April 30, 1940. T. L. GATKE 2,199,197

SPINNING BUCKET

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Fig. 1

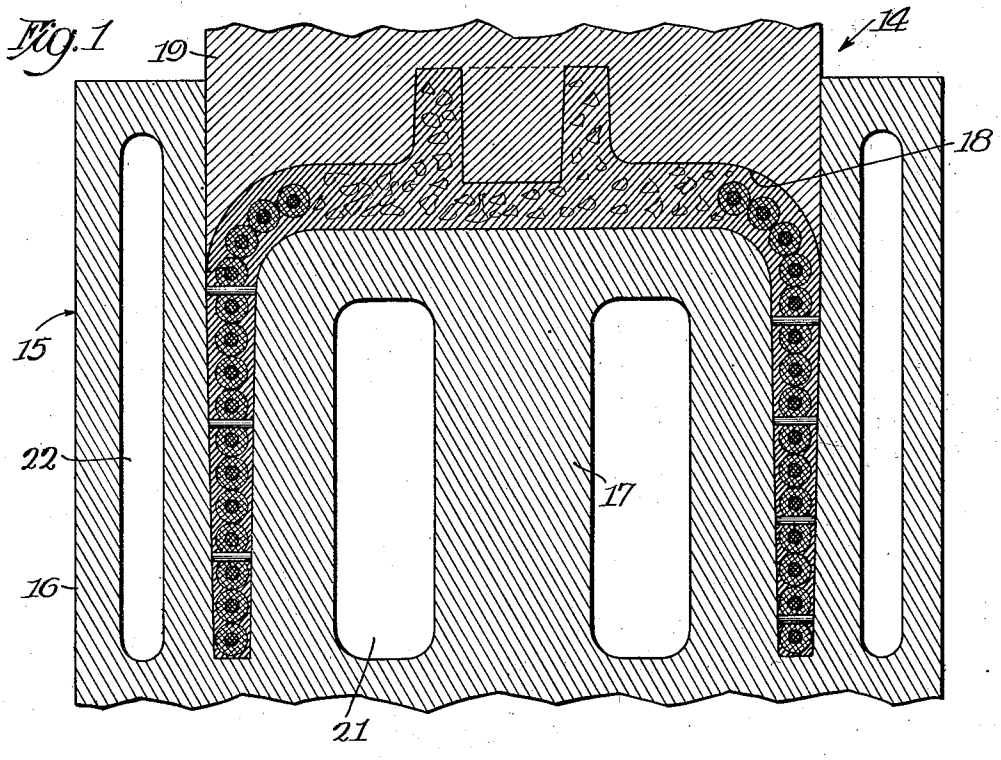


Fig. 2

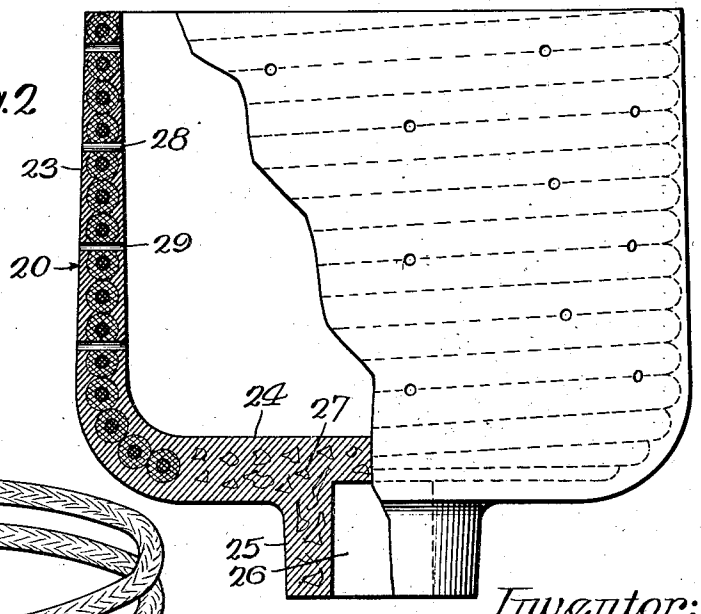
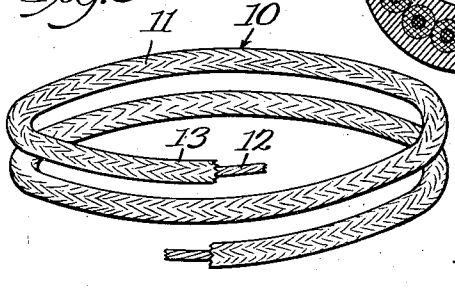


