Oct. 13, 1931. L. P. BURGESS 1,827,188

COUPLING FOR CONNECTING PUMP RODS AND PLUNGERS

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Fig. 1.

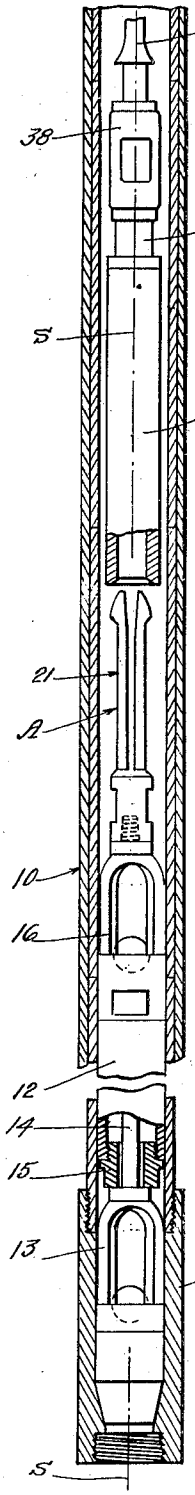



Fig. 2.

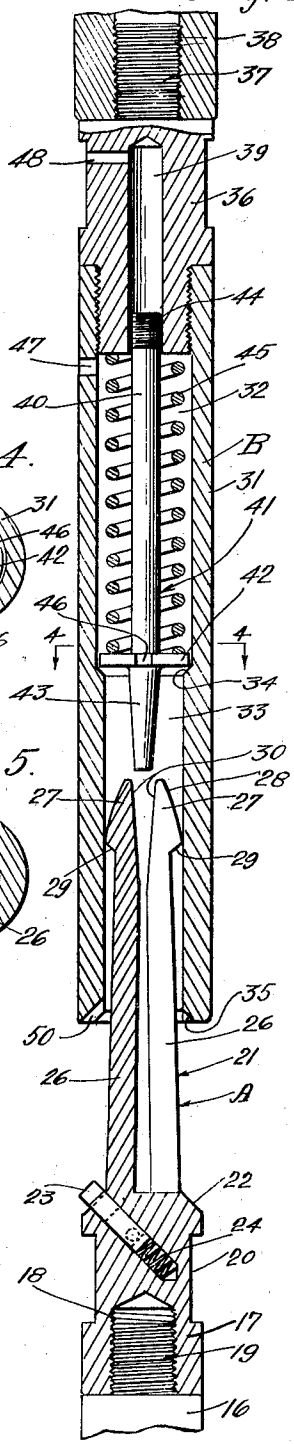



Fig. 3.

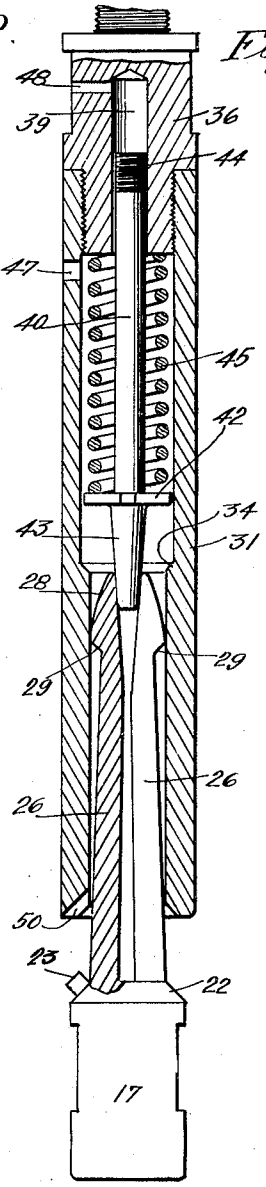



Fig. 4.

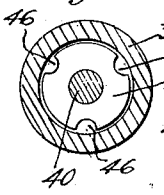
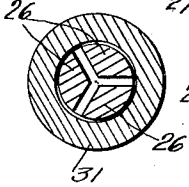



Fig. 5.




