

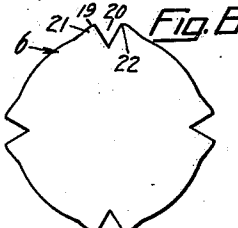
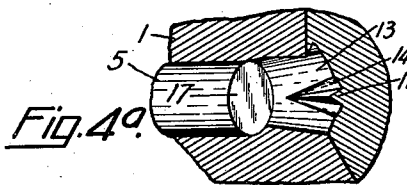
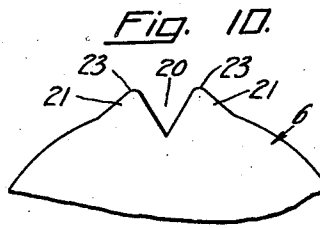
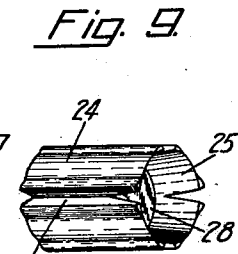
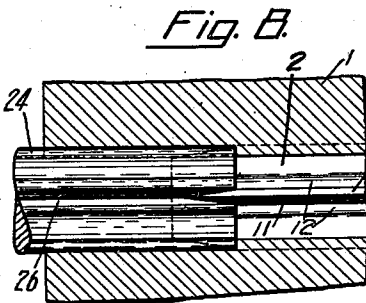
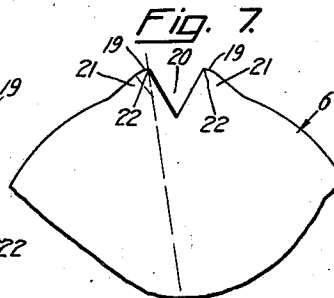
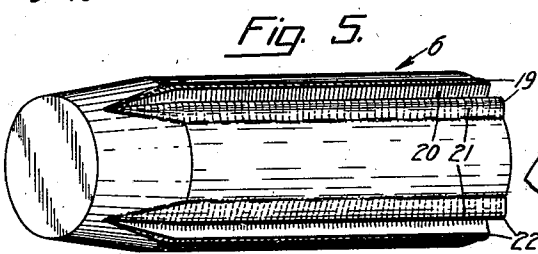
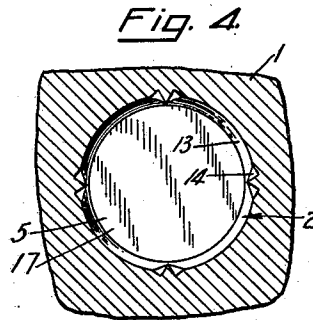
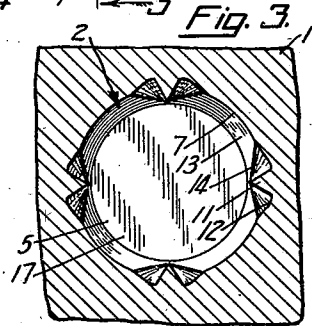
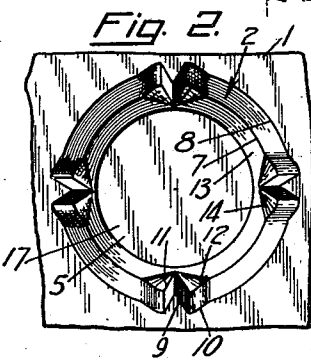
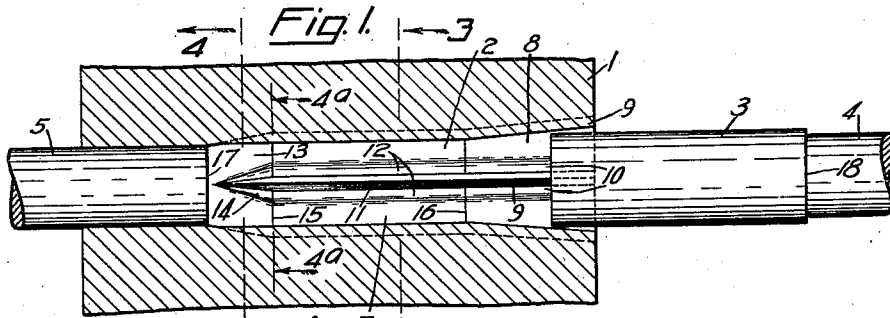
July 29, 1941.

