Feb. 17, 1948. H. P. PHILLIPS 2,436,227

METHOD OF FORMING PISTON RING ELEMENTS OF RIBBON STEEL

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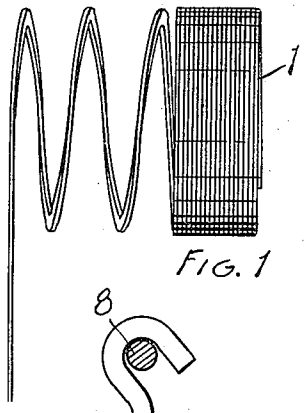


FIG. 1

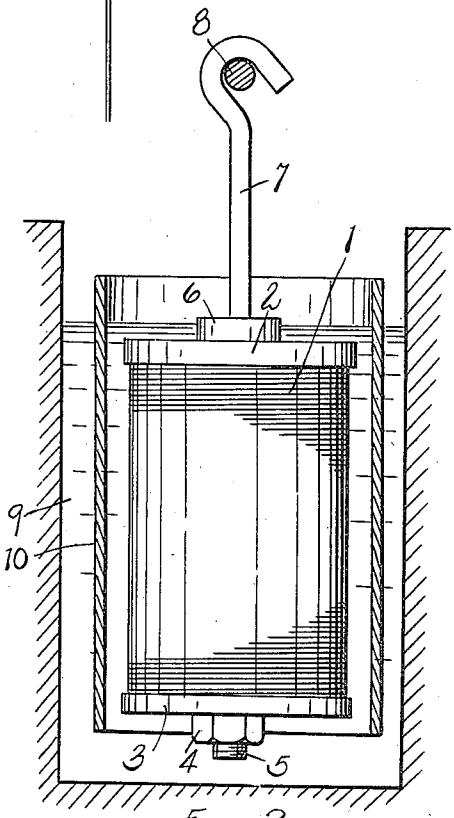


FIG. 2

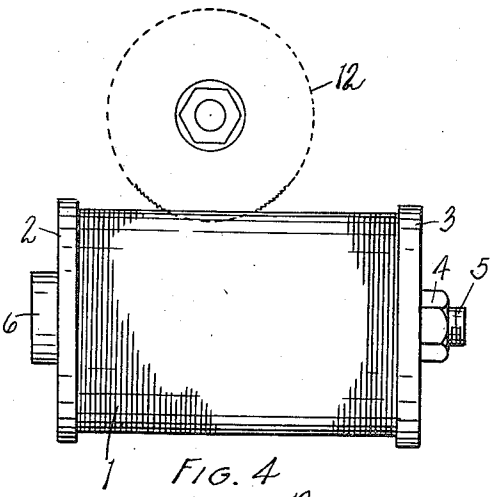


FIG. 4

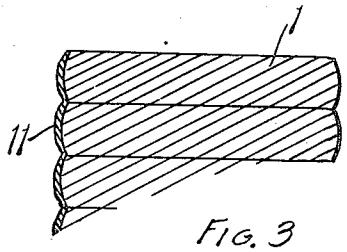


FIG. 3

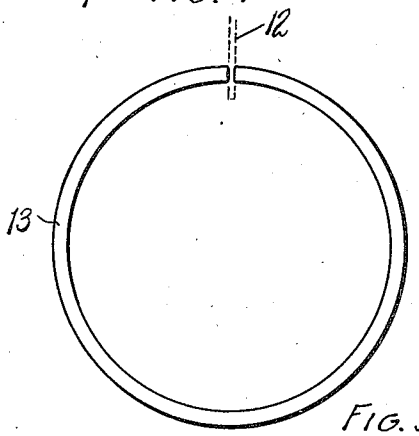


FIG. 5

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METHOD OF FORMING PISTON RING ELEMENTS OF RIBBON STEEL

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5 Claims. (Cl. 204—25)

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This invention relates to improvements in method of forming piston ring elements of ribbon steel.

