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WRIST PIN INSERTING TOOL

Filed June 3, 1929

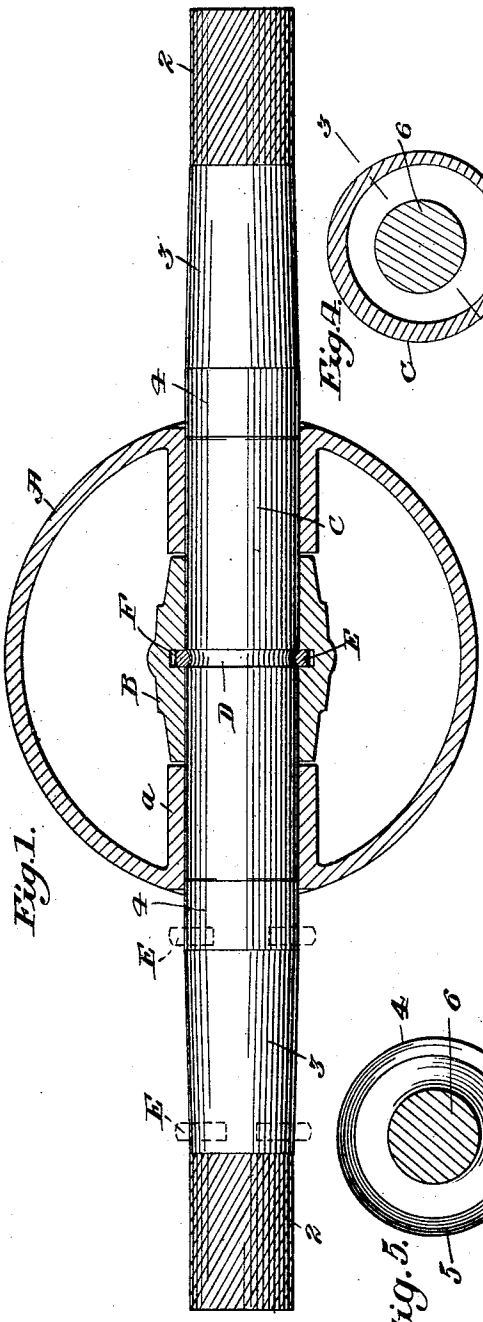


Fig. 1.

Fig. 4.

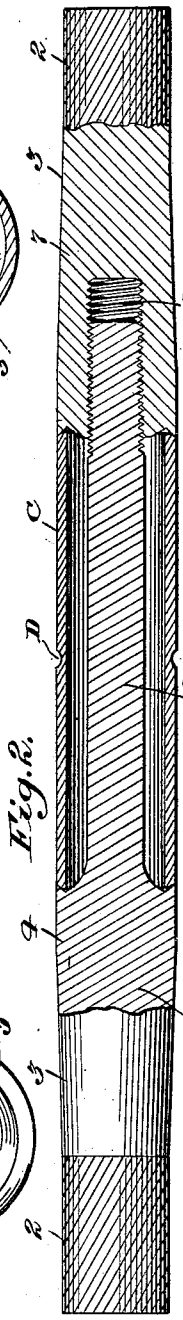


Fig. 2.

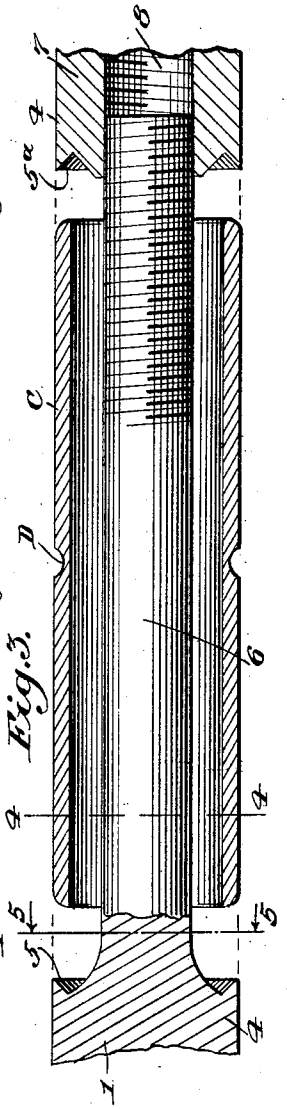


Fig. 3.