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COUPLING FOR CONNECTING PUMP RODS AND PLUNGERS

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Fig 6

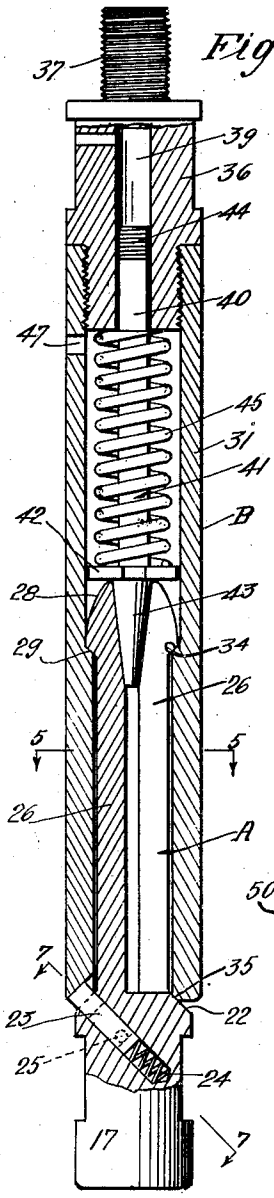



Fig. 8.

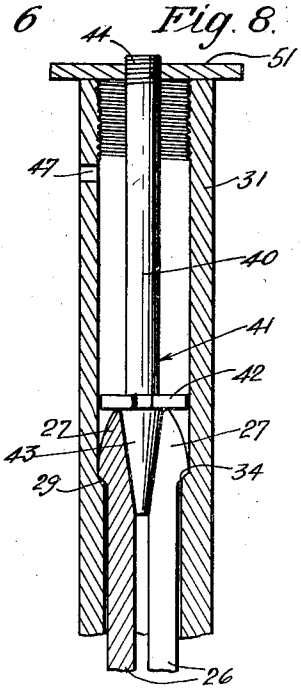



Fig 9.

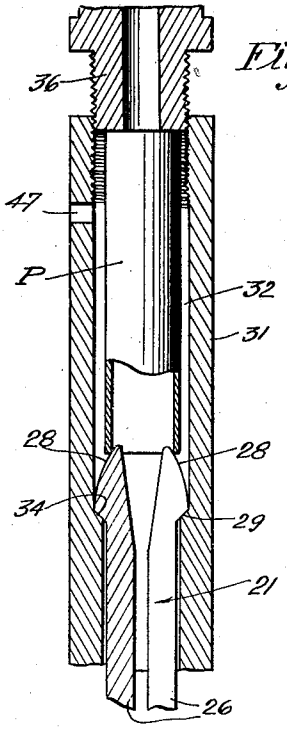
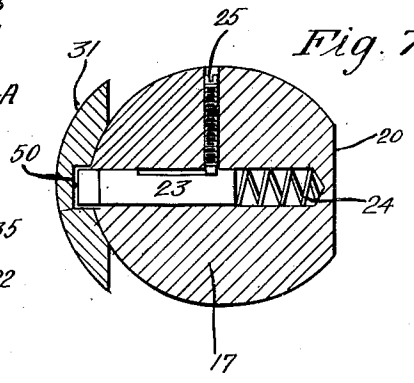



Fig. 7.




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# UNITED STATES PATENT OFFICE

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## COUPLING FOR CONNECTING PUMP RODS AND PLUNGERS

Application filed August 27, 1925. Serial No. 52,331.

This invention relates generally to oil well pumping apparatus, and more particularly has to do with means for automatically connecting sucker rods to the plungers of deep well pumps, the connection being made when the plunger is at the bottom of the well.

In order that a more complete understanding of the purpose of the invention may be had, I will first discuss briefly the generally practiced methods of making pump installations. It has long been common practice to lower the well tubing and working barrel of the pump before the pump plunger has been inserted therein; in other words, the tubing has been set completely, and then the plunger has been lowered through the tubing by means of usual sucker rods until the plunger comes to rest in its proper position in the working barrel.