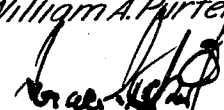
W. A. PURTELL

2,251,201

METHOD OF AND APPARATUS FOR MAKING DRIVE PINS

Filed Jan. 6, 1938



INVENTOR
William A. Purtell
By 
ATTORNEY

UNITED STATES PATENT OFFICE

2,251,201

METHOD OF AND APPARATUS FOR MAKING
DRIVE PINS

William A. Purtell, West Hartford, Conn., assignor
to The Holo-Krome Screw Corporation, a cor-
poration of Connecticut

Application January 6, 1938, Serial No. 183,682

21 Claims. (Cl. 10-56)

My invention relates to methods of and apparatus for making drive pins.

It has among its objects to produce an improved drive pin in an improved manner. A further object is to provide an improved method and apparatus for producing an improved pin of the type described and claimed in my copending application Serial No. 373,246, filed January 6, 1941, and having radially located longitudinally disposed grooves in the external surface thereof and longitudinally extending ribs or projections on opposite sides of these grooves, and wherein these projections are of an improved construction adapted to eliminate cutting or digging into the walls of an aperture in a companion member into which the pin is driven, while obtaining an improved gripping effect. Further objects of my invention are to provide an improved method of and an improved apparatus for making such pins, whereby it is made possible for the same to be quickly and completely made in a die in an improved and simple way and in such manner as to produce an improved pin while materially reducing the cost of production and while also eliminating all need for cutting the metal in forming the pin or for using either one or more movable cutting tools operating on the sides of the blank, or a plurality of radially adjustable tools or dies. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawing, I have shown for purposes of illustration certain forms of apparatus adapted to be used in carrying out my improved method.

In the drawing—

Figure 1 is a vertical longitudinal section through an upsetting die of my improved construction, the knock-out pin and upsetting member being shown in side elevation, as well as the blank, the latter being shown in process of being inserted in the die;

Figure 2 is an end elevation of the die, the view being taken from the right in Figure 1, with the blank removed;

Figure 3 is a sectional view on line 3-3 of Figure 1;

Figure 4 is a sectional view on line 4-4 of Figure 1;

Figure 4a is a fragmentary perspective view taken on line 4a-4a of Figure 1;

Figure 5 is a perspective view of the pin produced as a result of my invention;

Figure 6 is an end elevation of the pin show-

ing the right hand end of the pin shown in Figure 5;

Figure 7 is an enlarged detail view showing one of the grooves in the pin of Figure 5 and the projections on the opposite sides thereof of my improved construction;

Figure 8 is a detail view showing a modified form of knock-out member;

Figure 9 is a detail perspective view of the working end of this member shown in Figure 8, and

Figure 10 is a view similar to Figure 7 showing a further modified construction.

In the illustrative construction shown in Figures 1 to 4, it will be noted that I have shown a die member 1 of suitable one or more part construction and having therein an axial die aperture, generally indicated at 2, adapted to have a blank 3 of cylindrical cross section, upset in the same by longitudinal movement of an upsetting member 4; the die aperture 2 herein being of an improved construction and cooperating with a knock-out pin 5 and the blank 3 in an improved manner to produce my improved pin, generally indicated at 6, and of the improved cross section shown in Figure 6, all as hereinafter more fully described.

Referring more particularly to the die member 1, it will be understood that the same may be provided on any suitable machine, as, for example, a header, also carrying the upsetting tool 4 and knock-out pin 5 and adapted to operate these last mentioned elements in a well known manner. Further, it will be understood that I contemplate the use of usual mechanism for cutting off the blank 3 from the wire stock and feeding the same into a position opposite the die aperture 2, in such manner that the upsetting tool 4 may force the same into the die aperture, and that I further contemplate the control of the upsetting tool 4 and knock-out pin 5 so that the member 4 will force the blank into the die to complete the formation of the pin 6 in the aperture 2 and so that the knock-out pin 5 will thereafter eject the completed pin from the aperture 2.

