C. M., C. C. & J. W. HEETER.
METHOD OF MAKING WELL TOOLS.
APPLICATION FILED SEPT. 17, 1914.

1,169,642. Patented Jan. 25, 1916.

FIG. 1.

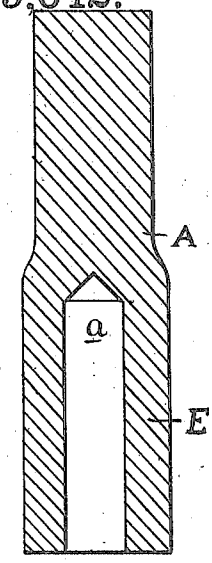


FIG. 2.

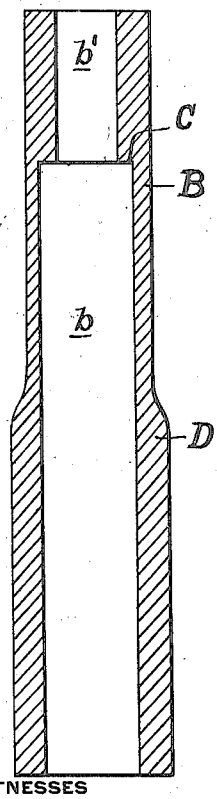


FIG. 3.

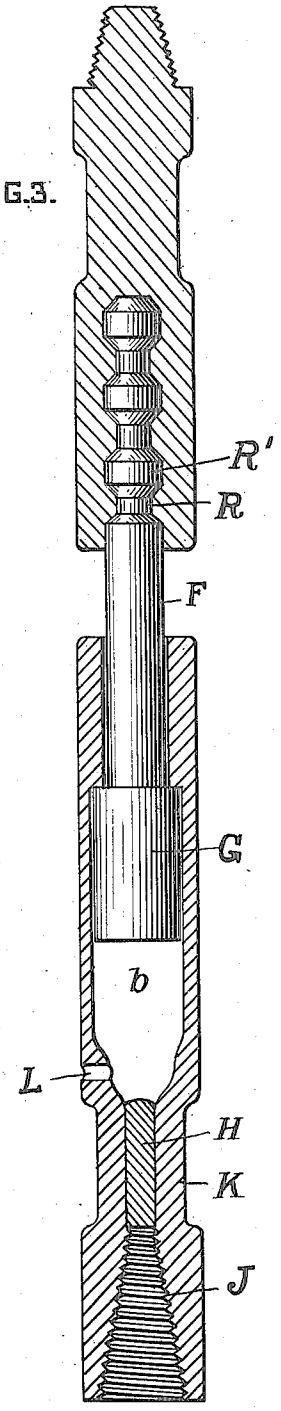
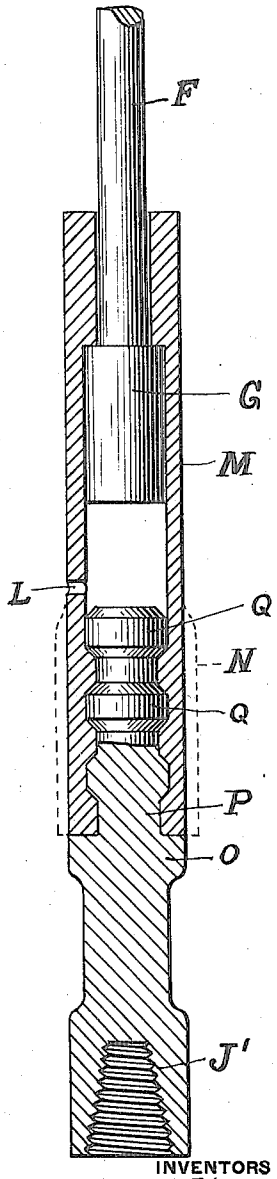


FIG. 4.



WITNESSES

J. Herbert Bradley.
Ella McConnell

INVENTORS

C. M. Heeter
C. C. Heeter
J. W. Heeter.
By Babcock & Doolittle
Attys

UNITED STATES PATENT OFFICE.

CHARLES M. HEETER, COLONEL C. HEETER, AND JOSEPH W. HEETER, OF BUTLER, PENNSYLVANIA, ASSIGNORS TO C. M. HEETER, SONS & COMPANY, INC., OF BUTLER, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

METHOD OF MAKING WELL-TOOLS.

1,169,642. Specification of Letters Patent. Patented Jan. 25, 1916.

Application filed September 17, 1914. Serial No. 862,239.

To all whom it may concern:

Be it known that we, CHARLES M. HEETER, COLONEL C. HEETER, and JOSEPH W. HEETER, citizens of the United States, and residents of Butler, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Making Well-Tools, of which the following is a specification.

This invention relates to well tools, and particularly tools which embody a swivel, such as a tubular or inclosed jar, and the primary object is to provide a durable tool of simple construction in conjunction with an economic and highly efficient method of constructing the same.

While the invention may be variously utilized and embodied, its adaptation to a swivel tool is of special importance as it affords a simple and effective means of assembling and maintaining assembled the connected parts.