When it is considered that the plunger must often be lowered several thousand feet, it will be readily understood that the highly finished peripheral face of the plunger is exposed to damaging conditions during plunger descent through the tubing; in fact, it is often found that the damage done by unavoidable contact between plunger and tubing is of sufficient extent to greatly impair the efficiency of the pump.

As a result, there has come into use an automatic coupling rendering it possible to insert the plunger in the barrel before the latter is lowered through the hole. There is consequently no relative longitudinal movement between plunger and tubing during the installation operation and there can therefore be no damage done to the plunger. However, when the tubing is finally set, it is necessary that connection be made between the plunger, now at the bottom of the well, and the sucker rods whereby the plunger is subsequently to be stroked through the working barrel during pumping operations.

There have been devised couplings whereby such connection may be automatically made, but it is their common fault that end play soon develops in their working parts, and the consequent lost motion must be taken up at each end of the pumping stroke. This is obviously a feature of disadvantage, and one of my principal objects is to provide an automatically acting coupling so constructed that end play may not develop, thereby insuring that the full reciprocatory stroke of the sucker rods delivers useful power to the plunger.

It is also among the objects of the invention to provide a device which is positive and sure in operation, that is, one which positively makes connection when the sucker rods are lowered onto the plunger, and holds that connection unfailingly throughout operation of the pump.

I have also provided means whereby the coupling may be quickly and easily disconnected when the plunger has been withdrawn from the tubing. The coupling is then in condition for use in another installation.

How I accomplish these desirable results, together with the general result of producing a sturdy, easily manufactured device, may be best understood from the following detailed description. Reference will be made to the accompanying drawings in which:

Fig. 1 is a contracted, medial longitudinal section through a pump barrel, showing the plunger bottomed therein and automatic coupling between the elements of my device about to be made;

Fig. 2 is a detached, medial section of my device after the rod-carried sleeve thereof has been thrust over the plunger-carried element but before the locking shoulders have become engaged;

Fig. 3 is a view similar to Fig. 2, but showing the sleeve thrust to a more advanced position;

Fig. 4 is a horizontal section on line 4—4 of Fig. 2;

Fig. 5 is a horizontal section on line 5—5 of Fig. 6;

Fig. 6 is a view similar to Fig. 3, but showing the coupling completely made;

Fig. 7 is an enlarged section on line 7—7 of Fig. 6;

Fig. 8 illustrates one step in disconnecting the coupling elements; and

Fig. 9 illustrates another step in disconnecting the elements.

In Fig. 1, numeral 10 designates a usual, lined working barrel having a usual shoe 11 at its lower end. It will be assumed that said barrel has been lowered at the end of tubing (not shown) into position at the bottom of a well and that before the barrel was thus lowered pump plunger 12 was inserted therein and brought to bottom on standing valve 13 which is fitted in shoe 11. The particular construction of the plunger is not important to the present invention, though I have shown usual Garbutt rod 14 connected to valve 13 and extending into the plunger bore, the plunger nut 15 resting on top of the crown of valve 13.

The plunger-carried element A of my device may be attached in any suitable manner, this largely depending upon the type of plunger employed in a given installation. I have therefore specified in my claims merely that element A is carried by a plunger element. In the drawings, element A is shown attached to valve 16 which, in turn, is connected to the plunger in the usual manner; though this is not intended as a limitation on the invention. It will also be understood that while I have shown the sleeve portion of my device attached to the sucker rods, and the finger or stem portion attached to the plunger element, that the sleeve may be attached to the plunger element and the fingers to the sucker rods, without departing from the spirit of my invention. Therefore specifications in the claims as to the direction in which various shoulders face, etc., are to be considered merely relative, and are made solely for the purpose of more clearly describing a typical embodiment of the invention. It may here be stated that, unless otherwise noted, all angles mentioned hereinafter are measured from the common longitudinal axis S of plunger 12 and sucker rods R.

