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3,485,118

COMBINATION WRENCH AND EXPANSION STOPPER FOR PIPELINES

Filed April 1, 1968

2 Sheets-Sheet 1

FIG. 1

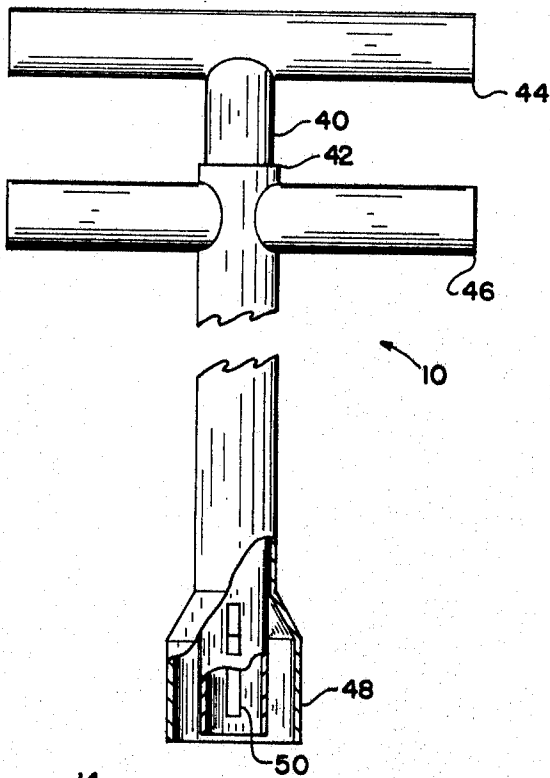


FIG. 3

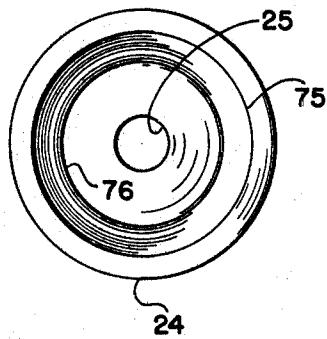
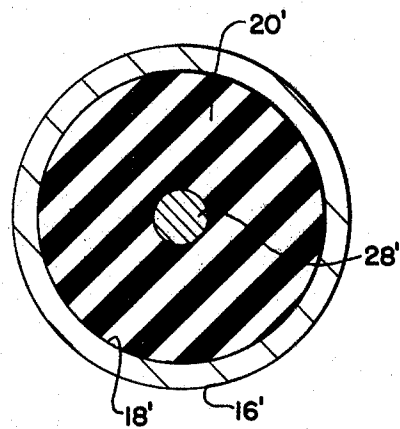


FIG. 4



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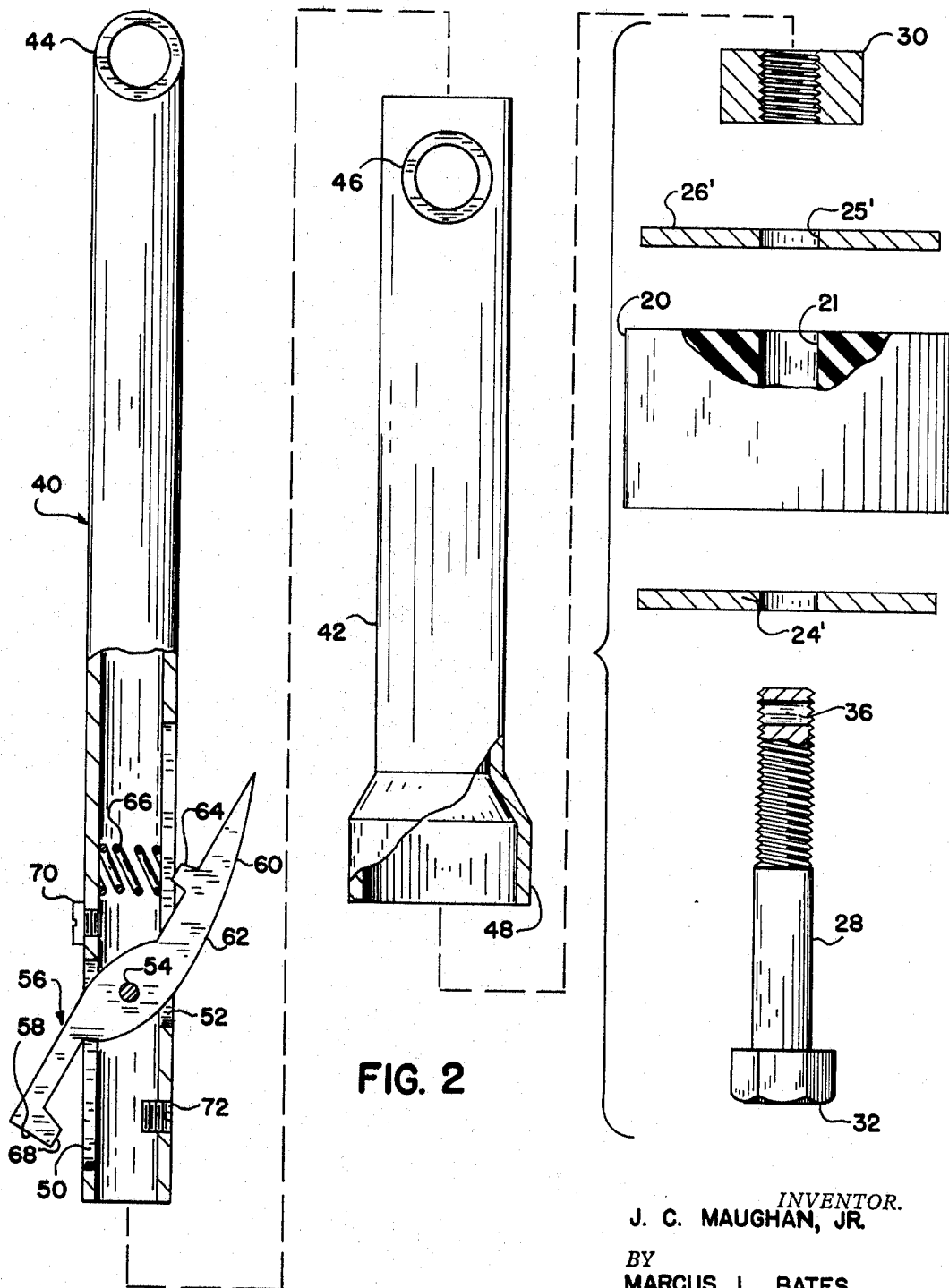
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COMBINATION WRENCH AND EXPANSION
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8 Claims