In the accompanying drawings, Figures 1 and 2 are sectional views of blanks from which the swivel-connected parts of a well tool are formed. Fig. 3 is a longitudinal section of one form of a completed tool embodying the invention, and Fig. 4 is a similar view of a portion of a tool disclosing a modified adaptation.

Referring to Figs. 1 and 2, A and B indicate, respectively, the billet-like steel blanks from which the swivel-connected tool parts are formed. Part A is formed with an axial cavity *a* which extends inwardly or upwardly from its lower end, and part B is formed with a through longitudinal passage, the larger portion *b* extending from the lower end while the upper portion is contracted as indicated at *b'*, a shoulder C being thus formed at the juncture of the passage portions. The surrounding wall D of the lower portion of passage *b* is relatively thick or heavy and the same is true of wall E which surrounds cavity *a*. A swivel stem F is entered in passage *b* and at its lower extremity is provided with head G which is larger than passage portion *b'*, and hence is adapted to engage shoulder C. After the headed stem has been entered in passage *b*, with stem F extending through passage portion *b'*, the lower portion of part B is contracted by forging, the forged portion being the thickened wall part D with the result that the lower portion of passage *b* is contracted and closed, or substantially closed, as shown in Fig. 3. If not entirely closed by the forging operation, a core or plug H may be inserted to prevent water from draining into the coupling box J formed in the contracted lower extremity of the tool part. Plug H may be of steel and permanently held by the forging operation, or it may be formed of wood, as may be preferred. The forging operation may also be utilized in forming the opposite wrench-hold flats K. A drain hole L may be provided for the closed lower end of the cavity *b*.

An alternative method and embodiment of the lower element of the tool is illustrated in Fig. 4, wherein a blank M is provided which is similar to part B, having the relatively thick lower wall portion N as indicated in dotted lines. But instead of threading a coupling box in the contracted lower portion of the tool as in Fig. 3, a short stem section O is provided, in the lower end of which the coupling box J' is formed. A shank P of reduced diameter projects from the upper end of stem O and is entered in the lower portion of the passage in part N, the shank being formed with the spaced annular enlargements Q. These enlargements are of a size to enter the passage in part M, whereupon the thickened wall portion N is reduced by forging and contracted into the spaces between the shank enlargements Q, thereby providing a permanent joint and in effect making parts M and O substantially integral.

The projecting upper portion of the swivel stem F is formed with the alternate annular ridges and depressions R and R', respectively, and the stem part of this irregular form is adapted to be entered in cavity *a* of the upper tool part A, after which the thickened lower wall portion of the latter is reduced by forging and contracted into cavities R and into tight engagement with enlargement R', thereby providing a secure and in effect integral union between the parts.

From the foregoing it will be apparent that the principles involved in the union between the swivel stem and part A are substantially the same as in the forged union construction illustrated in Fig. 4.

When the invention is utilized and embodied in a swivel jar of the forms shown in Figs. 3 and 4, there is ample clearance for the necessary relative rotary movement of the connected parts, also for the longitudinal movement necessary to enable the upper tool part to strike the swivel head-confining part when jarring.

While the invention is particularly applicable to a well tool of the character described, it is not limited thereto.

We claim:

1. The method herein described of uniting two parts of a swivel well tool, consisting in forming one part with a through longitudinal passage of reduced diameter for a portion of its length, entering a headed swivel stem in said passage with the stem extending through the reduced portion of the passage and with the head larger than said reduced portion and having a turning fit in the larger diameter portion of said passage, contracting a portion of said passage of larger diameter and thereby confining said head therein, and shaping said contracted portion to form a coupling member.

2. The method herein described of uniting two parts of a well tool, consisting in forming one part with a through longitudinal passage which is of reduced diameter for a portion of its length, entering a headed swivel stem in said passage with the stem extending through the reduced portion of the passage and with the head larger than the said reduced portion, and contracting that portion of the passage-formed part through which the larger end of the passage extends and thereby inclosing the stem head.

3. The method herein described of forming a swivel well tool consisting in forming a tool part with a through cavity of reduced diameter adjacent one end, forming a stem with a head at one end and with surface irregularities adjacent its opposite end, entering the stem in the through passage with the portion thereof of irregular form extending through the reduced portion of the passage and with the stem head of larger diameter than said reduced portion, contracting the extremity of the passage-formed part through which the larger end of the passage opens and thereby confining the stem head within said larger passage portion, forming another tool part with a passage open through an end thereof and entering in said passage the portion of the stem formed with irregularities, and finally forging the passage-formed portion of the last mentioned tool part into the irregularities of the stem and thereby forming a permanent union therewith.

4. The method herein described of constructing a swivel tool, consisting in forming a tool part with a through longitudinal passage with one end of the passage contracted and with the wall of the opposite portion of the passage abnormally thick, entering a headed stem in the through passage with the stem extending through the contracted portion thereof and with the stem head confined in said passage, forging the relatively thick wall of the passage-formed part and thereby contracting the passage and confining the stem head therein, shaping the contracted extremity of the tool part to provide a coupling member, and forming a forged connection between another tool part and the projecting portion of the stem.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES M. HEETER.
COLONEL C. HEETER.
JOSEPH W. HEETER.

Witnesses:
J. P. TROLL,
S. B. LITTLE.