Element A comprises a body portion 17 having a downwardly-opening, threaded bore 18 adapted to take threaded stem 19 of valve 16, and preferably has wrench faces 20. Upwardly pointing stem 21 is coaxial with body portion 17 but of relatively reduced diameter, there being provided an upwardly facing, conical, annular shoulder 22 provided on the body portion and adjacent said stem 21. Extending angularly through body portion 17 is a longitudinally slidable detent or plunger 23, spring 24 normally urging the detent outwardly to its limit, as established by limiting stop screw 25 in body 17, so the free end of the detent normally extends beyond shoulder 22.

The stem 21 is longitudinally split to provide a plurality of upwardly pointing fingers 26, the upper ends of these fingers being formed with noses 27 whose outer faces 28 incline inwardly towards the free end of the fingers or nose points. At the junction of the body portion of the fingers and noses 27, are formed downward and inwardly facing conical shoulders 29. The inner faces 30 of the fingers incline downward and inwardly from the free ends of the fingers and their angle is less than the angle of shoulders 29, for reasons that will presently be apparent. It will be noted that shoulders 22 and 29 may be considered as longitudinally spaced, oppositely facing, annular shoulders on element A. Fingers 26 have such inherent spring tendency that, when unrestrained, they spread radially outwardly or expand, but are susceptible of being radially compressed to the contracted position of Fig. 2.

The rod-carried element B is in the nature of a sleeve 31 having two internal diameters 32 and 33, the bore portion 33 being the smaller. At the junction of the bores 32, 33 is formed an upwardly facing annular shoulder 34 which is complementary to shoulders 29, while at the lower end of the sleeve, to which bore 33 opens, is provided a downwardly facing annular shoulder 35 which is complementary to shoulder 22. The upper end of the sleeve is closed by nut 36 which has a threaded shank 37 whereby attachment is made to the sucker rod coupling 38 in the usual manner. Nut 36 has a longitudinally extending central guideway 39 adapted to take shank 40 of locking pin 41, this locking pin having a flange 42 adapted normally (when the coupling is disconnected) to rest on shoulder 34 and having a pointed or tapered coaxial plug 43 whose taper is preferably complementary to the taper of finger faces 30 when the fingers are in locking position, as shown in Figs. 2 and 3. Shank 40 is adapted to slide freely through guideway 39 and is preferably provided at its upper end with threads 44 for a purpose to be later described. Spring 45 encircles shank 40 and is interposed between flange 42 and the lower end of nut 36 so it constantly urges the locking pin downwardly. Flange 42 has peripheral notches 46 to allow the passage of oil therepast, while sleeve 31 and nut 36 have relief ports 47 and 48 respectively, to allow the escape of oil from the sleeve bore and guideway 39.

When fingers 21 are in their normal, unrestrained position of radial expansion (Fig. 1) noses 27 are out of vertical alignment with bore 33, but shoulder 35 overlies the points of the noses 25, upon continued downward movement of sleeve 31, this shoulder engages faces 28 of the noses and radially compresses stem 21 to admit fingers 26 to bore 33. Continued downward movement of the sleeve carries tapered plug 43 of locking pin 41 downwardly between the upper ends of fingers 26 until the downward movement of the pin is checked by the engagement of plug 43 with inclined faces 30 (Fig. 3). Thereafter, continued downward movement of the sleeve compresses spring 45 between flange 42 and

the lower end of nut 36, it being understood that shank 40 continues to center pin 41 during relative longitudinal sliding movement between pin and sleeve.

As soon as shoulder 34 comes into horizontal alignment with finger shoulders 29, the inherent spring tendency of the fingers expands them radially outwardly, moving shoulders 29 behind shoulders 34 in a manner to resist subsequent relative, separative longitudinal movement between sleeve and fingers. As the fingers move out to this position, spring 45 acts to thrust pin 41 downwardly, carrying plug 43 into the position of Fig. 6 thereby to hold the fingers in spread or locking position, it being remembered that the degree or plug taper is less than that of the shoulder taper. Preferably, also, the angle of the plug taper and consequently the angle of complementary finger faces 30 is less than the critical angle at which compressive forces acting on the fingers would tend to force the plug out. By making such provision, spring 45 need not be depended upon for holding the locking pin downwardly in locking position. However, should the fingers have insufficient spring to throw shoulders 29 properly behind shoulder 34, spring 45 acts to thrust the plug 43 down as a wedge to spread the fingers and bring about the described shoulder engagement.

