a conventional shuttle eye 13 is placed in recess 15 in end portion 3, the recesses being shown most clearly in Fig. 2. A recess is provided in end portion 1 and the adjoining shuttle wall 5, on either side of bobbin guide 9, to accommodate the bobbin holding means 7. These fittings are secured in position by screws or bolts 17 in openings 19 and 21 in end portions 1 and 3, respectively, as illustrated in Figs. 2 and 3. Along the side wall where the yarn travels from the shuttle eye 13 is a groove 23 to accommodate the yarn. Steel spurs 25 are located at both ends of the shuttle. Openings 27 are provided in side walls 5 to effect a reduction in the weight of the shuttle body. The entire external surface of the shuttle, with the exception of the spurs, is covered with a relatively thick molded synthetic resin 29, as

shown clearly in Figs. 2, 3, and 4. The coating is said to be relatively thick because it is much thicker than a paint film. The coating, being a molded unitary body, is suitably anchored to the shuttle body. To provide additional anchorage the coating may extend over the edges of the shuttle into the internal surface. Furthermore, if the coating becomes cracked or otherwise injured so that the shuttle can be used no longer, the old coating may be completely removed and a new coating applied in its place.

Other types of shuttles than the one described above can be made of magnesic metal and can be coated with a non-metallic substance. The details of shuttle design do not form a part of the present invention. The use of magnesic metal in any case permits the construction of a shuttle which is not only light in weight but also one which has adequate strength and high resilience. Such a combination of properties is only attainable where magnesic metal is employed.

Having described my invention and certain embodiments, which are offered by way of example and not limitation, I claim:

1. A shuttle comprising a body of magnesic metal and a synthetic non-metallic coating thereon covering at least a portion of the external surface of said body.

2. A shuttle comprising a body of magnesic metal and a synthetic non-metallic coating thereon covering substantially the entire external surface of said body.

3. A shuttle comprising a body of magnesic metal and a coating of a synthetic resin thereon covering at least a portion of the external surface of said body.

4. A shuttle comprising a body of magnesic metal and a coating of a thermosetting resin thereon covering at least a portion of the external surface of said body.

5. A shuttle comprising a body of magnesic metal and a relatively thick unitary molded coating of a thermosetting resin thereon covering substantially the entire external surface of said body.

6. A shuttle comprising a body of magnesic metal and a coating thereon selected from the group of thermosetting resins consisting of urea formaldehyde, phenol formaldehyde, melamine formaldehyde, and phenol furfural, said coating covering at least a portion of the external surface of said body.

7. A shuttle comprising a body of magnesic metal and a coating thereon consisting of a mixture of a thermosetting resin and graphite, said coating covering at least a portion of the external surface of said body.

8. A shuttle comprising a body of magnesic metal and a coating thereon consisting of a mixture of a thermosetting resin, glass cloth, and graphite, said coating covering at least a portion of the external surface of said body.

9. A shuttle comprising a body of magnesic metal and a coating thereon consisting of a mixture of a thermosetting resin, graphite, and asbestos, said coating covering at least a portion of the external surface of said body.

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