

July 18, 1939.

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2,166,426

EQUALIZER FOR SUCKER RODS

Filed March 27, 1937

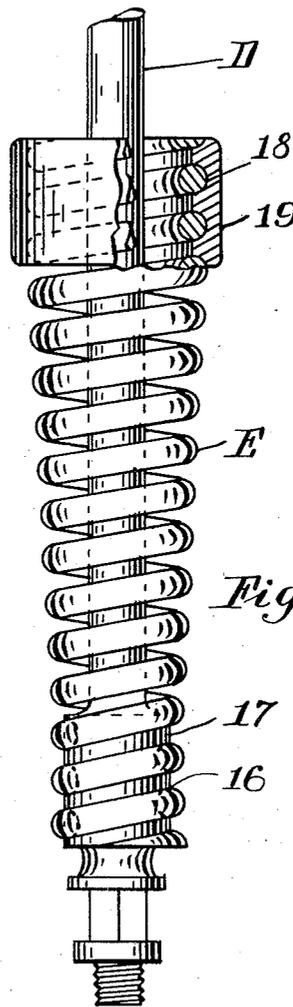
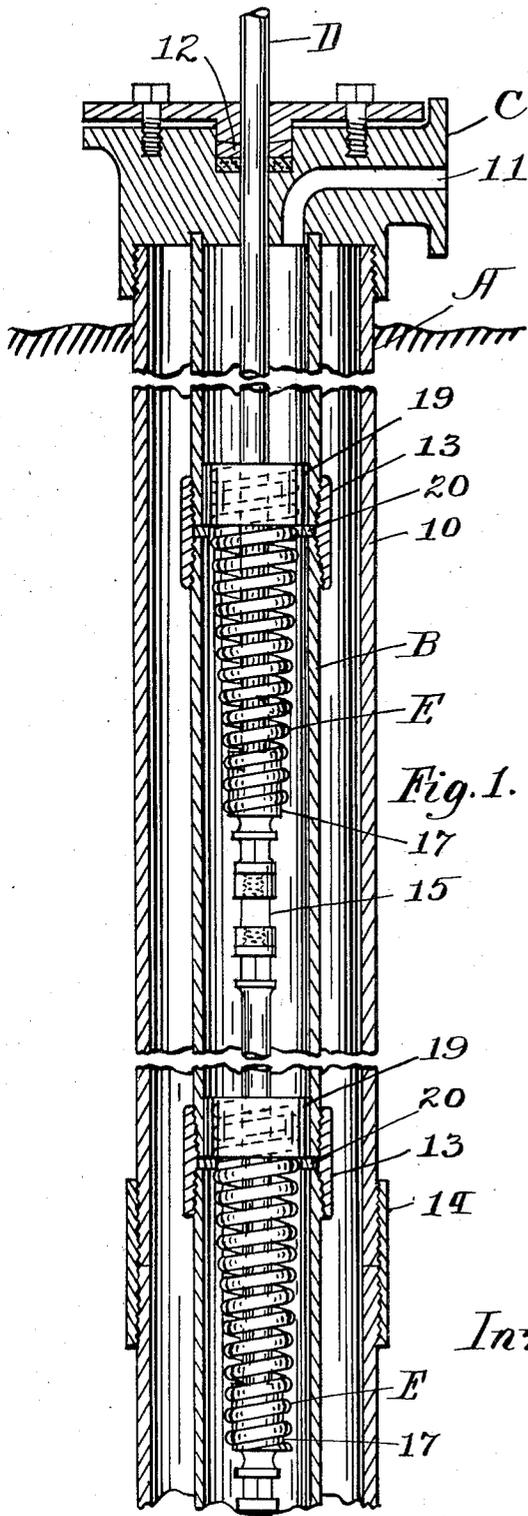


Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE

2,166,426

EQUALIZER FOR SUCKER RODS

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Application March 27, 1937, Serial No. 133,416

1 Claim. (Cl. 103—206)

This application is a continuation in part of my application entitled "Pumps", Serial Number 74,538, filed April 15, 1936, and which matured into Letters Patent Number 2,075,428, on March 30, 1937. My invention relates to improvements in equalizers for sucker rods which are used for pumping oil or other liquid from wells. In wells from which oil, water or other liquid is pumped and in which a sucker rod actuated pump is used, a long string of sucker rod sections is usually employed and the aggregate weight thereof produces a heavy strain on the rod and on the prime mover which actuates the rod, thus necessitating as a safety factor the use of a comparatively heavy rod of sufficient strength to more than overcome all strain and requiring expensive power for lifting the objectionable weight and operating the pump. The primary object of my invention therefore is to minimize all uneven strain on the rod. This I accomplish by sustaining the weight of the rod at intervals distributed along its length. This permits more efficient use of a sucker rod of reduced size and expense. Also sucker rods heretofore in use are subjected to shocks and jars while reciprocating, due primarily to their excessive weight. Other objects are the reduction of power required to operate the pump for which the rod is employed, to more evenly distribute the application of power to the sucker rod from the prime mover over an entire cycle of operation, and to reduce shock and jar to a minimum. My improved equalizer is simple in construction and provides a structure by which the sucker rod is not influenced by any irregularities in the well such as crookedness, whereby the pump apparatus can be operated as efficiently and effectively as if the well were uniform and straight.

