June 5, 1934. G. W. ROTH 1,961,789

WRIST PIN

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Fig. 5

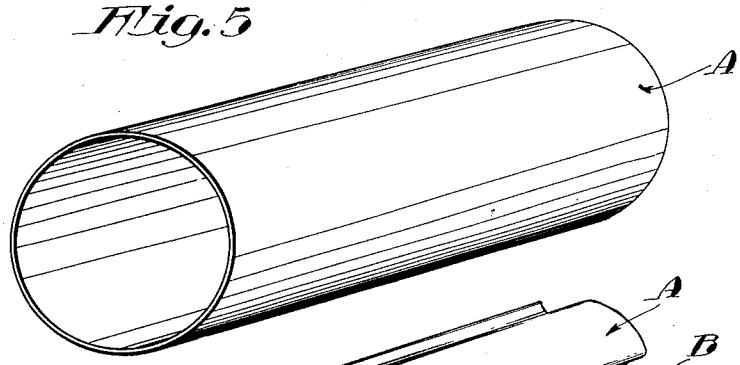


Fig. 6

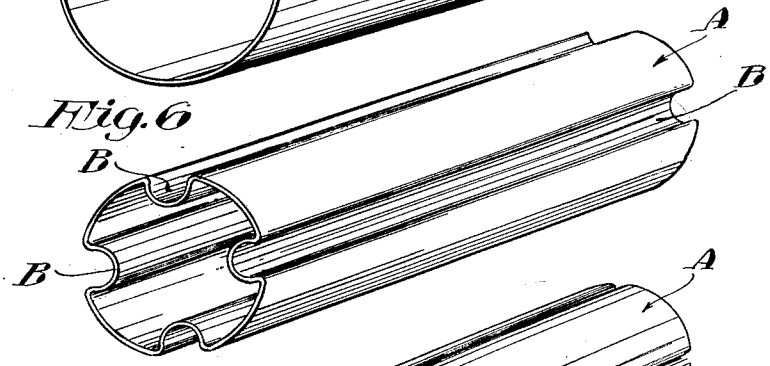


Fig. 7

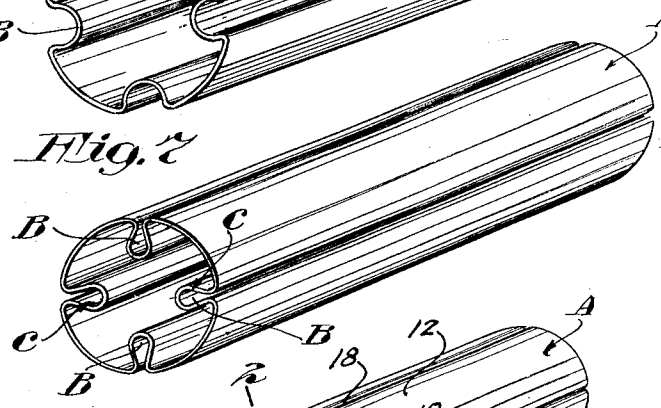


Fig. 1

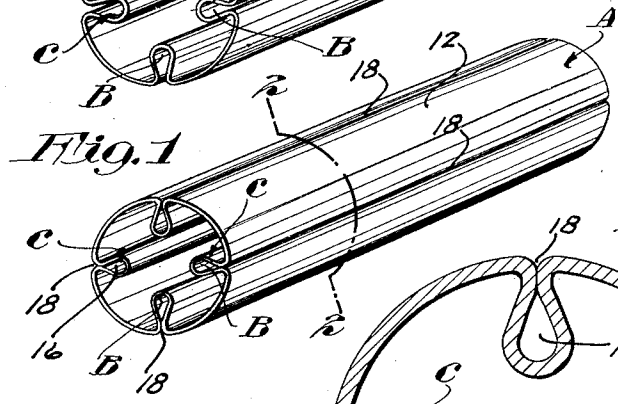
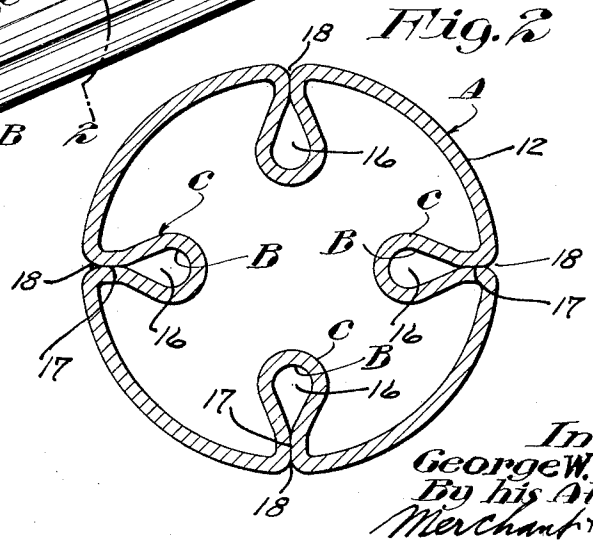