Fig. 5.

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UNITED STATES PATENT OFFICE

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WRIST-PIN INSERTING TOOL

Application filed June 3, 1929. Serial No. 368,058.

This invention relates to wrist-pin and similar tubular element inserters and is primarily intended for use in connection with internal combustion engines to center a wrist-pin to be inserted and to then, as a single continuous operation, spread a split-ring form spring wrist-pin retainer, or to radially displace some element or part from the path followed by the wrist-pin during insertion, and to properly position the wrist-pin, which in the form illustrated is formed with an annular groove which registers with, and receives a portion of, said retainer when said wrist-pin is in proper operative position in the connection-rod.

The primary objects of this invention are, to provide an efficient tool for cooperating with the external end faces of such a wrist-pin to properly center it with respect to the cooperating external faces of said tool for easy and expeditious insertion; to provide said tool with a portion having a tapering face for engaging the retainer and displacing it radially out of the bore in said connecting-rod; and to provide a very simple, sturdy tool for this purpose which will stand considerable abuse without impairing its efficiency and which is economical of manufacture and is capable of being manufactured on a large production basis by present known automatic machinery.

A popular make of automobile now in extensive use throughout the world employs a tubular wrist-pin having an annular groove in its exterior cylindrical face and equi-distant from its ends and apparently formed from stock tubing, the outer face being trued up and the inner face apparently merely roughed out, so that there is no general uniform relation between the interior and exterior faces of all wrist-pins used in said make of automobile, in practically all of such wrist-pins the interior cylindrical face is eccentric to the exterior cylindrical face, but the degree of such eccentricity will vary more or less as between any two given wrist-pins, but the exterior end portions of each wrist-pin are rounded off or curved in an axial direction, the curve in an axial direction of said end portions being uniform, or substantially so, as to all said wrist-pins, although it is not essential to the proper operation and functioning of our invention that they should be so.

In this application we show and describe only the preferred embodiment of our invention simply by way of illustration of the practice thereof, as by law required. However, we realize our invention is capable of other and different embodiments, and that the various details thereof may be modified in a number of ways, all without departing from our said invention. Therefore, we wish it understood that the drawings and description herein are to be considered as merely illustrative and not as exclusive.

In the accompanying drawings:

Figure 1 represents an elevation of an embodiment of our invention in use in inserting a wrist-pin in place in engine parts shown in cross-section;

Figure 2, a view partly in section and partly in elevation of said embodiment as applied to a wrist-pin, said section being taken on a line corresponding to line 3—3 of Fig. 4;

Figure 3, a sectional view taken on line 3—3 of Fig. 4, the centering elements being slightly separated from the ends of the wrist-pin; and

Figure 4, a sectional view on line 4—4 of Fig. 3 to bring out the eccentric relation between the inner and outer faces of the wrist-pin.

Referring now in detail to the drawings, A designates a piston of conventional construction, B the connecting-rod, C the wrist-pin annularly grooved as at D to receive the inner portion of the split-ring spring retainer E disposed in the registering annular groove F in the wall of the bore through the upper end

portion of the connecting-rod and radially displaced from said bore into said groove F prior to the passage of the end portion of said wrist-pin C beyond the near wall of groove F during insertion of said wrist-pin, and contracting so as to protrude into said groove D in the wrist-pin when the latter has been completely inserted. The wrist-pin C makes a snug fit in the bearing or bore in the upper end of the connecting-rod B and in the bearings *a* of the piston A, as illustrated in Figure 1, and as is usual.

The construction set forth in the immediately above paragraph forms no part of our present invention, but its illustration and brief description serves to make the operation and functions of our invention more readily understandable.