Fig. 3



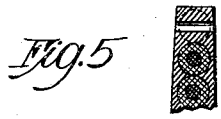
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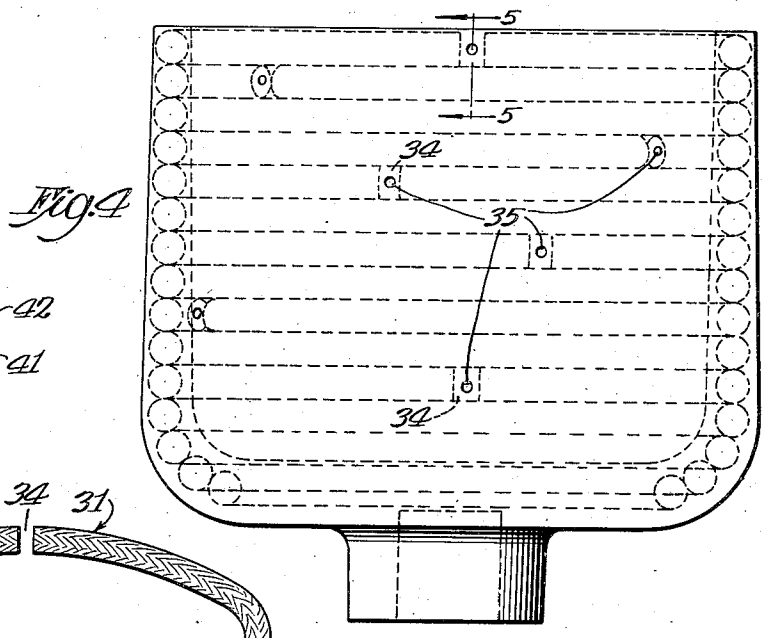
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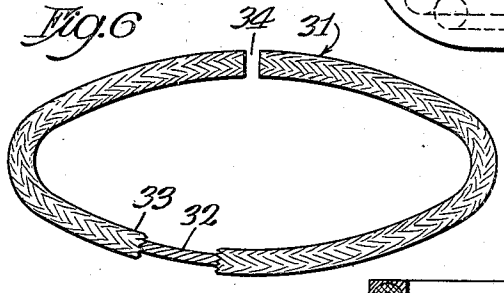
SPINNING BUCKET

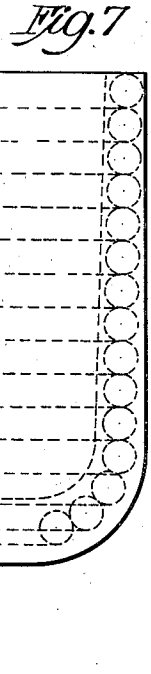
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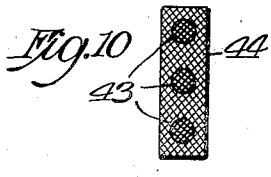


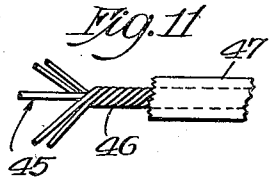


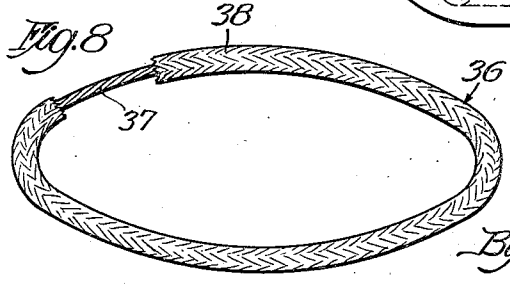












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Patented Apr. 30, 1940 2,199,197

UNITED STATES PATENT OFFICE

2,199,197

SPINNING BUCKET

Thomas L. Gatke, Chicago, Ill.