Here it will be noted that the aperture 2 has a generally cylindrical intermediate or main portion 7 and an enlarged flaring mouth 8 at its right hand end, of generally conical form and tapering down to the diameter of the cylindrical portion 7, as shown in Figure 1, this flaring mouth 8 preferably being of such length as to protrude substantially beyond the adjacent end of the aperture 2. Further, it will be observed that the

tapering mouth portion 8 is provided with like longitudinally disposed V-shaped projections 9 on the walls thereof, disposed radially around the axis thereof, these projections herein being four in number and equally spaced from one another, with the apex of each V-shaped projection extending toward the axis of the die aperture 2 and equally spaced therefrom. It will further be noted that on the base of each projection 9, a like arcuate surface 10 is provided. Moreover, it will be observed that in addition to the projections 9 and surfaces 10 formed in the walls of the inwardly tapering mouth 8, corresponding projections 11 and surfaces 12, longitudinally aligned with the projections 9 and surfaces 10, are provided in the walls of the intermediate or cylindrical portion 7 of the die aperture. Herein, these projections 11 and surfaces 12 extend throughout the length of the major portion of the aperture 2 without change in shape or size. However, as shown in Figure 1, it will be noted that near the inner end of the aperture 2, they merge into a tapered portion 13 just in front of the knock-out pin 5; cooperating tapered sloping surfaces 14 being provided on opposite sides of the projections 10 and forming tapering continuations of the surfaces 12. Attention here is particularly directed to the fact that the surfaces 10, 12 and 14 and the width of the projections 9 and 11 are such that the portion of each of the above surfaces adjacent a sloping side wall of its projection, lies in an arc struck about a radius point located in a radius line extending to the axis of the aperture 2 from the junction between the surface and the sloping wall of the projection, as diagrammatically illustrated in Figure 7 and hereinafter described in connection with the conformation of the pin. Note here also that the junction between the tapered surface 13 and the main portion 7 of the aperture 2 is indicated at 15, and that the junction between the main portion 7 of the aperture and the tapering mouth portion 8 is indicated at 16. Here also it will be noted that the inner end surface 17 of the knock-out pin 5 is flat and of the same diameter as the inside diameter of the main portion 7 of the aperture, while the upsetting tool 4 is provided with a like flat end 18 of the same diameter as the inside diameter of the die aperture 2 at the line 16.

In the practice of my invention, the blank 3, which is of larger diameter than that of the main portion 7 of the aperture 2, is cut off from the stock in any usual manner and fed opposite the flared mouth 8 of the aperture 2, preferably automatically by mechanism usual in headers. When the blank 3 is so disposed, Figure 1, the upsetting tool 4 is reciprocated to the left to force the blank longitudinally into the die aperture 2. Thus, it will be evident that, not only will the tapered mouth 8 serve to center the blank, but also perform a preliminary forming operation thereon as the blank 3 moves longitudinally into engagement with the various surfaces on the inner end of this tapered portion 8. Further, it will be evident that, as the tool 4 pushes the blank 3 further into the main portion 7 of the aperture 2, further forming operations will be performed by the projections 11 and surfaces 12, and, also by the tapered portion 13 and surfaces 14. Also, after the inner end of the blank 3 strikes the end abutment or cooperating die surface 17 provided by the flat end face of the knock-out pin 5, the blank will be upset in such manner as to fill out the die aperture, the

flat end surface 18 on the upsetting tool 4 then being at or inside the junction 16 between the tapering mouth 8 and main portion 7 of the die aperture. The forming operation then being complete, the upsetting tool 4 is withdrawn to the right and the knock-out pin 5 also moved to the right in such manner as to eject the finished pin from the die aperture.

As a result of my invention, it is not only possible to produce a finished pin in a single operation of the upsetting tool, but also, in such a single operation, to produce a pin of improved construction. More particularly, considering the pin structure, the surfaces 19 on opposite sides of the grooves 20 in the pin are so disposed that, while the displaced metal forming the projections 21 on the pin will be resilient and produce an effective grip when driven into a round aperture in a companion member, no edges are provided at 22 which dig into the wall of the companion member. Instead, these junctions 22, as a result of my improvements, lie in the surfaces 19 in such manner as to prevent digging in, while also enabling these junctions 22 to be disposed substantially longitudinally to the surface of the hole. Attention here is also particularly directed to the fact that an improved drive pin, formed in accordance with my improved method and by the use of my improved apparatus, has the surface thereof so formed or worked in the process of manufacture as to improve the wearing quality of the pin. Further, I am also enabled to eliminate all necessity for cutting the blank, which not only tends to produce an inferior article but also one wherein further finishing operations are required to remove burrs, from which the pin produced by my improved method and apparatus is quite free. Moreover, in addition to producing such an improved article, it is also made possible, as a result of my improved method, not only to expedite the formation of finished drive pins, but to enable the same to be produced in an improved series of forming operations and in such manner as to enable the pins to be produced markedly more inexpensively than has heretofore been possible. Also it will be evident that the die structure is exceedingly simple and of a character adapted to stand up under long use without appreciable wear, due to the stages provided in the forming operation by the improved die structure.