Fig. 2



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Fig. 3

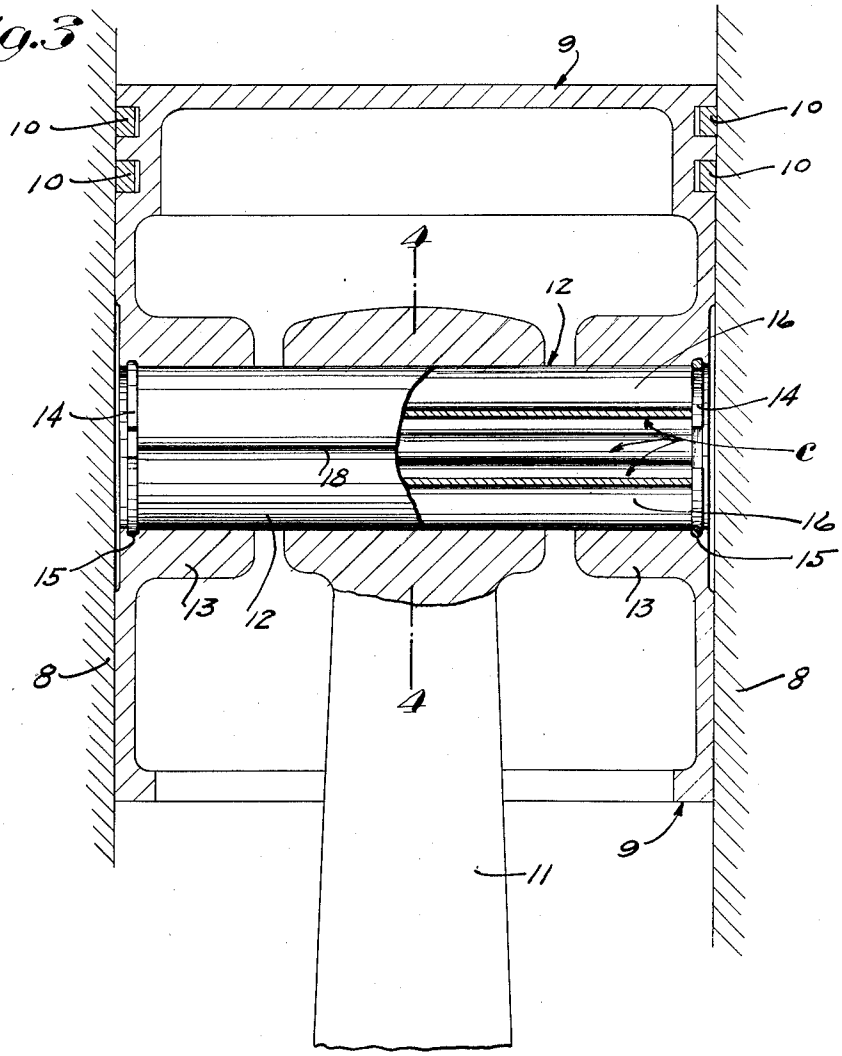
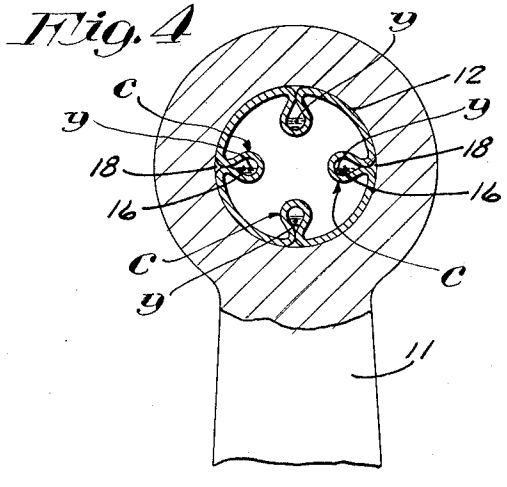


Fig. 4



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UNITED STATES PATENT OFFICE

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WRIST PIN

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Application April 6, 1932, Serial No. 603,570

2 Claims. (Cl. 309—19)

This invention relates to an improvement in wrist pins or analogous devices and also to a highly efficient process for producing the improved device.

Generally stated, the invention consists of a novel product and process hereinafter described and defined in the claims.

In the accompanying drawings, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a perspective view of the improved wrist pin;

Fig. 2 is an enlarged cross-sectional view of the pin taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view of an engine and showing my improved wrist pin incorporated therein, some parts of the pin being shown in full and some parts being broken away;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of a tubing from which the improved pin is produced; and

Figs. 6 and 7 are perspective views illustrating the tubing at different stages during the process of forming the improved wrist pin.