ABSTRACT OF THE DISCLOSURE

A wrench and retrievable expansion stopper which forms a plug for plugging a pipe line or the like. The plug is comprised of spaced apart plates having a resilient member sandwiched therebetween and a bolt extending through the central axis of the plug whereby a nut tightened against the bolt compresses each plate member towards one another to thereby expand the resilient material against the inside peripheral wall surface of the pipe, thereby effectively sealing the pipe against fluid flow and contamination.

A wrench having telescoping members includes an innermost member having a movable hook-like element associated therewith for engaging a hole which is provided in the depending threaded end of the bolt. The outermost member of the wrench includes a nut engaging socket having a frustoconical portion which is formed thereon for engaging the nut and the hook member.

This combination cooperates together in a manner which enables the wrench to engage both the nut and apertured bolt to thereby enable the plug to be placed within the pipe, whereupon the independently rotatable inner and outer members of the wrench may be rotated with respect to each other to thereby tighten the nut and effectively plug the pipe. When it is desired to retrieve the plug, the wrench is utilized in the before described manner, but this time the nut is loosened to thereby enable the resilient material to be relaxed, whereupon the plug may be slidably removed from the pipe.

BACKGROUND OF THE INVENTION

Transmission lines for flowing fluids, especially domestic water or gas mains such as found in municipalities and large processing plants, require continual modification wherein new line is often added to the existing system or old line is modified by tapping thereinto and laying several laterals. Often the laterals lead to a housing development, part of which will be in immediate use, while the remaining line awaits the completion of the remaining additional parts of the development. These various lines often must be provided with a blind flange in order to avoid contamination as well as to prevent the escape of fluid therefrom while the remainder of the system is being utilized or fabricated.

Welding a blind flange onto the end of a main or lateral is time consuming and requires a skilled welder. Furthermore, the blind flange must be cut away later on by a cutting torch, leaving rough ends which must be refaced prior to continuing additional tie-ins.

When the line is small so as to enable a threaded cap to be placed thereon, the cap can be tampered with, sometimes resulting in the escape of deadly gases.

SUMMARY OF THE INVENTION

The present invention is directed to a wrench which may be used in conjunction with a novel retrievable expandable type stopper, hereinafter called a "plug," in order to enable a marginal depending end of a fluid carrying

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line to be efficiently and rapidly plugged, and if desired, the wrench can later on be used in order to retrieve the plug from the line. Both the plug and wrench can be used a multiplicity of times. The wrench can be used in conjunction with numerous different sizes of plugs or packers.