The main objects of this invention are:

First, to provide a method of forming split piston ring elements having chromium plated peripheral cylinder wall engaging faces which enables the very rapid production of the elements and a very uniform product.

Second, to provide a method in which only the peripheral surface is plated, thereby conserving material.

Third, to provide a method of forming split piston ring elements which have very long life even when used under severe conditions such as in badly worn cylinders.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary side elevation illustrating the first step of my method, namely, the coiling of a strip of ribbon steel edgewise into a multiple coil spiral.

Fig. 2 is a fragmentary view partially in vertical section illustrating the succeeding steps, that is, the step of mounting such a multiple coil spiral in a plating bath holder and the submerging of the multiple coil spiral so mounted in a plating bath.

Fig. 3 is an enlarged fragmentary section illustrating the multiple coils after plating.

Fig. 4 is a fragmentary section illustrating the step of cutting the multiple coil peripherally plated spiral into split piston ring elements.

Fig. 5 is a side view of one of the split piston ring elements illustrating the relation thereto of the saw, although it will be understood that the ring elements expand under their inherent tension after they have been released from the holder.

In the practice of my method, I first form a multiple coil spiral 1 out of ribbon steel coiled edgewise, as is illustrated in Fig. 1. The means for coiling are not illustrated as they form no part of this invention.

I mount the multiple coil spiral upon a plating bath holder comprising end plates 2 and 3 which are clamped upon the ends of the multiple coil spiral by means of the nut 4 threaded upon the end of the spindle 5, this being provided with an abutment collar 6 for the clamping member 2.

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The holder is provided with a suspending hook 7 engaged with the support 8 which in practice is preferably a current conductor. The coils of the spiral are clamped between the members 2 and 3 of the holder in side by side relation forming a substantially fluid seal—that is, they are clamped together so that there is very little opportunity or tendency for the plating fluid to "throw" between the individual coils and thus plate the sides thereof. The clamping members 2 and 3 are solid so that the plating fluid is substantially excluded from the coils.

The plating bath 9 is conventionally illustrated and the loaded holder is preferably submerged in the bath within a sleeve-like anode 10. The rings constitute the cathode. This results in the application or depositing of a coating 11 of chromium or other desired material on the peripheries of the composite or multiple coil.

After the plating the multiple coils are cut longitudinally as by means of a saw 12 into individual ring elements 13. This severing or cutting of the individual elements is preferably done while the multiple coil is supported on the holder, as is illustrated in Fig. 4, as this avoids the necessity of a separate chucking operation for the coil. This method, including the coil forming and plating steps, may be very rapidly performed. Where it is attempted to chrome plate the peripheries of split rings after the gap is cut therein, instead of before cutting the gap therein as in the method of my invention herein described, the gap must be very accurately milled and the diameter held very accurately so that when the rings are closed up the gaps of all the rings on the plating arbor or mandrel come together solidly. If one ring is a little larger than others it will butt together first and hold the adjacent rings open; gassing will result and the plate may be destroyed at the openings. If certain of the rings have too much gap in comparison to the others they naturally stand open and will "gas." My method, which includes the step of electrically plating the multiple coil spiral while in the form of a continuous integral multiple coil member, and with the individual coils thereof clamped in side by side substantially fluid sealing relation, overcomes all of these difficulties and not only results in a superior product but greatly lessens labor and time. The suspending hook 7 may be threaded into the collar or thrust member 6 on the spindle 5.