The conventional parts of the engine shown in Fig. 3 include mainly a cylinder 8, a piston 9 having the usual piston rings 10, and a connecting rod 11. The connecting rod 11 is illustrated as being pivotally connected to the piston 9 by means of the improved wrist pin and is indicated as an entirety by the numeral 12. In the preferred application of the pin illustrated, it is free to rotate in bearing bosses 13 of the pin and also in the head of the connecting rod 11, so that in a sense it is full-floating, but said pin is held against accidental axial movements out of the bearing bosses by means of split spring-retaining rings 14 that are frictionally retained in annular retaining grooves 15.

The nature of the improved product will be made clear from the process by which it is produced. The improved wrist pin is produced from the relatively thin tubing shown in Fig. 5 and indicated as an entirety by the character A and which is preferably of the drawn seamless type and of considerably greater diameter than that of the product to be produced therefrom.

The process of producing the improved wrist pin from the tube A consists first in pressing toward the axis of the tube longitudinally extended circumferentially spaced segments forming channels B, as shown in Fig. 6, and thereafter reducing the circumference of the tubing, thereby folding the channel-shaped segments B longitudinally upon themselves to form longitudinally extended ribs C, bringing the cylindrical segments of the tube substantially into contact and reducing the radius of the cylindrical segments to conform to a circle struck from the axis of the finished pin shown in Fig. 1. The folded segments forming the ribs C are loop-shaped in cross-section and are open at their bottoms the portions thereof nearest the axis of the pin, to afford longitudinal passages 16 through the ribs, but are folded together and substantially closed near the periphery of the pin at 17, so that the cylindrical segments of the tube are brought into close relation and separated only by grooves 18 that are left in the periphery of the pin as a result of forming the ribs C.

The forming of the completed pin 12 from the primary channeled tubing shown in Fig. 6 may be accomplished in any desired manner, but is preferably accomplished by heating the channeled tubing and then drawing the same to fold the impressed channel-forming segments together near the periphery of the pin. The drawing of the tube will simultaneously fold the impressed segments and reduce the radius of the cylindrical segments to conform to a circle struck from the axis of the pin so that the finished pin will be symmetrical.

In practice the primarily impressed tubing shown in Fig. 6 will usually be subjected to a series of drawing operations, each successive drawing operation further reducing the circumference of the tubing and further folding together the impressed channel-forming segments until they are finally closed. In Fig. 7 the tubing is shown in a partially formed condition with its folds forming the ribs C only partially closed as it would appear after only a portion of the drawing operations were completed. The final finishing of the completely formed pin and reducing the same to an exact required diameter is preferably accomplished by machining or grinding the exterior surface of the pin.

The improved product has several important features hereinafter pointed out which render it exceptionally efficient for use as a wrist pin in forming a pivotal connection between the piston and connecting rod of an engine but is nevertheless adapted for much broader and more general use and the term wrist pin has here been used in a very broad and liberal sense to include all analogous devices, such as, for example, channel pins or shafts.

The improved wrist pin is comparatively quite light but nevertheless is very strong due to its internal ribs C. These ribs C besides materially strengthening the pin also aid materially in lubricating the pin and further they give the pin highly desired characteristics of expansion. When incorporated in an engine, as illustrated for example in Fig. 3, oil *y* from the walls of the cylinder will, under operation of the engine, flow into the wrist pin bearing holes in the piston and from thence through the longitudinal passages 16 through the wrist pin ribs C from which the oil will be fed between the substantially closed folds forming the ribs to the grooves 18 in the periphery of the pin. The pin will in this manner be well lubricated at all times during its operation. It should here be understood that although the fold segments forming the ribs C are brought together or substantially so at 17, there will usually be sufficient clearance between opposite sides of the fold to permit a film of oil.

As the bearing holes in the piston and connecting rod wear larger, the piston pin ribs C will tend to open under heat and expand the circumference of the pin to fill the enlarged holes and thereby maintain a tight fit at all times. This tendency of the pin to expand under heat will not, however, be sufficient force to squeeze out the film of oil and cause the pin to freeze or become stuck in the bearing holes.

What I claim is:

1. The combination with a piston and a connecting rod, of a wrist pin forming a pivotal connection between the piston and connecting rod, said pin being in the form of a tube having longitudinally extended circumferentially spaced rib-forming folds that are open near their bottoms to afford a longitudinal passage through each rib but which are substantially closed near the periphery of the pin to bring the cylindrical segments of the pin substantially into contact.

2. The combination with a piston and a connecting rod, of a wrist pin forming a pivotal connection between the piston and connecting rod, said wrist pin being in the form of a tube having a rib-forming fold that is open near its bottom to afford a longitudinal passage through the rib, but is substantially closed near the periphery of the pin to bring the cylindrical segments of the pin substantially into contact.

GEORGE W. ROTH.