The plug is comprised of two spaced apart plate-like members having compressible or resilient material therebetween, and with a bolt disposed along the central axis of the plate members so that when a nut associated with the threaded end of the bolt is tightened, the resilient member is compressed tightly against the wall of the pipe thereby precluding dislodgment of the plug from the pipe. The depending threaded end of the bolt is provided with an aperture which cooperates with an inside hook-like member of the wrench whereby the inside member can be jointly used with the remainder of the apparatus in order to position the plug within the pipe. The outside member of the wrench includes one end which terminates in a frustoconical section which supports a socket that cooperates with the nut in a manner to thereby enable the outside member to be rotated with respect to the inside member, whereupon the nut can be tightened or loosened in order to plug the pipe or to remove the plug, which ever may be the case.

It is therefore a primary object of the present invention to provide a new combination for effectively sealing the ends of pipe.

Another object of the present invention is the provision of a combination wrench and retrievable plug which enables the depending end of a pipe to be rapidly and safely sealed so that fluid contained therewithin cannot flow therefrom.

A still further object of the present invention is the provision of an improved tamper-proof pipe plug which is low in cost and which protects the pipe against the loss of fluid therefrom.

A still further object of the present invention is the provision of a wrench which enables a bolt to be held stationary while a fastener associated therewith is manipulated.

Still another object of the present invention is the provision of apparatus for providing fluid flow lines with a removable protective seal.

The above objects are attained in accordance with the present invention by the provision of a combination pipe plug and wrench assembly which is fabricated substantially as described in the above abstract. Other objects of the present invention will become apparent to those skilled in the art as the description proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is an elevational view of a wrench and plug of the present invention, with the plug being shown in cross-section, while some parts of the wrench are broken away to more clearly illustrate the details thereof;

FIGURE 2 is an exploded view of the wrench seen in FIGURE 1, with some parts being broken away and shown in section;

FIGURE 3 is an end view of one of the plates seen in FIGURE 1; and

FIGURE 4 is a cross-sectional view taken along line 4-4 of FIGURE 1.

DETAILED DESCRIPTION OF THE DRAWINGS

Illustrated in the drawings is a wrench, generally indicated by the arrow at numeral 10, and a retrievable plug assembly, generally indicated by the arrow at numeral 12, sealingly located within a pipe as seen at 14. The pipe 16 has an inside peripheral wall surface 18 against which the resilient material 20 of the plug is

forcibly compressed as indicated by the numeral 22. Spaced apart plate members 24 and 26 are disposed in face to face relationship with one another and are provided with a longitudinally extending bolt centrally received therethrough, with the bolt having threads 28 at the depending end thereof. Nut 30 is threadedly received by the bolt while the bolt head 32 is oppositely disposed therefrom so as to permit the head to bear against washer 34. Aperture 36 is provided near the marginal end portion of the bolt. For convenience only, it is preferred that the aperture extend diametrically through the bolt as illustrated in FIGURE 2.

Looking now to the details of the wrench, in FIGURES 1 and 2 is seen an inner member 40 in the form of a cylindrical tube and an outer member 42 which is also in the form of a cylindrical tube, and which is of a size and configuration to enable it to slidably receive the inner tubular member therethrough. Handles 44 and 46, respectively, are attached to the outer and inner members, respectively. The depending end of the outer member includes a polygonic shaped end 48 which is the nut engaging end of the tube, and which is connected to the remainder of the member by the illustrated frustoconical bore. The inner member has a bolt enclosing tube with a slot formed near the marginal edge portion thereof, which is longitudinally aligned with the tubular member and diametrically opposed to slot 52.

In FIGURE 2 the before mentioned wrench, along with a modified plug, is shown in a telescopic view in order to better illustrate the details of the invention. The before mentioned inner member 40 includes the first elongated slot longitudinally disposed along the member, with a pin 54 diametrically extending through the member 90° from each oppositely disposed slot. The pin receives a pivoted hook 56 journaled thereto. One end 58 of the hook includes an engaging end 68 in the form of a depending lug which engages the before mentioned aperture 36 of the bolt. The opposite end of the hook includes a contoured outer portion 60 having a bearing face 62 thereon with a spring receiving tang 64 depending from the opposite edge portion thereof. Spring 66 receives tang 64 therewithin so as to capture the tang and at the same time bias the bearing face 62 outwardly from the first elongated slot to where it engages the inside peripheral wall surface of the inner tubular member.

The outer member slidably receives the inner member therethrough with the hook being in the retracted position, that is, enclosed within the inner tubular member. Therefore handle 46 does not extend diametrically through the outer member, but instead is comprised of two portions each welded to the outside peripheral wall surface thereof to enable assembly of the telescoping members. Stop means 70 prevents inadvertent disassembly of the components of the tool, while stop means 72 positions bolt 28 a predetermined distance within the inside bore of the inner member to thereby assure engagement or alignment of the engaging end of the hook with the aperture formed in the threaded end of the bolt.