Preferably, the longitudinal spacing of shoulders 34—35 is slightly greater than the longitudinal spacing of finger shoulders 22—29. Consequently, when the coupling is fully made, as in Fig. 6, it is assured that there may be no relative longitudinal movement, either telescopic or separative, between sleeve and fingers, this elimination of end play serving to prevent lost motion between plunger and sucker rods when the latter are reciprocated to stroke the plunger, a feature of obvious advantage.

It will readily be seen from the above that, since pin 41 cannot be moved longitudinally by an upward strain put upon the sucker rod, the locking inter-engagement between sleeve and fingers holds the plunger and sucker rods against relative longitudinal movement throughout operation of the pump and that there is no danger of the coupling becoming disconnected and resulting in loss of the plunger.

The lower end of sleeve 31 has a notch 50 which is adapted to be brought into register with detent 23 when sleeve 31 and body portion 20 of element A are relatively revolved, that is, if this condition of registration does not already exist when the sleeve is lowered onto element A. Assuming that the condition of registration does not exist initially, the end of sleeve 31 depresses detent 23 against the action of spring 24, but as soon as the sleeve is rotated about element A by sucker rod rotation, spring 24 urges the detent into the notch as soon as notch and detent registration is had, and subsequent relative rotation between the sleeve and element A is prevented. As a consequence, should occasion arise for tightening up the threaded joints in the sucker rods from the top of the well, the lowermost rod, that connected to the sleeve, is held by the plunger against rotation to such an extent that the threaded joints above may be taken up. The detent or its equivalent is necessary whenever a rod "rotation" is to be used for moving the plunger angularly during pump operation, the purpose of such plunger movement being well known to those skilled in the art. Were it not for the detent, rotative force applied to the rods, after the rod joints are taken up, would not be positively transmitted to the plunger, as is necessary.

When the plunger has been lifted clear of the tubing for purposes of inspection, replacement, or repair, my coupling may be readily and easily disconnected in the following manner, though other methods may be employed, of course, if found more convenient. Nut 36 and spring 45 are first removed, it being noted that shank 40 of pin 41 is of such length that its upper, threaded end 44 extends above the upper edge of sleeve 31 (Fig. 8). This upward extension of the shank provides readily accessible means whereby the pin may be grasped and pulled out of engagement with the fingers. However should plug 43 be wedged so tightly between the fingers that it is a matter of difficulty to pull the pin, a plate or nut 51 may be threaded on the shank to provide a grip whereby pressure may be more easily and effectively applied to the pin for pulling it. Should the pins still resist withdrawal, nut 51 may be threaded down on top of the sleeve, which action will, since the pin is wedged so tightly that it cannot revolve with respect to the sleeve, exert a longitudinal withdrawing tension on the pin.

When the locking pin has thus been removed, the next step is to radially compress stem 21 in order to free shoulders 29 from shoulders 34. If the angle of shoulders 29 be such that an ordinary pull upon sleeve 31 does not have sufficient reactionary effect upon the fingers to compress them, a pipe P may be lowered through sleeve bore 32 into the position of Fig. 9, the pipe being of such inside diameter that it takes the ends of noses 27 in such a manner that further downward movement of the pipe moves its lower end over nose faces 28 and thereby moves the fingers radially together sufficiently to free shoulders 29 from shoulder 34. Such movement of the pipe may be caused by threading nut 36 downwardly through sleeve 31 and into engagement with the end of the pipe. Thereupon sleeve 31 may be easily withdrawn from over stem 26.

It will be understood the drawings and description are to be considered merely as illustrative of and not restrictive on the broader claims appended hereto, for various changes in design, structure and arrangement may be made without departing from the spirit and scope of said claims.

