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2,587,938

ADJUSTABLE FLUID HANDLING CONDUIT

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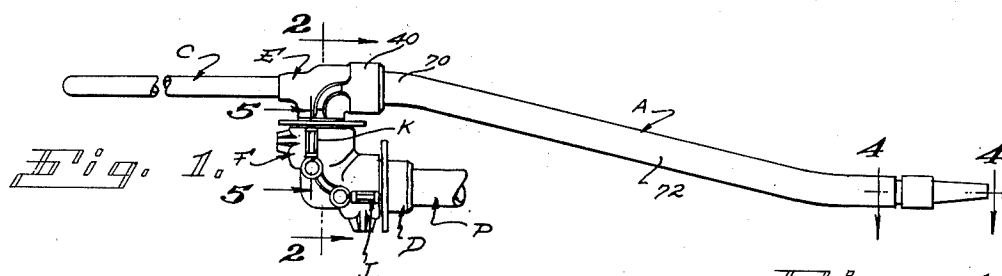


Fig. 2.

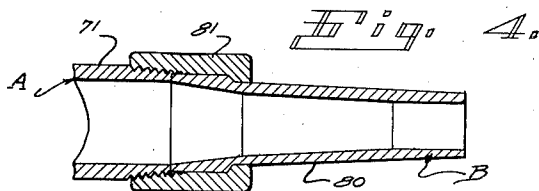
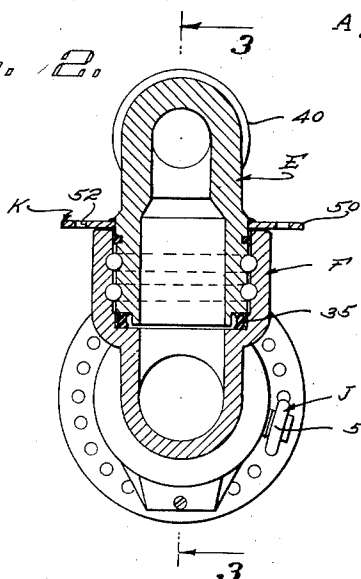


Fig. 5.

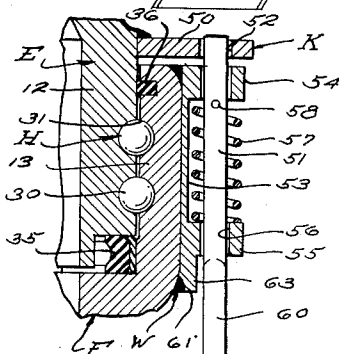


Fig. 3.

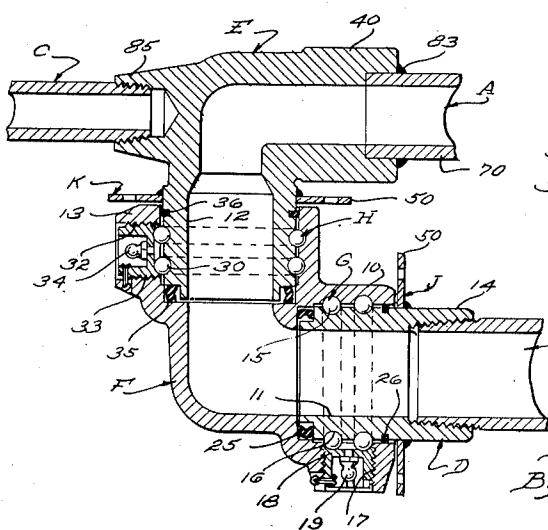
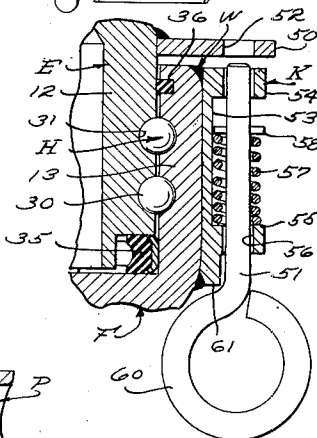


Fig. 6.