The apparatus illustrated is highly practical for the practicing of my method. I have not attempted to illustrate other apparatus which might be used as it is believed that the disclosure

will enable those skilled in the art to practice my invention in a satisfactory manner with available equipment.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of forming split piston ring elements having chromium plated peripheral cylinder wall engaging edges comprising the steps of coiling a strip of ribbon steel edgewise into a continuous integral multiple coil spiral, clamping such continuous integral multiple coil spiral in a plating bath holder with such axial clamping pressure that the individual coils thereof are clamped in side by side substantially fluid sealing relation, submerging the multiple coil spiral so mounted in the holder in a chromium plating bath and centrally within a tubularly shaped anode, electrically plating the peripheral cylinder wall engaging edge of the multiple coil spiral while submerged in said bath, in the form of a continuous integral multiple coil member, and with the individual coils thereof clamped in said side by side substantially fluid sealing relation, and thereafter cutting the multiple coil peripherally plated spiral into split piston ring elements, said step of coiling fashioning the ring elements approximately to shape, and positioning the coils of the ring elements in superimposed relation for the plating operation.

2. The method of forming split piston ring elements having plated peripheral cylinder wall engaging edges comprising the steps of coiling a strip of ribbon steel edgewise into a continuous integral multiple coil spiral, clamping such continuous integral multiple coil spiral in a plating bath holder with such axial clamping pressure that the individual coils thereof are clamped in side by side substantially fluid sealing relation, submerging the multiple coil spiral so mounted in the holder to a plating bath, electrically plating the peripheral cylinder wall engaging edge of the multiple coil spiral while submerged in said bath, in the form of a continuous integral multiple coil member, and with the individual coils thereof clamped in said side by side substantially fluid sealing relation, and thereafter cutting the multiple coil peripherally plated spiral into split piston ring elements, said step of coiling fashioning the ring elements approximately to shape, and positioning the coils of the ring elements in superimposed relation for the plating operation.

3. The method of forming split piston ring elements having chromium plated cylinder wall engaging edges comprising the steps of coiling a strip of ribbon steel edgewise into a continuous integral multiple coil spiral, mounting such continuous integral multiple coil spiral in a plating bath holder so that axial clamping pressure is applied to the multiple coiled spiral and the individual coils thereof are clamped in side by side substantially fluid sealing relation, subjecting to a chromium plating bath, electrically plating the peripheral cylinder wall engaging edge of the multiple coil spiral while submerged in said bath, in the form of a continuous integral multiple coil member, and with the individual coils thereof clamped in said side by side substantially fluid sealing relation, and thereafter cutting the multiple coil spiral into split piston ring elements.

4. The method of forming split piston ring elements having plated cylinder wall engaging edges comprising the steps of coiling a strip of ribbon steel edgewise into a continuous integral multiple coil spiral, mounting such continuous integral multiple coil spiral in a plating bath holder so that axial clamping pressure is applied to the multiple coiled spiral and the individual coils thereof are clamped in side by side substantially fluid sealing relation, subjecting to a plating bath, electrically plating the peripheral cylinder wall engaging edge of the multiple coil spiral while submerged in said bath, in the form of a continuous integral multiple coil member, and with the individual coils thereof clamped in said side by side substantially fluid sealing relation, and thereafter separating the multiple coil spiral into split piston ring elements.

5. The method of forming split piston ring elements having chromium plated cylinder wall engaging edges comprising the steps of coiling a strip of ribbon steel edgewise into a continuous integral multiple coil spiral, mounting the continuous integral multiple coil spiral in a holder under axial clamping pressure with the individual coils thereof in side by side substantially fluid sealing relation, subjecting the multiple coil spiral while so mounted to a chromium plating bath and centrally within a tubularly shaped anode, electrically plating the peripheral cylinder wall engaging edge of the multiple coil spiral while submerged in said bath, in the form of a continuous integral multiple coil member, and with the individual coils thereof clamped in said side by side substantially fluid sealing relation, and thereafter severing the plated multiple coil into split piston ring elements.

HAROLD P. PHILLIPS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,450,346	Anderson	Apr. 3, 1923
1,600,961	Payne	Sept. 21, 1926
1,772,074	Englehardt et al.	Aug. 5, 1930
1,794,973	McBride	Mar. 3, 1931
2,119,035	Ballard	May 31, 1938
2,129,868	Pearson	Sept 13, 1938
2,349,372	Phillips	May 23, 1944
2,367,159	Van Der Horst	Jan. 9, 1945