I claim:

1. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a radially expansive stem, and the other member including a sleeve adapted to slide over the stem when the members are moved longitudinally together, an external shoulder on the stem, an internal shoulder on the sleeve, the stem being adapted to expand radially and engage its shoulder with the sleeve shoulder when the sleeve and stem are moved to have a predetermined amount of longitudinal overlap, the shoulder engagement being adapted to resist subsequent separative longitudinal movement of the sleeve and stem; and spring actuated means mounted in the sleeve and adapted to hold the stem in expanded condition when the shoulders are so engaged.

2. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a radially expansive stem, and the other member including a sleeve adapted to slide over the stem when the members are moved longitudinally together, an external shoulder on the stem, an internal shoulder on the sleeve, the stem being adapted to expand radially and engage its shoulder with the sleeve shoulder when the sleeve and stem are moved to have a predetermined amount of longitudinal overlap, the shoulder engagement being adapted to resist subsequent separative longitudinal movement of the sleeve and stem; and releasable means adapted to hold the stem in expanded condition when the shoulders are so engaged; said last named means including a longitudinally slidable locking pin on said other member, and a spring adapted to urge said pin into operative engagement with said expansible stem.

3. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a radially expansive stem, and the other member including a sleeve adapted to slide over the stem when the members are moved longitudinally together, a pair of longitudinally spaced, internal, oppositely facing, annular shoulders on the sleeve, a pair of complementary external shoulders on the stem, the shoulders on the sleeve adapted to engage the associated shoulders on the stem when sleeve and stem are moved to have a predetermined amount of longitudinal overlap and to resist thereby subsequent relative longitudinal movement of the two members; the effective longitudinal spacing of the stem shoulders being slightly less than the effective longitudinal spacing of the sleeve shoulders.

4. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a longitudinally split stem providing a plurality of angularly spaced fingers having an inherent spring tendency to hold them radially separated, the other member including a sleeve adapted to slide longitudinally over the stem, said sleeve having a bore of two diameters with an annular shoulder formed at their junction, the bore portion of smaller diameter opening to the free end of the sleeve; external shoulders on the fingers and complementary to said sleeve shoulder, the sleeve being adapted to press the fingers radially together by engagement with said finger shoulders as the fingers pass through said smaller bore portion, and the fingers being adapted to spring radially outward, when their shoulders pass into the larger bore portion of the sleeve, and thereby engage their shoulders behind the sleeve shoulder to prevent subsequent longitudinal separative movement of the members; and a longitudinally slidable and coaxial locking pin carried by the sleeve, and means adapted to slide said pin between the ends of the fingers to hold them in outward position.

5. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a longitudinally split stem providing a plurality of angularly spaced fingers having an inherent spring tendency to hold them radially separated, the other member including a sleeve adapted to slide longitudinally over the stem, said sleeve having a bore of two diameters with an annular shoulder formed at their junction, the bore portion of smaller diameter opening to the free end of the sleeve; external shoulders on the fingers and complementary to said sleeve shoulder, the sleeve being adapted to press the fingers radially together by engagement with said finger shoulders as the fingers pass through said smaller bore position, and the fingers being adapted to spring radially outward, when their shoulders pass into the larger bore position of the sleeve, and thereby engage their shoulders behind the sleeve shoulder to prevent subsequent longitudinal separative movement of the members; and a

longitudinally slidable and coaxial locking pin carried by the sleeve, and yieldable means adapted to slide said pin between the ends of the fingers to hold them in outward position.

6. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a longitudinally split stem providing a plurality of angularly spaced fingers having an inherent spring tendency to hold them radially separated, the other member including a sleeve adapted to slide longitudinally over the stem, said sleeve having a bore of two diameters with an annular, conical shoulder formed at their junction, the bore portion of smaller diameter opening to the free end of the sleeve; external, conical shoulders on the fingers and complementary to said sleeve shoulder, the sleeve being adapted to press the fingers radially together by engagement with said finger shoulders as the fingers pass through said smaller bore portion, and the fingers being adapted to spring radially outward, when their shoulders pass into the larger bore portion of the sleeve, and thereby engage their shoulders behind the sleeve shoulder to prevent subsequent longitudinal separative movement of the members; the inner faces of said fingers inclining inwardly from the free ends of the fingers, the angle of incline being less than that of said conical shoulders on the stem; and a longitudinally slidable, coaxial and tapered locking pin carried by the sleeve, and means adapted to slide said pin between the ends of the fingers and into contact with said inclining faces and thereby hold said fingers in outward position.

7. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a longitudinally split stem providing a plurality of angularly spaced fingers having an inherent spring tendency to hold them radially separated, the other member including a sleeve adapted to slide longitudinally over the stem, said sleeve having a bore of two diameters with an annular, conical shoulder formed at their junction, the bore portion of smaller diameter opening to the free end of the sleeve; external, conical shoulders on the fingers and complementary to said sleeve shoulder, the sleeve being adapted to press the fingers radially together by engagement with said finger shoulders as the fingers pass through said smaller bore portion, and the fingers being adapted to spring radially outward, when their shoulders pass into the larger bore portion of the sleeve, and thereby engage their shoulders behind the sleeve shoulder to prevent subsequent longitudinal separative movement of the members; the inner faces of said fingers inclining inwardly from the free ends of the fingers, the angle of incline being less than that of said conical shoulders on the stem; and a longitudinally slidable coaxial and tapered locking pin carried by the sleeve, and means adapted to slide said pin between the ends of the fingers and into contact with said inclining faces and thereby hold said fingers in outward position, and said angle of incline being less than the critical angle at which compressive forces acting on said fingers would tend to force said pin out.

8. A coupling for automatically connecting a pump rod or the like to a pump plunger or the like, embodying a member carried by a plunger element, and a member carried by the pump rod, one of the members including a longitudinally split stem providing a plurality of angularly spaced fingers having an inherent spring tendency to hold them radially separated, the other member including a sleeve closed at one end by a nut and open at the other end whereby it is adapted to slide longitudinally over the stem, said sleeve having a bore of two diameters with an annular, conical shoulder formed at their junction, the bore portion of smaller diameter opening to the free end of the sleeve; external, conical shoulders on the fingers and complementary to said sleeve shoulder, the sleeve being adapted to press the fingers radially together by engagement with said finger shoulders as the fingers pass through said smaller bore portion, and the fingers being adapted to spring radially outward, when their shoulders pass into the larger bore portion of the sleeve, and thereby engage their shoulders behind the sleeve shoulder to prevent subsequent longitudinal separative movement of the members; the inner faces of said fingers inclining inwardly from the free ends of the fingers, the angle of incline being less than that of said conical shoulders on the stem; and a locking pin mounted for longitudinal sliding movement in the sleeve, said pin having at one end a shank extending, with clearance, into a central guideway in said nut, and having at the other end a coaxial, tapered plug, and means adapted to slide said pin longitudinally to carry said plug between the ends of the fingers and into contact with said inclining faces and thereby hold said fingers in outward position; said shank being of such length that it extends above the open end of the sleeve when the nut is removed after the pin is in holding position, and thereby provides an accessible extension whereby the pin may be gripped for removal.

9. An automatic coupling for pump rods and plungers, embodying a plurality of spaced fingers movable laterally at their outer ends to and from each other, a sleeve adapt-

ed to slide longitudinally over the fingers and having an internal shoulder, shoulders on the fingers adapted to engage the sleeve shoulder by expansive movement of the fingers, and a finger separating pin mounted in the sleeve and adapted to enter between the fingers to hold them expanded.

10. An automatic coupling device of the character described, embodying a plurality of spaced fingers movable laterally at their outer ends to and from each other, a sleeve adapted to slide longitudinally over the fingers and having an internal shoulder, shoulders on the fingers adapted to engage the sleeve shoulder by expansive movement of the fingers, a finger separating pin adapted to enter between the fingers to hold them expanded, and a spring urging the pin between the fingers.

