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METHOD OF MAKING SUCKER RODS

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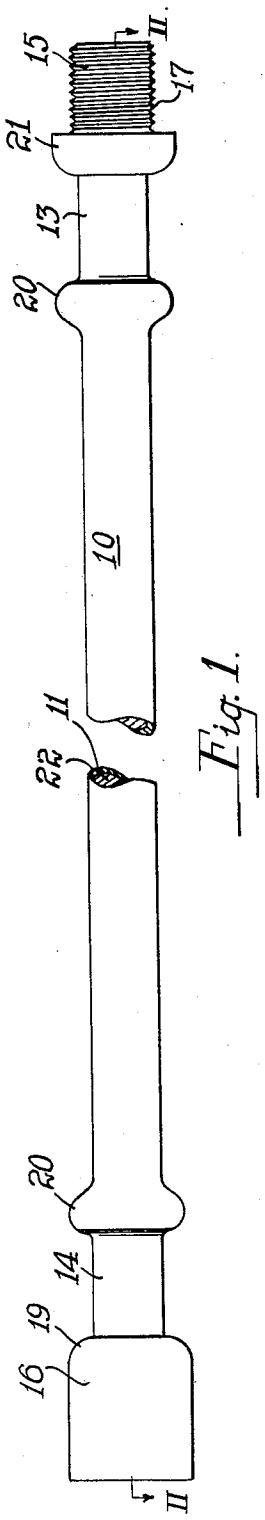

Fig. 1.

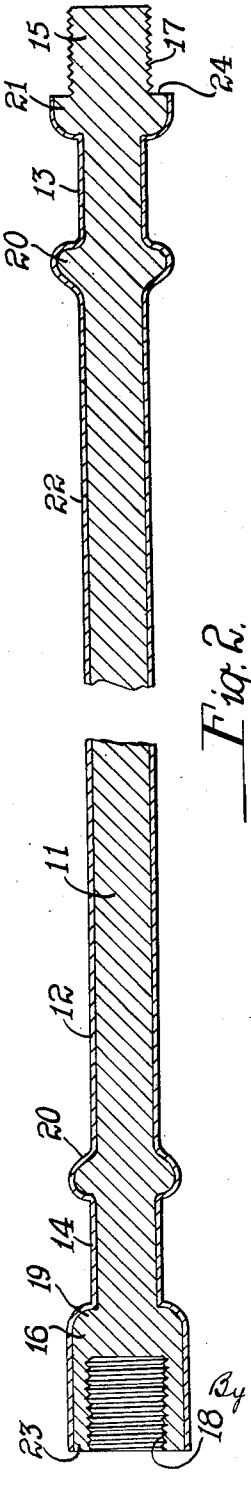

Fig. 2.

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METHOD OF MAKING SUCKER RODS

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4 Claims. (Cl. 29—148)

This invention pertains to a method of making fabricated composite steel pump or sucker rods and particularly sucker rods having an outer shell that is highly resistant to corrosion, this application being a division of my copending application Serial No. 417,925, filed January 2, 1930.

The wooden sucker or pump rod has been hitherto generally adopted by oil producers for deep well and oil pumping requirements. The steel rod is a comparatively recent development that has been designed to overcome many of the disadvantages inherent in the wooden rod although adding the new one of corrosion.

Prior attempts to overcome corrosion in metal sucker rods have included galvanizing, tin, lead and cadmium plating but the results have been imperfect and unsatisfactory. In such combinations, if the steel core is tempered before the application of the plating or coating, the latter operation injures the temper of the core, whereas if the whole is tempered after the coating or plating has been applied, the latter is damaged.

It is an object of this invention to provide a method of making a pump or sucker rod which will be practically immune to corrosive forces and the like.

Another object of this invention is a method of providing an integrally formed sucker rod and a non-corrodible envelope or shell thereon.

A further object of this invention is a method of providing a composite metallic rod which may be tempered without injury to any part thereof.

These and many other objects which will be apparent to those skilled in the art, are attained by means of the embodiment of the invention which is disclosed in the specification and illustrated in the drawing accompanying and forming a part of this application.

In this drawing, wherein similar numerals refer to similar parts throughout the several views:

Figure 1 is a side view in elevation of a sucker or pump rod embodying this invention; and Fig. 2 is a sectional view taken on the line II—II of Fig. 1.