In Figure 10 I have shown a modified form of pin which may be produced by a corresponding modification of the surfaces heretofore described as forming the surfaces 19 on the pin. In this construction, it will be observed that the surfaces 23 are struck on an even smaller arc than that used in forming the surfaces 19, thereby also eliminating digging in. Further, in Figures 8 and 9, I have shown a modified form of knock-out pin which may be used if desired where it is desired to reduce the cost of the die. In this construction, the knock-out pin, generally indicated at 24, has a tapered inner surface 25 thereon, corresponding to the surface 13 heretofore described, while the member 24 is also provided with triangular grooves 26 therein registering with the projections 11 formed on the main portion 7 of the aperture 2 and adapted to receive extensions 27 thereon, these projections 11 and surfaces 12 in this form of my invention, being longer than heretofore and being adapted to be formed with a broach. Obviously this construction will function generally similarly to that heretofore described save that the surface 25 on

the knock-out pin 24 will act to form the taper on the end of the pin and that no surfaces corresponding to the surfaces 14 will be provided, while the extremity of the tapered portion on the pin will be formed against the flat end 28 inside the tapered portion 25 and corresponding to the flat end 17 heretofore described.

No claim is made herein to the drive pin, the same being claimed in my copending divisional application Serial No. 373,246, filed January 6, 1941.

While I have herein specifically described certain forms which my invention may assume in practice, it will be understood that the same are shown for purposes of illustration, and that the invention may be further modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. The step in making locking pins which consists in, longitudinally grooving a blank moving longitudinally in one direction in a closed die while the displaced metal is free to form ribs extending longitudinally along the grooves and raised above the periphery of the blank.

2. The method of making locking pins which consists in, longitudinally grooving a blank moving longitudinally in one direction in a closed die while the displaced metal is free to form ribs extending longitudinally along the grooves and raised above the periphery of the blank, and upsetting the blank in said die to complete the formation of said ribs in said die.

3. The step in making locking pins which consists in, longitudinally grooving a blank moving longitudinally in one direction in a closed die while the displaced metal on opposite sides of each groove is free to form ribs extending longitudinally along the grooves and raised above the periphery of the blank.

4. The method of making locking pins which consists in, longitudinally grooving a blank moving longitudinally in one direction in a closed die while the metal on opposite sides of each groove is free to form ribs extending longitudinally along the groove and raised above the periphery of the blank, and upsetting the blank in said die to complete the formation of said ribs in said die.

5. The method of making locking pins which consists in, longitudinally grooving a blank moving longitudinally in one direction in a closed die while the displaced metal is free to form ribs extending longitudinally along the grooves and raised above the periphery of the blank, and upsetting the blank in said die to complete the formation of said ribs in said die while forming a tapered inner end on the blank.

6. The method of making locking pins which consists in, longitudinally grooving a blank moving longitudinally in one direction in a closed die while the displaced metal is free to form ribs extending longitudinally along the grooves and raised above the periphery of the blank, and upsetting the blank to complete the formation of said ribs in the die aperture while forming a tapered inner end on the blank and maintaining said grooves opening into the tapered end.

7. The step in making drive pins which consists in, longitudinally grooving the periphery of the body of a blank at circumferentially spaced points while the blank moves longitudinally in a closed die and while distributing the displaced metal during such longitudinal movement to form raised locking ribs projecting radially beyond the

periphery of the grooved body of the blank on opposite sides of the grooves therein.

8. The method of making drive pins which consists in, longitudinally grooving the periphery of the body of a blank at circumferentially spaced points while the blank moves longitudinally in a closed die and while distributing the displaced metal during such longitudinal movement to form raised locking ribs projecting radially beyond the periphery of the grooved body of the blank on opposite sides of the grooves therein, and upsetting the blank while in said die and approaching the end of said longitudinal movement further to fill out said ribs.

9. The method of making drive pins which consists in, longitudinally grooving the periphery of the body of a blank at circumferentially spaced points while the blank moves longitudinally in a closed die and while distributing the displaced metal during such longitudinal movement to form raised locking ribs projecting radially beyond the periphery of the grooved body of the blank on opposite sides of the grooves, and upsetting the blank in the die while completing said ribs and tapering the forward end of the blank.

10. Apparatus for making drive pins including means for feeding a blank longitudinally, a die having an aperture receiving said blank, and means in said aperture for forming on said blank as the latter is so fed into said aperture radially located longitudinally extending locking means raised above the periphery of the blank and extending substantially throughout the length of the pin.

11. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture including grooving members projecting inwardly into said aperture and grooves in the latter at the bases of said members, and cooperating means for forcing a blank into said aperture through said forming means to form raised ribs in said grooves and on the periphery of said blank and for upsetting the blank in said aperture to complete the formation of said ribs while in said aperture.

12. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture, and cooperating means for forcing a blank into said aperture to form said ribs and upsetting the blank therein to complete the formation of the pin while in said aperture, said aperture having a tapered mouth provided with cooperating tapered rib forming means.

13. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture including grooving members projecting inwardly into said aperture and grooves in the latter at the bases of said members, and cooperating means for forcing a blank into said aperture to form raised ribs in said grooves and on the periphery of said blank and for upsetting the blank in said aperture to complete the formation of said ribs while in said aperture, said last mentioned means including an upsetting tool and a cooperating abutment at the inner end of said aperture.

14. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture including grooving members projecting inwardly into said aper-

ture and grooves in the latter at the bases of said members, and cooperating means for forcing a blank into said aperture to form raised ribs in said grooves and on the periphery of the blank and for upsetting the blank in said aperture to complete the formation of said ribs while in said aperture, said aperture also having a tapered inner end and an upsetting abutment in the latter.

15. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture, and cooperating means for forcing a blank into said aperture to form said ribs and upset the blank therein to complete the formation of the pin while in said aperture, said die aperture having a tapered mouth and said last mentioned means including a knock-out pin having a tapered socket in its inner end.

16. Apparatus for making drive pins comprising a die having a tapered entrance aperture and a coaxial main aperture and having circumferentially spaced longitudinally extending groove forming projections on the walls of said apertures and grooves in said walls at opposite sides of said projections and extending longitudinally thereof, and means for forcing a blank through said tapered aperture into said main aperture to preliminarily form raised ribs on the periphery of the blank in said grooves in the tapered aperture from metal displaced by said projections and subsequently upsetting the blank to complete said ribs in the grooves in said main aperture.

17. Apparatus for making drive pins comprising a die having a tapered entrance aperture and a coaxial main aperture and having circumferentially spaced longitudinally extending groove forming projections on the walls of said apertures and grooves in said walls at opposite sides of said projections and extending longitudinally thereof, and means for forcing a blank through said tapered aperture into said main aperture to preliminarily form raised ribs on the periphery of the blank in said grooves in the tapered aperture from metal displaced by said projections and subsequently upsetting the blank to complete said ribs in the grooves in said main aperture including an abutment at the inner end of said main aperture.

18. Apparatus for making drive pins comprising a die having a tapered entrance aperture and a coaxial main aperture and having circumferentially spaced longitudinally extending groove forming projections on the walls of said apertures and grooves in said walls at opposite sides of said projections and extending longitudinally thereof, and means for forcing a blank through said

tapered aperture into said main aperture to preliminarily form raised ribs on the periphery of the blank in said grooves in the tapered aperture from metal displaced by said projections and subsequently upsetting the blank to complete said ribs in the grooves in said main aperture including an abutment and a tapered portion in the inner end of said main aperture for tapering the inner extremity of the blank as the latter is forced into said aperture.

19. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture including grooving members projecting inwardly into said aperture and grooves in the latter at the bases of said members, and cooperating means for forcing a blank into said aperture to form raised ribs in said grooves and on the periphery of said blank and upsetting the blank in said aperture to complete the formation of said ribs in said grooves, said aperture having a flaring mouth carrying flared extensions of said grooving members and grooves.

20. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture including grooving members projecting inwardly into said aperture and grooves in the latter at the bases of said members, and cooperating means for forcing a blank into said aperture to form raised ribs in said grooves and on the periphery of said blank and upsetting the blank in said aperture to complete the formation of said ribs while in said grooves, said aperture having means forming a tapered inner end thereof and an upsetting abutment in said end, and said ribs and grooves having sloping ends merging into the side wall of said tapered end.

21. Apparatus for making drive pins including a die having an aperture and cooperating radially located longitudinally extending locking rib forming means in said aperture including grooving members projecting inwardly into said aperture and grooves in the latter at the bases of said members, and cooperating means for forcing a blank into said aperture to form raised ribs in said grooves and on the periphery of said blank and upsetting the blank in said aperture to complete the formation of said ribs, said ribs and grooves extending substantially throughout the length of said aperture and said last mentioned means including a socketed abutment received in the inner end of said aperture and having cooperating grooves and ribs.

WILLIAM A. PURTELL.