With these and other objects in view my invention comprises the features of construction and combination of parts hereinafter described and claimed.

In the accompanying drawing forming part of this specification, Fig. 1 is a vertical section of a detail of a well showing the application of my invention thereto, and Fig. 2 is a side elevation, on a slightly enlarged scale of one of my improved sucker rod equalizers shown applied to a portion of one of the sections of the sucker rod.

In my companion application of which this is a continuation, I have described the application of the present invention to a sucker rod, the weight of which is suspended by a series of helical springs. The pump in the well however is fluid actuated and the sucker rod is not the con-

ventional type which conveys power from a prime mover above the well to a pump located in the bottom of the well as set forth in the present application. The present application is directed specifically to improvements over the parent application and to the use of a resilient equalizer with a sucker rod of any known type. For the purpose of showing my improved equalizer applied in use, a portion of a deep oil or water well A, in the ground is shown in Fig. 1 of the drawing, in which the customary string of casing is shown extending from the top downwardly. Lowered into the casing and spaced from its inner wall is a string of tubing B forming an inner barrel which may provide an egress duct up which the liquid produced by the well is adapted to be forced above the surface of the ground or may form a duct in which the sucker rod is applied to the pump (not shown) in the bottom of the well when the liquid from the pump is conducted through the passage between the tubing and casing according to which type of pump is employed. The upper ends of the casing and tubing are shown closed by the usual cap C which is shown threaded on the casing and through which the reciprocable sucker rod D extends downwardly into the tubing. A suitable gland 12 in the cap is provided through which the rod slides and an outlet duct 11 is shown for the liquid pumped from the well. It will be understood that any form of reciprocable pump (not shown) may be provided in the bottom of the well with which the sucker rod connects for operating and which is adapted to pump the liquid from the well up the tubing or space between the tubing and casing or any other duct provided for that purpose.

The string of casing is composed of sections joined together by couplings such as 13 and the tubing is composed of a string of sections joined by couplings such as 14 in the usual manner. Also the sucker rod D is composed of a string of sections joined by couplings such as 15 of conventional type.

My improved equalizer consists of a helical spring E, the lower end of which is connected to the sucker rod by the convolutions engaging a corresponding thread groove 16 in a cylindrical body 17 which is formed integral with the sucker rod. The upper end of the spring is lodged upon the tubing B by its convolutions engaging a corresponding thread groove 18 in the inner wall of a sleeve 19 and by said sleeve being supported by an annular inwardly projecting shoulder formed by a ring 20 which is clamped in the joint between the adjacent ends of a pair of the tube

sections and by the coupling 13. The convolutions of the spring may be held firmly engaged with the cylindrical body 17 and the sleeve 18 by welding when desired. Thus the equalizer is adapted to support the weight of the sucker rod and resiliently suspend the sucker rod from the tubing in the well leaving the sucker rod free to be reciprocated to actuate the pump in the bottom of the well. As many of the equalizers are used as will support the load of the sucker rod thus in effect counter balancing the rod so that the power applied to reciprocate the rod will be relieved from extra work during the return upward portion of the stroke of said rod. The equalizers are adapted to be distributed evenly at spaced intervals on the sucker rod or at any desired distance apart. The spring E constituting part of each equalizer tapers in diameter downwardly and when stretched while supporting the load of the sucker rod allows liquid pumped from the well to move freely through its convolutions. The springs as described support the load of the sucker rod by suspension in the well through their effort to contract but it will be obvious that they can be substituted by compression springs of suitable form in which event the lower end of greatest diameter and engaged in sleeve 19 is made to rest on the annular supporting shoulder 20 and the upper end of least diameter is secured to the sucker rod in the manner above set forth. Thus the load is resiliently supported by compression instead of by expansion members while the rod is free to be reciprocated during the operation of the pump.

In accordance with the patent statutes, I have described the principles of operation of my invention together with the construction thereof which I now consider to represent the best em-

bodiment thereof but I desire to have it understood that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claim.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

In a pumping apparatus, a pump casing having a longitudinal series of tubular sections, an external coupling sleeve by which abutting ends of said sections are joined, a ring clamped between said sections by said sleeve and projecting into said casing to form a narrow annular inner abutment, a reciprocable sectional sucker rod extending downwardly in said casing for operating a pump, a section thereof having an integral coupling member by which adjacent sections of said rod are separably connected, the member of the coupling on one end of a sucker rod section being formed with a solid cylindrical body having an external helical thread groove therein, a helical spring tapering longitudinally in diameter over said sucker rod having its small end engaged to said body in said thread groove, a collar separate and freely disposed from said casing and over said sucker rod and of larger internal diameter than the external diameter of said sucker rod body having an internal helical thread groove therein in which the free large end of said spring is engaged, said collar being adapted to lodge freely upon said abutment and freely allowing the sucker rod, spring and collar carried by said spring to be elevated in the casing and said spring when stretched and collar providing increased clearance for the free circulation of liquid longitudinally in said casing.

JAMES T. DICKSON.