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ADJUSTABLE FLUID HANDLING CONDUIT

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26,265. Divided and this application October
11, 1949, Serial No. 120,633

2 Claims. (Cl. 285—97.1)

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This invention relates to an adjustable fluid handling conduit, and it is a general object of the invention to provide a simple, practical and easily operated structure for handling fluids at high velocities.

The apparatus of the present invention can be used generally in combination with a nozzle or the like, or where fluid is to be discharged from a nozzle at high pressure or in the form of a jet. For purpose of example the apparatus will be referred to as being used in connection with a nozzle for mixing or agitating material and in a situation where a high pressure jet of fluid is delivered at a high velocity with the view of causing agitation or mixing of a body of material, such as mud, or the like. A mud mixing operation such as is referred to is generally required in connection with the drilling of wells when such wells are drilled by the rotary method and mud laden fluid is employed in the course of drilling.

This application is filed as a division of application Serial No. 26,265, "Apparatus for Delivering a High Pressure Jet," filed May 11, 1948, now Patent No. 2,501,639.

A general object of the present invention is to provide apparatus of the general character referred to effective to handle a substantial quantity of liquid at high velocity. With the apparatus of the present invention a nozzle may be carried so that it is subject to being manipulated into any desired position and can be freely moved at will.

A further object of the present invention is to provide a support for a nozzle or the like enabling the nozzle to be moved a substantial direction in any desired direction.

A further object of the present invention is to provide a fluid handling head of the general character referred to including lock means whereby relative movement between parts of the head may be controlled or checked as circumstances require.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side elevation of a typical embodiment of the present invention, showing it applied to a horizontally disposed supply pipe and carrying a nozzle. Fig. 2 is an enlarged detailed sectional view taken as indicated by line 2—2 on Fig. 1. Fig. 3 is a sectional view taken as in-

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dicated by line 3—3 on Fig. 2. Fig. 4 is an enlarged detailed sectional view taken as indicated by line 4—4 on Fig. 1. Fig. 5 is an enlarged detailed sectional view taken as indicated by line 5—5 on Fig. 1 showing the lock means engaged or set, and Fig. 6 is a view similar to Fig. 5, showing the lock means released or disengaged.

The apparatus provided by the present invention is intended for application to a supply line or pipe P delivering fluid under the desired head or pressure, and it involves, generally, a swivel head with a projecting neck A carrying a nozzle B. A handle C projects from the head to be convenient for the operator.

The head as provided by the present invention involves, generally, a straight tubular base section D, an outer or neck section E, and a middle or intermediate section F. The head further involves means G coupling the inner end 10 of the middle section F with the outer end 11 of the base section, means H connecting the inner end 12 of the neck section with the outer end 13 of the middle section, lock means J engageable to set the middle section against movement relative to the base section, and lock means K operable to set the neck section against movement relative to the middle section F.

The base section D of the head is a simple, straight, tubular part with its inner end 14 adapted to be connected to the supply pipe P while its outer end 13 is coupled to the middle section F by the means G. In the case illustrated the end portion 14 of section D is internally threaded and the end of pipe P is threaded into the section D, as clearly shown in Fig. 3 of the drawings.

The middle section F of the head is a tubular L-shaped member having its inner end portion 10 extending at right angles to its outer end portion 13. The inner end portion 10 is connected or coupled to the base section D through the means G. In the case illustrated the end portions 10 and 11 of sections F and D, respectively, are telescopically related or engaged one inside the other, the end portions 11 being shown engaged in the end portion 10.

The means G coupling sections F and D connects the sections for free movement or rotation of the section F on the section D about an axis coincidental with the longitudinal axis of the section D. The particular means G illustrated in the drawings involves a plurality of balls 15 carried in registering grooves 16 in the overlapped portion of the sections F and D. The balls are adapted to be arranged in place through-

an access opening 17 normally closed by plug 18 and in practice lubricant is supplied to the balls through a suitable lubricant fitting 19.