In the illustrated embodiment of our invention 1 designates a centering member or element or block having an integral, or preferably integral, stem 6 and having its radially outer face preferably circular in cross-section at all points, and 7 designates a cooperating centering member, element or block having its inner end formed with an internally screw-threaded bore 8 disposed concentric with its axis, its guide face portion 4 and its inner end conical face or centering means 5*a*. The external faces of said centering members or elements preferably correspond to each other throughout and comprise preferably an extreme outer knurled or roughened portion 2, an expanding face, or frustro-conical, portion 3 increasing in diameter from said portion 2 toward and to a cylindrical guide portion 4, which extends to its inner end and is of substantially, and preferably exactly, the same diameter as the exterior diameter of the particular wrist-pin C to be inserted, all external parts of each of said face portions of each of said elements or centering members preferably lying concentric with the axes of said elements or centering members respectively.

The centering element or member 1 has an inwardly presented radially extending face formed with axially outwardly extending radially inwardly converging centering means disposed concentrically with relating to the external cylindrical guide portion 4 and also expanding portion 3, and extending radially at all points outwardly to the said face 4, or substantially so. Since the intersection or approach of said centering means or face to the external guide face portion 4 would result in the forming of a knife edge theoretically said centering means may not extend absolutely and exactly to said face 4, but they will preferably approach as close thereto as practicable. Said centering means may, and preferably will, be in the form of the wall of a continuous annular groove, and said wall will preferably be a conical face 5 as illustrated.

The centering element or member 7 will preferably have its radially inner face, presented in opposition to the radially inner face of member 1, formed with similar centering means 5*a*, preferably in the form of a conical face opposed to conical face 5 of member 1 and concentric with the face 4 of member 7 and the common axis of said members 1 and 7 and registering axially at all points with conical face 5 in the operative relation of the members 1 and 7.

The stem 6 is of greater length than the wrist-pin C, preferably extends concentric with the axis of centering element or member 1, and has its outer end externally screw-threaded to be engaged by the internal screw-threads of the bore 8 of member 7, which bore 8 will be of such length as to easily accommodate the end portion of stem 6 when said members 1 and 7 are drawn toward each other so as to respectively engage with their centering faces or means 5 and 5*a* the adjacent opposed axially curved outer peripheral or external face portions of the respective ends of the wrist-pin C being centered, the stem 6 of course extending through said wrist-pin C, which is tubular, all as illustrated.

In Figure 1 we have indicated in two positions in dotted lines a retainer E, one position indicating said retainer as the small end of the frustro-conical expanding face 3 engages in said retainer, but prior to any expansion of said retainer, and in the other dotted position the retainer is illustrated as having been spread by the passage therethrough of the frustro-conical face 3 and a portion of guide face 4, so as to be displaced radially to such degree as to lie in the groove F entirely out of the wrist-pin bore in the connecting-rod B so as to permit the unobstructed insertion of said wrist-pin C in said bore.

While it is preferable to have both centering elements or members 1 and 7 of the same size and form, this is not essential, and it is sufficient if only one of said members is formed with suitable dimensions and of such contour as to radially displace said retainer and to present with the adjacent portion of the external face of the wrist-pin C a composite face substantially unbroken and smooth in an axial direction so that said member and wrist-pin may be respectively threaded through and into said connecting-rod bore without being caught and obstructed by said retainer.

Also, it is desirable, but not essential, to have one of said centering elements or members 1 and 7 formed with an external cylindrical guide face portion 4, as distinguished from the adjacent end of the expanding frustro-conical face portion 3, but inasmuch as the inner end of face portion 3 at the point of merging with cylindrical guide face portion

4, is of the same external diameter as said portion 4, it is not essential that there should be a definite cylindrical portion 4 as distinct from the frustro-conical or axially tapering face portion 3, and obviously while the roughened portions 2 of the respective elements 1 and 7 are preferable as affording easy means for gripping and turning, such portions obviously are not essential.

