

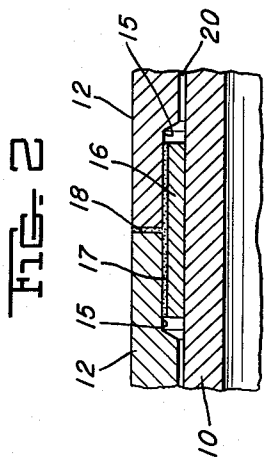
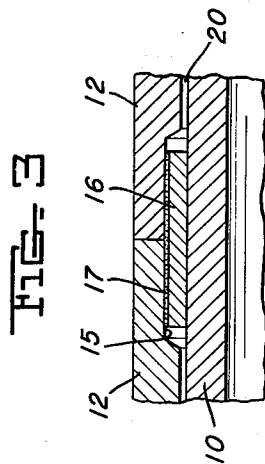
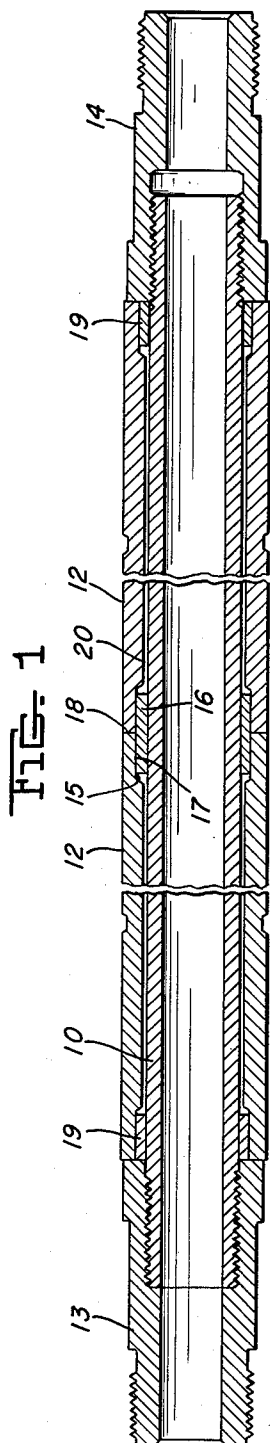
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PUMP PLUNGER

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2,991,806

PUMP PLUNGER

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4 Claims. (Cl. 138—101)

This invention relates to an improved plunger construction for subsurface pumps and one which provides an improved method of assembling plungers.

Conventionally a plunger used in a deep well subsurface pump includes a tubular steel body and a facing of harder metal, such as boron-containing cast iron. The facing is of a hardness which resists wear, but is brittle and easily broken. In plungers of longer length the facing is formed in sections which abut end-to-end and are held in place by adapters threadedly attached to the ends of the body. For the plunger to operate properly, it is essential that the facing sections be accurately aligned, yet such alignment is difficult to attain.

An object of the present invention is to provide an improved plunger construction in which alignment of the facing sections is facilitated.

A more specific object is to provide an improved plunger construction in which the facing sections intentionally have clearance with respect to the tubular body and are positioned with aligning rings and adhesive.

In accomplishing these and other objects of the invention, we have provided improved details of structure, preferred forms of which are shown in the accompanying drawing, in which:

FIGURE 1 is a longitudinal section of a plunger constructed in accordance with our invention;

FIGURE 2 is a fragmentary longitudinal section on a larger scale showing the relation between the facing sections and the body; and

FIGURE 3 is a view similar to FIGURE 2 but showing a modification.

FIGURE 1 shows a plunger which includes a tubular steel body 10, a plurality of tubular facing sections 12 covering said body, and a pair of adapters 13 and 14 threadedly engaged with the ends of the body and holding the facing sections thereon. The facing sections are of hard metal which resists wear but is brittle and easily broken. In an actual installation a traveling valve and a rod string are connected to one adapter, a standing valve puller is connected to the other adapter, and the plunger is housed within a pump cylinder for reciprocable movement. However, no showing of these parts is offered, since they are not involved in the present invention.