In the preferred form of the invention sealing means are provided to prevent leakage between sections F and D. In the case illustrated a sealing ring 25 is shown engaged between the end of section D and the opening in section F, which receives section D. A second sealing ring 26 may be provided between the sections F and D to prevent lubricant from escaping from the coupling balls 15 and also to prevent foreign matter from entering between the sections F and D to interfere with proper operation of the balls.

The inner end 12 of the neck section E is joined with the outer end 13 of the middle section F and in the case illustrated the end portion 12 is engaged in the end portion 13. The means H couples the sections E and F so that section E is freely rotatable relative to section F about the longitudinal axis of the end portion 13 of the section F, which axis is at right angles to and intersects the axis of the inner end portion 10 of section F.

The means H may correspond in form and construction with the means G, in which case it involves balls 30 operating in grooves 31 and arranged in place through an access opening 32 normally closed by a plug 33. The balls are supplied with lubricant through a fitting 34. A sealing ring 35 prevents escape of fluid from between sections E and F and a second sealing ring 36 acts between the sections E and F to prevent lubricant from escaping from between the sections and to prevent foreign matter from entering between the sections.

The neck section E of the head is a tubular L-shaped member with an outer end portion 40 extending at right angles to the inner end portion 12 which is coupled to the middle section F.

From the foregoing description it will be apparent that the head involving the three sections D, E and F is such as to enable the outlet or outer end 40 of section E to be faced in various directions since the middle section F is freely rotatable about the axis of the base section while the neck section is freely rotatable about the axis on which the sections E and F are joined, which latter axis is at right angles to that first mentioned.

The lock means K is provided to act between section E and F and when engaged locks these sections against relative rotation. In the form of the invention illustrated the means K involves a lock plate or flange 50 on the neck section 40 immediately beyond or adjacent the outer end of the end portion 13 of section F, and a lock pin 51 carried by section F to cooperate with the plate. The pin is shown carried by section F to cooperate with openings 51 provided in the plate 50.

The plate or flange 50 is an annular part extending completely around the portion 12 of section E and the openings 52 in the plate 50 are in an annular series concentric with the axis of the end part 12 of section E.

The pin 51 is slidably mounted on the exterior of the end portion 13 of section F to extend parallel with the axis of end portions 12 and 13 and to be so located as to enter into or register with the openings 52, one at a time, depending upon the position of section E relative to section F.

The particular structure shown in the drawings involves a pin carrying bracket 53 fixed on the exterior of the end portion 13 of section F as by welding W. The bracket 53 has spaced lugs 54 and 55 with aligned openings 56 in which the pin 51 is slidably carried. A helical compression spring 57 is arranged on the pin 51 between the lugs or between lug 55 and an abutment pin 58 on pin 51 so that the spring normally yieldingly urges pin 51 toward the plate 50.

The pin 51 projects beyond lug 55 where it has a loop-shaped portion 60 forming a handle easily engaged by an operator. The bracket 53 is provided with a rest or shoulder 61 suitably spaced from lug 55 and adapted to be engaged by the projecting handle portion 60 of pin 51 when the pin is rotated to the position shown in Fig. 6 of the drawings. Further, the bracket 53 has a flat side or shoulder 63 against which the handle portion 60 is located when the lock means is engaged as shown in Fig. 5. The shoulder or face 63 holds the pin 53 against rotation and maintains the handle portion 60 in a position where it does not project radially from the side of the head section F.

When it is desired to hold the lock means K fully released or disengaged or to leave it in such condition the pin 51 is withdrawn from plate 50 against the resistance of spring 57 and is then rotated to engage the head or handle 60 of the pin on the shoulder 61, as shown in Fig. 6, where it will remain until deliberately rotated in a manner to release it for movement to the position shown in Fig. 5.