11. An automatic coupling for pump rods and plungers, embodying a plurality of spaced fingers movable laterally at their outer ends to and from each other, a sleeve adapted to slide longitudinally over the fingers and having an internal shoulder, shoulders on the fingers adapted to engage the sleeve shoulder by expansive movement of the fingers, and a conical finger separating pin mounted in the sleeve for longitudinal movement and adapted to enter by longitudinal movement between the fingers to hold them expanded, the conical angle of the pin being less than the critical angle at which compressive forces acting on said fingers would tend to force said pin out.

12. An automatic coupling device of the character described, embodying a plurality of spaced fingers movable laterally at their outer ends to and from each other, a sleeve adapted to slide longitudinally over the fingers and having an internal shoulder, shoulders on the fingers adapted to engage the sleeve shoulder by expansive movement of the fingers, and a conical finger separating pin mounted in the sleeve for longitudinal movement and adapted to enter by longitudinal movement between the fingers to hold them expanded, the conical angle of the pin being less than the angle between the line of movement of the pin and the engaging surfaces of the finger and sleeve shoulders whereby said pin is held in position against compressive forces acting on said fingers.

13. An automatic coupling device of the character described, embodying a longitudinally split stem providing a plurality of spaced fingers having an inherent spring tendency to hold them radially separated, a sleeve adapted to slide axially over a stem and having an internal shoulder, external shoulders on the stem fingers adapted to engage the sleeve shoulder by expansive movement of the fingers, said sleeve and finger shoulders being in a conical surface whose axis is the axis of the sleeve, a finger separating pin adapted to move axially of the sleeve and enter between the fingers to hold them expanded, and a spring urging the pin between the fingers, the surfaces of engagement between said pin and the fingers lying in a conical surface whose axis is the axis of the sleeve and the angle of said conical surface being less than the angle of said first mentioned conical surface whereby said pin is held in position between said fingers independently of said spring.

14. An automatic coupling device of the character described comprising: a member carried by a plunger element and a member carried by a pump rod, one of said members including a radially expansive stem, and the other member including a sleeve adapted to slide over the stem when said members are moved longitudinally together; an external shoulder on said stem; an internal shoulder on said sleeve, said stem being adapted to expand radially to engage its shoulder with said sleeve shoulder when said sleeve and stem are moved to have a predetermined amount of longitudinal overlap, the shoulder engagement being adapted to resist subsequent separative longitudinal movement of said sleeve and stem; and spring actuated means carried by said sleeve and adapted to hold said stem in expanded position when said shoulders are engaged.

15. An automatic coupling device of the character described comprising: a plurality of spaced fingers movable laterally at their outer ends to and from each other; a sleeve adapted to slide longitudinally over said fingers and having an internal shoulder; shoulders formed on said fingers adapted to engage said sleeve shoulder by expansive movement of said fingers; a separating pin mounted in said sleeve for longitudinal movement and adapted to enter between said fingers to hold the same expanded; and spring means carried by said sleeve and engaging said pin for holding said fingers in expanded position.

16. An automatic coupling device of the character described comprising: a plurality of spaced fingers movable laterally to and from each other; a sleeve adapted to slide longitudinally over said fingers and being formed with an internal shoulder; shoulders formed on said fingers adapted to engage said sleeve shoulder by expansive movement of said fingers; a conical finger separating pin mounted in said sleeve for longitudinal movement and adapted to enter between said fingers to hold the same expanded; and spring means for actuating said finger separating pin.

17. An automatic coupling device of the character described comprising: an element embodying a plurality of spaced fingers movable laterally at their outer ends to and from each other; a sleeve element adapted to slide

longitudinally over said fingers and having an internal shoulder; shoulders formed on said fingers adapted to engage said sleeve shoulder by expansive movement of said fingers; a conical finger separating pin mounted in said sleeve for longitudinal movement and adapted to enter between said fingers to hold them expanded; and a spring carried by said sleeve element adapted for holding said separating pin in finger separating position, the conical angle of said pin being less than the angle between the line of movement of said pin and the engaging surfaces of said finger and said sleeve shoulders, whereby said pin is held in position against compressive forces acting on said fingers.

In witness that I claim the foregoing I have hereunto subscribed my name this 29th day of July, 1925.

LYSLE P. BURGESS.