The preferred embodiment of this invention which has been chosen for the purpose of illustration consists of a pump or sucker rod which is designated in its entirety by the numeral 10. This rod has a core 11 formed from ingot steel or preferably from a billet and having the necessary properties of hardness, strength, and of resistance to shock, jarring, and to compressive, tensile, and shearing stresses. The core 11 has a body portion 12 for giving a desired length to the rod sections. Disposed at each end of the body portion 12 and integral therewith, are "formed" squares 13 and 14; a pin 15 and a box 16 are integrally formed with these squares 13 and 14, respectively.

In order that the rod sections may be secured together, the pin 15 has been provided with an external thread 17 adapted to cooperate with a thread 18 cut in the box 16 of an adjacent rod. This pin 15 has an annular stop flange 21 to prevent the adjacent box from "over-riding". The box 16 is adapted to cooperate with the pin of an adjacent rod or with the pin of a valve stem. The squares 13 and 14 have faces formed to receive a suitable tool or wrench, so that the pin and box of adjacent rods may be tightly screwed together; and, the annular stop flange 21, a raised portion 19 of the box 16, and the annular flanges 20 serve as guide stops for tools while engaging the squares 13 and 14.

As seen from Fig. 2, a metallic envelope or shell 22 extends the length of the core 11, at one end to the outer face 23 of the box 16, and at the other end to the outer face 24 of the stop flange 21. This envelope 22 is cohesively fabricated with its core 11 so as to provide a non-corrodible outer surface or shell therefor. It will preferably contain say about 8% nickel and about 18% chromium although various other nickel and chromium contents may be used; and the carbon content must be kept at a low value, say about .12–.15% or less; and steel will, of course, constitute the balance.

I have thus provided a tubular envelope or shell of chromium-nickel alloy steel which is adapted to fit over a suitable billet or ingot of steel having properties and characteristics making it adaptable for the production of sucker rods. The cooperating surfaces of the steel billet or ingot and the tubular envelope are preferably machined to provide smooth-fitting surfaces. The envelope may then be "shrunk" onto its ingot core and then the combination may be rolled, forged, or otherwise shaped, and the whole may be suitably tempered.

The exact composition of the core is relatively immaterial and may be a relatively high or low carbon steel, regardless of its corrodibility, since the non-corrodible envelope or shell protects the same.

From the circumstances foregoing it will be appreciated that a substantially unitary sucker rod is obtained, although a cross-section will show inner and outer layers of metal. The greater coefficient of expansion of the shell, particularly

when it is relatively low in carbon compared to the core, aids in the result as will be understood.

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

1. A method of forming a sucker rod having a non-corrodible surface including the steps of making a steel core, forming a tube of non-corrodible chromium nickel alloy steel substantially coextensive with said core, shrinking the tube on the core to form a substantially unitary rod, the mating surfaces having been previously rendered smoothly interfitting, rolling, forging or otherwise suitably shaping the whole, and finally tempering it.

2. A method of making a pump or sucker rod having a non-corrodible surface which includes the steps of making a steel core irrespective of its corrodibility but possessing predetermined characteristics as to hardness, strength, and resistance to shock, jarring, compressive, tensile and shearing stresses; forming a tube of non-corrodible alloy steel substantially coextensive with said core and containing about 18% chromium, about 8% nickel, and about .12–.15% carbon; rendering smoothly interfitting the outer surface of said core and the inner surface of tube; shrinking the tube on the core to form a substantially unitary rod; subjecting the thus-formed unitary rod to such shaping operations as will produce a pump or sucker rod of the required configurations; and tempering the whole.

3. A method of making a pump or sucker rod having a non-corrodible surface which includes the steps of making a steel core irrespective of its corrodibility but possessing predetermined characteristics as to hardness, strength, and resistance to shock, jarring, compressive, tensile and shearing stresses; forming a tube of non-corrodible alloy steel substantially coextensive with said core and containing about 18% chromium, about 8% nickel, and about .12–.15% carbon; rendering smoothly interfitting the outer surface of said core and the inner surface of tube; shrinking the tube on the core to form a substantially unitary rod; subjecting the thus-formed unitary rod to such shaping operations as will produce a pump or sucker rod of the required configurations; and tempering the whole, said shaping operations including the formation of annular flanges spaced inwardly from the ends of the rod.

4. A method of making a sucker rod which has a non-corrodible surface comprising the steps of making a suitable steel core irrespective of its corrodibility, fashioning a non-corrodible chrome alloy steel tube of appropriate dimensions which is substantially coextensive with said core, rendering the mating surfaces of tube and core smoothly interfitting, shrink-fitting the tube on the core to provide a substantially unitary composite rod, carrying out suitable shaping operations upon the composite rod to form it into a sucker rod of the desired configurations and then tempering the sucker rod to develop final properties.

VERE B. BROWNE.