The lock means J acting to lock section F against rotation relative to section D may correspond in construction to the lock means K above described, in which case the plate 50 is fixed on head section D while the lock pin is carried by the head section F. The general arrangement and relationship of the lock means J and K will be readily understood from Fig. 1 of the drawings.

The neck A of the structure is an elongate tubular part characterized by an inner end portion 70 joined to and parallel with the outer end 40 of head section E, an outer end portion 71 the axis of which intersects the point at which the axis of section D intersects the axes of the portions 12 and 13 of sections E and F, respectively, with the result that when the structure is in operation the reactionary force generated by fluid leaving the nozzle B on the end portion 71 of the neck has little or no tendency to operate sections of the head relative to each other; either the section E relative to section F or the sections E and F relative to section D.

The nozzle B, or other element on the outer end 70 of the neck may be of any suitable form or construction and it may vary in size and shape depending upon the character of work to be performed. In the case illustrated the nozzle is shown as involving an outwardly convergent body 80 tubular in form and coupled to the end of neck part 70 by a coupling 81 so that fluid passed by the neck flows therethrough and issues therefrom in a suitable stream or jet. In the particular case illustrated the neck A is one continuous length of tubing, or the like, suitably shaped or bent and it is permanently joined to the end portion 40 of section E by welding 83.

The handle C is provided on or projects from the section E of the head and is preferably located so that it extends parallel with the end portion 40 of section E. In the particular case

illustrated the handle is an elongate bar joined to section E through a suitable boss 85, the parts being related so that the neck A extends in one direction from section E while the handle C extends in the opposite direction therefrom. By thus locating the handle and by making it of suitable length it provides a part that can be very easily handled and which makes it convenient for an operator to direct or face the nozzle in the desired manner.

From the foregoing description it will be apparent that the present invention provides a head construction which may be applied to a supply pipe P whether the pipe be horizontally disposed, as shown in the drawings, or vertically disposed, and that the head is such as to enable an operator to manipulate the neck and consequently the nozzle into any desired position. The means G and H incorporated in the head make for free smooth operation of the head and the head construction involving but three main sections D, E and F related as shown in Fig. 3, provides a continuous smooth flow passage between the pipe P and the neck A. It will be apparent how the lock means J and K may be utilized when desired to set parts of the head against relative movement so that the operation of the neck and nozzle may be limited or set, as circumstances may require.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims:

Having described my invention, I claim:

1. In combination two tubular sections, means rotatably coupling the sections, and lock means engageable to hold the sections against relative rotation including, a lock flange fixed on and projecting radially from one section, a lock pin, spaced lugs fixed on and projecting from the exterior of the other section and carrying the pin

for rotation and reciprocation, and a spring normally yieldingly urging the pin into engagement with the flange, the pin having a handle projecting therefrom and movable into and out of engagement with said other section by rotation of the pin to hold the pin retracted from the flange.

2. In combination two tubular sections, one a female section having a socket portion with an axial socket opening therein and the other a male section with a pin portion entering the said opening from the outer end of the female section, antifriction means rotatably coupling the sections including, axially spaced annular series of bearing balls in the socket opening and engaged between the said pin and socket portion, and lock means engageable to hold the sections against relative rotation including, an annular lock flange fixed on and projecting radially from the male section adjacent the outer end of the female section, a lock pin, spaced lugs projecting from the exterior of the socket portion and slidably and rotatably supporting the pin parallel with the socket portion and adjacent thereto at the exterior thereof, a shoulder on the female section adjacent one of the lugs, a spring on the pin between the lugs normally yieldingly urging the pin into engagement with the flange, and a handle on the pin operable by rotation of the pin into and out of engagement with the shoulder and holding the pin retracted from the flange when engaged with said shoulder.

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The following references are of record in the file of this patent:

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