In accordance with our invention, the bores in the facing sections 12 contain counterbores 15. Aligning rings 16 of metal or suitable composition material are loosely received within the pair of counterbores at each juncture between sections and held in place with an adhesive layer 17. The adhesive can be any suitable commercial preparation for joining metal to another metal or to a composition material, for example that sold under the trademark "Cycleweld." The rings are of a length approaching the length of two counterbores to leave clearance at bottoms of the counterbores. In FIGURES 1 and 2 additional adhesive layers 18 are interposed between the end faces of the facing sections, but in the modification of FIGURE 3 these faces abut in metal-to-metal contact. Shorter rings 19 are received in the counterbores at the ends of the facing adjacent the adapters 13 and 14, but there is no adhesive between the rings 19 and the facing sections. The body 10 is fitted into the assembly of facing sections and rings, being closely received

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in the rings, but with clearance spaces 20 between its outer face and the inner faces of the facing sections.

According to our assembly method, adhesive is applied to the counterbores 15 of a pair of abutting facing sections and optionally to the end faces of these sections. An aligning ring 16 is inserted in these counterbores, and the partial assembly clamped together with a suitable conventional aligning clamp. This procedure is repeated until all the sections and aligning rings are assembled. Excess adhesive is cleaned out both as sections are added and after the whole has been assembled. The end rings 19 are inserted in the end counterbores without adhesive. The tubular body 10 is then inserted through the assembly, and the adapters 13 and 14 are screwed in place. After the adhesive has set, the clamps are removed and the plunger ground to its final dimensions.

From the foregoing description it is seen that our invention affords a plunger which is economical to manufacture and whose facing sections are easily aligned. The arrangement affords sufficient resilience to allow the plunger to be transported and otherwise handled without danger of causing misalignment.

While we have shown and described certain preferred embodiments of the invention, it is apparent that other modifications may arise. Therefore, we do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

We claim:

1. A pump plunger comprising a tubular steel body, a plurality of tubular facing sections of hard brittle metal covering said body in end-to-end relation, the maximum outside diameter of the plunger being the outside diameter of said sections, said sections having counterbores therein at their ends, respective aligning rings received in each adjacent pair of counterbores, the outside diameter of said rings being less than the diameter of said counterbores, a layer of adhesive between the inner face of each counterbore and the ring therein, said sections and rings by themselves forming an assembly retained by the adhesive, said body fitting within said assembly with said rings closely receiving said body, and means at the ends of said body holding said assembly thereon, there being clearance spaces between the inner faces of said sections and the outer face of said body, whereby the radial alignment of the assembled sections can be adjusted and held in such condition of adjustment until the adhesive sets and thereafter said rings and adhesive position said sections rigidly on said body.

2. A pump plunger as defined in claim 1 including adhesive layers between the end faces of said sections.

3. A pump plunger as defined in claim 1 in which the end faces of adjacent sections abut in metal-to-metal contact.

4. A pump plunger comprising a tubular steel body, a plurality of tubular facing sections of hard brittle metal covering said body in end-to-end relation, the maximum outside diameter of the plunger being the outside diameter of said sections, said sections having counterbores therein at their ends, respective aligning rings received in each adjacent pair of counterbores and being of a length approaching the combined length of the pair of counterbores but leaving clearance spaces at the bottoms of the counterbores, the outside diameter of said rings being less than the diameter of said counterbores, a layer of adhesive between the inner face of each counterbore and the aligning ring therein, said sections and aligning rings by themselves forming an assembly retained by the adhesive, shorter end rings received in the counterbores at the ends of said assembly, said body fitting within said assembly and end rings with said retaining rings

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closely receiving said body, and adapters threadedly attached to the ends of said body holding said assembly and end rings thereon, there being clearance spaces between the inner faces of said sections and the outer face of said body, whereby the radial alignment of the assembled sections can be adjusted and held in such condition of adjustment until the adhesive sets and thereafter said aligning rings and adhesive position said sections rigidly on said body.

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References Cited in the file of this patent

UNITED STATES PATENTS

504,871	Forsyth	Sept. 12, 1893
1,837,312	Arms	Dec. 22, 1931
2,080,027	Allsop et al.	May 11, 1937
2,277,613	Swenson	Mar. 24, 1942
2,289,401	Yost	July 14, 1942
2,812,571	Strom	Nov. 12, 1957
2,850,044	Kihlgren	Sept. 2, 1958