Application June 10, 1936, Serial No. 84,424

4 Claims. (Cl. 57—76)

This invention relates to apparatus employed in the manufacture of artificial silk or rayon, and, more particularly to spinning buckets or rotating boxes of such apparatus and the process of manufacturing the same.

One of the objects of the invention is the provision of a new and improved spinning bucket for use in the preparation of rayon or artificial silk.

A further object of the invention is the provision of a new and improved spinning bucket having incorporated within the side wall thereof or integral therewith, circumferentially extending strands which resist the radial distortion of the side wall during the rapid rotation of the bucket.

Another object of the invention is the provision of a new and improved process of manufacturing a spinning bucket and the selection and arrangement of the material in the manufacture of the bucket.

A still further object of the invention is the provision of a new and improved spinning bucket that is inexpensive to manufacture, efficient in operation, exceedingly well-built, well balanced, and with walls so strongly reinforced that the bucket is capable of very high rotational speed, whereby the output of this type of mechanism is very greatly increased.

Other and further objects and advantages of the invention will appear from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a vertical section of a mold for molding the bucket;

Fig. 2 is an elevation of a completed bucket with parts in section and parts broken away;

Fig. 3 is a perspective view of a strip or cable used in the molding of the bucket and showing the same in helical form;

Fig. 4 is an elevation of a modified form of the bucket;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 is a section of one of the split rings employed on the molding of the bucket, shown in Fig. 4;

Fig. 7 is a further modified form of bucket made from endless rings;

Fig. 8 is one of the rings from which the bucket shown in Fig. 7 is molded with parts broken away;

Fig. 9 is a cross section of a modified form of strip used in the molding of the buckets;

Fig. 10 is a cross section of a further modified form of strip which may be used in the manufacture of a modified form of bucket; and

Fig. 11 is an elevation of a further modified form of strip used in the manufacture of a further modified form of bucket.

In the production of artificial silk or rayon by what is known as the "wet process"—that is, the process in which the filaments are discharged into and are caused to pass through, a liquid setting solution—the filament is conducted from the bath into a rapidly rotating container known as the spinning box or bucket and often referred to as the "Topham box". Since the bath contains more or less acid, it is necessary that this box or bucket be of a material not affected by the acid adhering to the filaments or yarn. Usually the buckets are made from artificial resin such as a phenolic condensation product, vulcanized rubber or the like, and while the cohesive properties of these materials when molded, are fairly high, the speeds at which boxes or buckets made from this material alone may be safely rotated are limited.

Attempts have been made to reinforce the walls by plain metal wire wound around the exterior or in grooves in the exterior of the side walls, or by bands, wires, or the like, applied to the exterior or embedded in the molded walls of the article in certain zones only, but these expedients are more or less objectionable in that the composition does not adhere so well to smooth wire, and, hence, a strain on the wall, due to centrifugal force, is likely to disrupt the bond between the material and the smooth surface of the wire with the result that the coils or wire are likely to crowd together and the wire become more or less slack, thereby permitting distortion of the walls of the buckets. Furthermore, should one turn of a smooth wire break, the others would likely become loose. Where plates or groups of wires are in separate zones on the boxes, the walls are likely to become distorted non-uniformly between the reinforced zones with the result that the bucket would become unbalanced and at high speeds such distorted portion would seriously interfere with the proper operation of the bucket.

The fact that these buckets are provided with apertures in their side walls for centrifuging the yarn or filaments and freeing it of acid as it is being wound, complicates the problem, because of the likelihood of the escaping acid coming in contact with the metal reinforcing elements and causing their rapid deterioration.

The present invention seeks to remedy these difficulties by the provision of new and improved spinning buckets with parts so arranged that the side walls of these buckets will have reinforcing elements of such nature that not only does the material of the walls firmly adhere to those ele-

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ments but a maximum reinforcement equally distributed througnout the height of the buckets is provided. Furthermore, the walls are so constructed that the acid discharged through the apertures therein will not come in contact with any metal parts, even in buckets where metal reinforcing members are employed.