Further, while it is preferable to have the faces of each of the portions 3 and 4 extend peripherally continuously in unbroken circular form, this is not essential, it being sufficient if said portions have faces extending continuously axially so as to provide smooth continuous axial face portions and the cross-sectional form of said portions 3 and 4 be such as to properly center the particular element 1 or 7 and the wrist pin C gripped between said elements as inserted through the retainer E.

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

1. A tool for inserting a tubular element in a bore and displacing a part in a radial direction from said bore, said tool comprising a centering element having on inner radial face formed with a radially disposed axially outwardly extending radially inwardly converging centering face concentric with its axis and having an outer face tapering from a small diameter outer end portion toward its large diameter inner end portion and being at its inner end of substantially the same diameter as the external diameter of said tubular part, said centering face extending to the external peripheral face of said centering element and being adapted to engage the external peripheral face of the adjacent end of said tubular element to center the same, whereby the outer face of said tubular element and the adjacent portion of the outer face of said centering element will lie flush, and concentric, with each other and will present in an axial direction a smooth composite substantially uninterrupted surface for insertion in said bore and movement past and in contact with said radially displaceable part.

2. A tool for inserting a wrist-pin in the aligned bores in a piston and its connecting-rod and for displacing a part in a radial direction from one of said bores, said tool comprising a pair of centering elements, each said element having a frustro-conical external face portion extending from its portion of greatest diameter toward its outer end, said portion of greatest diameter being substantially of the same diameter as the external diameter of said wrist-pin, and each said element having a radially extending inner face formed with a grove concentric with its axis and so located as to extend to the external face of said element at all points about its axis, in combination with a stem extending rigidly from, and concentric with the axis of, one of said elements and into, and concentric with the axis of, the other of said elements, said stem being of greater length than said wrist-pin and adapted to extend therethrough.

3. A tool for inserting a wrist-pin in the aligned bores in a piston and its cooperating connecting-rod and for displacing a part in a radial direction from one of said bores, said tool comprising a pair of centering elements, one of said elements having a frustro-conical external face portion extending from its portion of greatest diameter adjacent its inner end toward its outer end, said portion of greatest diameter being substantially of the same diameter as the external cylindrical face of said wrist-pin, and each said element having a radially extending inner face formed with an annular groove concentric with its axis and so located as to extend to the external face of said element at all points about its axis, the external diameter of said groove being substantially equal to the greatest diameter of said frustro-conical face portion, in combination with a stem extending rigidly from one of said elements into the other of said elements and concentric with the annular groove in the radial face of the latter.

4. A tool for inserting a wrist-pin in the aligned bores in a piston and its cooperating connecting-rod and for displacing a part in a radial direction from one of said bores, said tool comprising a pair of centering elements, each of said elements having a frustro-conical external face portion extending from its portion of greatest diameter adjacent its inner end toward its outer end, and a cylindrical guide-face portion extending from said frustro-conical portion to the inner end of said element and being substantially of the same diameter as the external cylindrical face of said wrist-pin, and each said element having a radially extending inner face formed with a groove concentric with its axis and so located as to extend to the external face of said element at all points about its axis, in combination with means for drawing said elements toward each other tightly against an intervening wrist-pin.

5. A tool for inserting a wrist-pin in the aligned bores in a piston and its cooperating connecting-rod and for displacing a part in a radial direction from one of said bores, said tool comprising a pair of members, one of said members having a frustro-conical external face portion extending from its portion of greatest diameter toward its outer end, said portion of greatest diameter being substantially of the same diameter as the external cylindrical face of said wrist-pin and having a radially extending inner face formed with an annular groove concentric with its axis and so located as to extend to the external face of said member at all points

about its axis, the external diameter of said groove being substantially equal to the greatest diameter of said member, in combination with means adapted to extend through the wrist pin for drawing said members tightly into engagement with the respective adjacent ends of an intervening wrist-pin.

In testimony whereof, we have signed our names to this specification at Lancaster, Pennsylvania, this 29th day of May, 1929.

HARRY W. KULP.
MARTIN C. DELLINGER.