In the construction of spinning buckets, lengths of elongated flexible material, preferably fabricated, are incorporated in the walls of the molded article. The filaments, fibers or strands of this material extend circumferentially of the side walls of the buckets. This is considered an important feature of the invention because it insures maximum reinforcement of those walls.

Referring now to Figs. 1 to 3 of the drawings which illustrate one embodiment of the invention and a mold, shown more or less diagrammatically, for forming the bucket, the reference character **10** designates the stock material from which the spinning buckets are made. This material is in the form of what for convenience of description will herein be termed strips, and in the form shown in Figs. 1 and 3, comprises a cable **11** having a core of twisted wire **12**, around which is braided a heavy covering or sheath of fibrous material **13**. The strip is impregnated with an acid resistant synthetic resin before being placed within the mold. This may be accomplished in different ways, as for instance, the individual strands of the strip are conducted through molten acid-resistant synthetic resin before being braided or twisted, and, if desired, the finished strip may then be conducted through the molten resin before being placed within the mold **14**, or the strip may be saturated with the resin after it is finished.

The mold is shown more or less diagrammatically in Fig. 1 and comprises a die block **15** including an outer member **16** and inner member **17** forming the die cavity **18** and a plunger **19** movable in the cavity **18**. The inner member **17** is hollow in order to provide a cavity or recess **21** for receiving steam for heating the inner wall of the cavity and the outer portion of the die block is provided with cavities **22** for receiving steam for heating the outer wall of the die cavity.

The completed article is shown in Fig. 2 and comprises a receptacle **20** having a side wall **23**, a bottom wall **24** and a hub portion **25**. The hub portion is provided with a socket **26** for receiving the driving spindle, as is usual in such constructions. The side wall is provided with a plurality of apertures through which the acid adhering to the yarn is discharged by centrifugal force.

The form or shape of the bucket may be of the usual or any well known construction, and the cover not shown may be applied in the conventional manner. In molding the bucket shown in Fig. 2, the strip is placed within the mold, either in pre-wound form, as shown in Fig. 3, or the strip coiled within the mold cavity while being inserted, but, in either case, it is in the form of a helix in the mold cavity. Synthetic resin is then added in the mold cavity in suitable amounts and the mass molded in the usual manner.

If desired, the central portion of the bottom wall of the bucket which is not subjected to such great centrifugal force as the sides of the bucket, may be, and preferably is, made from scraps and from synthetic resin **27** with or without reinforcing filaments, strands or fibers.

If desired, cores, as pins **28**, may be placed between the turns of the strip and removed after the molding operation for forming the apertures **29** in the wall of the finished bucket or preferably these holes may be drilled at these points after the bucket is molded. These apertures are located between the turns of the strip and, consequently, the metal reinforcing wires **12** will not be exposed to the acid that may be discharged from the spun threads by the centrifugal forces during the spinning operation.

After the strip is placed in the mold, heat is applied for molding the synthetic resin, and simultaneously pressure applied to the plunger **19**, as is usual in molding operations. By this molding operation, the individual turns of the strip are caused to coalesce and form a unitary structure having smooth inner and outer walls of synthetic resin. After the openings **29** are drilled and the upper edge of the bucket is formed for receiving the lid, the bucket is ready for use.

Instead of employing a single strip in the form of a helix, the bucket may be made from a plurality of split rings **31**, each ring formed of material similar to that shown in Fig. 3 having a group of wires **32** twisted together and covered by a sheath **33** of braided strands.

The ends of the ring **31** are spaced apart and a quantity of synthetic resin or other acid nonresistant material is inserted between the ends for completing the ring. These rings are placed in the mold and occupy a position similar to the helix as shown in Fig. 1.

The split portions of the rings are spaced apart circumferentially, as shown in Fig. 4, whereby the strength of the walls is reinforced to its maximum and at the same time maintains the bucket in a balanced relation relative to its rotation. The openings **35** for the discharge of the acid are drilled through the sections **34** between the ends of the rings. By means of this arrangement, the acid is prevented from coming in contact with the metal reinforcing member **32**.

The form of the construction shown in Figs. 7 and 8 differs from that shown in Figs. 4, 5 and 6 in that individual endless rings **36** are employed in the molding of the bucket. The rings are provided with the reinforcing member **37** and a sheath or covering **38** similar to that shown in Fig. 3. The openings **39** for the discharge of the acid are drilled through the spaces between the reinforcing members **37** in a manner similar to that shown in Fig. 1.

Instead of using a cable, or a member substantially circular in cross section for use in molding the bucket, the strip may be square, as shown in Fig. 9, with a core of twisted or untwisted wires **41** covered with suitable fibrous material **42**, or it may be rectangular in cross section, as shown in Fig. 10.

If rectangular in cross section, a plurality of groups of wires **43**, either twisted or untwisted, are covered by suitable fibrous material **44**, as shown in Fig. 10. Preferably, in all forms of the strip from which the bucket is molded, the core is of twisted wires, and the cover is braided about the wires. By using twisted wires, the synthetic resin adheres more firmly to the surface—that is, it takes a greater force to disengage the wires from the resin than would be the case with straight wires. Furthermore, pound for pound, a twisted wire cable is much stronger than a single wire and is at the same time, more flexible, thereby facilitating the braiding operation.

The sheath or covering is preferably braided in order that all the fibers forming the same will

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be arranged circumferentially of the molded bucket, thereby adding to the strength of the cable or strip and affording a maximum of strength against distortion during the rotation of the bucket.

The form of the strip shown in Fig. 11 differs from that shown in Fig. 3 in that the core **45**, which may be a single wire or a cable of twisted wires, is covered with strands **46** of wire or fiber, which are wound rope-like about the core **45** and a sheath **47** of fibrous material braided about the same.

It will thus be seen that in all forms of the device, the receptacle portion of the bucket, or at least the side wall thereof down beyond the junction of the side and bottom walls of the bucket, is formed from strips of reinforcing material extending circumferentially around the bucket and a binder of synthetic resin by heat and pressure in a molding operation which causes the parts to become a unitary structure; and that in the form of construction employing groups of metallic strands the walls are very greatly reinforced. As a result of this reinforcement, the speed of the spinning bucket may be materially increased, whereby production is greatly increased, without sacrificing the element of safety.

The molding material may be of any suitable composition. While acid-proof synthetic resin, such as the formaldehyde resins, and especially the formaldehyde-phenolic resin is preferred, it is understood that other moldable acid-resisting material, such as the formaldehyde-urea resins, natural resins, rubber and the like may be employed.

It is thought from the foregoing taken in connection with the accompanying drawings that the construction and operation of my device will be apparent to those skilled in the art, and that changes in size, shape, proportion and details of construction may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. A spinning bucket comprising a molded receptacle having its side wall composed of acid-resistant phenolic condensation composition having a group of reinforcing metal strands twisted together and embedded in said wall and extending spirally throughout the height of the side wall thereof, the turns of said groups of strands being spaced apart a sufficient distance to provide for apertures between said strands without exposing said strands.

2. A spinning bucket comprising a molded receptacle having a side wall composed of a phenolic condensation product and groups of twisted metallic strands embedded in the wall and comprising individual turns spaced apart and arranged in parallel planes with the ends of each turn spaced a short distance apart forming gaps occupied by said product, said gaps being offset from each other to occupy different vertical planes, said wall having apertures between the ends of some of said groups of metallic strands through which liquid is discharged by centrifugal action during the normal operation of said bucket.

3. A spinning bucket comprising a molded receptacle having side walls of Bakelite, a group of endless strands of metal twisted together and surrounding with braided fibrous material forming an endless strip extending spirally from top to bottom of the side wall of the receptacle, the turns of said strip being in contact and embedded in said Bakelite and forming an integral wall therewith, said wall having acid discharging apertures between said groups of endless strands.

4. A spinning bucket for use in the production of rayon comprising a molded receptacle having its side wall comprising acid-resistant synthetic resin and a plurality of strips of reinforced material embedded within said side wall, each of said strips being disposed concentrically of said receptacle, said strips being in contact with each other throughout the height of the side wall of said receptacle, said strips comprising strands of metal twisted together and having a covering or braided material, said wall having apertures therethrough between the braided material of adjacent strands.

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