Sufficient threads must be provided on the bolt to enable the nut to travel from a "tightened" to a "loosened" position without abutting the engaging end of the hook.

OPERATION

In operation, with the inner and outer members being telescoped together as illustrated in FIGURE 1, and with the plug made up with the resilient member sandwiched between the spaced apart plate members and with the nut screwed onto the bolt so as to expose the aperture 36 therein, handle 44 is pushed toward handle 46 to allow the contoured outer portion of the hook to be biased outwardly as it rides against the frustoconical portion of the outer member. This action permits the engaging end of the hook to be pivoted sufficiently outwardly through the second slot to a position where the depending end of the bolt is received in abutting relationship against

stop 72 as the bolt slidably enters the inner member. This action brings the aperture into alignment with the engaging end of the hook, whereupon handles 44 and 46 may be slightly parted from one another a sufficient distance to cause the polygonic nut receiving end of the outer member to slidably receive the nut therewithin while at the same time the engaging end of the hook pivots about the pin and into the aperture 36. The nut is now secured by the socket while the apertured bolt is attached to or captured by the engaging end of the hook. The wrench may now be used to manipulate the plug. The plug cannot be released from the wrench until the handle 44 is again moved toward handle 46.

With the plug attached to the wrench, the plug is placed well within a pipe with the maximum depth or distance which the plug is placed being determined by the length of the body between the socket and the handle. When it is desired to expand the plug into sealing relationship within the pipe, the handle 44 is maintained stationary while handle 46 is rotated. This action secures the plug and bolt against rotation while the nut is being "made up" by the socket. Rotation of the nut by handle 46 compresses each spaced apart plate member towards one another, thereby compressing the resilient material therebetween and outwardly against the side walls of the pipe with a tremendous force. The leverage afforded by handle 46 enables sufficient force to be imparted to the nut to thereby assure the plug to be safely positioned in sealing relationship within the pipe. Handle 46 is then relaxed and next moved toward handle 44 thereby permitting the engaging end of the hook to be released from the aperture located in the threaded end of the bolt as the contoured outer portion of the hook rides outwardly within the frustoconical section of the outer member. Spring 66 pivots the hook in a clockwise rotational direction about the pivot pin, thereby releasing the apertured bolt from the engaging end of the hook. The tool is now ready to be used to plug another pipe by using another plug, assuming the first plug is to remain within the first pipe.

When it is desired to remove the plug from the pipe, the inner member is again positioned to enable the engaging end of the hook to be inserted into the apertured bolt, whereupon the handle 46 is then moved so as to position the socket upon the nut. Handle 46 is then rotated in a counterclockwise direction to loosen the nut associated with the bolt, whereupon the resilient material is uncompressed, and the wrench and plug can be slidably removed from the inside of the pipe. If desired, the wrench and plug may be left attached to each other until the plug is used again, or alternatively, the plug can be removed from the wrench and a different size plug substituted therefor, assuming a different size pipe will be plugged next.

The wrench of the present invention can be used with a multiplicity of different diameter plugs, so long as the nut properly fits within the socket of the wrench. This enables plugs of different diameters to be fabricated and used with the same wrench so long as the same size nut is used on the plug. Substitution of different sizes of sockets for the one seen at 48 is considered within the comprehension of the present invention.

While I have illustrated and described a preferred embodiment of my invention it is to be understood that such is merely illustrative and not restrictive and that variations and modifications may be made without departing from the spirit and scope of the invention. I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes as fall within the purview of my invention.

I claim:

1. A wrench for manipulating a fastener means wherein the fastener means includes a nut screw threaded onto an elongated threaded member having an aperture near the terminal end with the aperture being normal to the

longitudinal axis of the threaded member; the improvement comprising:

- said wrench having an inner member, an outer member, with each said inner and outer member being telescoped together and with each said inner and outer member being independently rotatable with respect to each other;
- said inner member having a means forming an enclosure for receiving the depending end of the threaded member, the opposite end of said inner member having means associated therewith for securing said inner member against rotation;
- pivot means, means forming a slot, and a hook means; said hook means being journaled within said enclosure by said pivot means, with said hook means further including an engaging end for engaging the apertured terminal end of the threaded member, said hook means further including a bearing face, said hook means being biased toward and capable of extending into said slot;
- said outer member having means forming a socket at one end thereof which is adapted to engage the nut, and means associated with the remaining end of said outer member for imparting rotational motion to the socket; and
- means adjacent said socket for positioning said engaging end of said hook means into the aperture of the threaded member when the inner and outer members enclose the threaded member and the nut, respectively, to thereby enable the nut to be rotated with respect to the threaded member.
2. The improvement of claim 1 wherein said outer member includes an inside peripheral wall surface and said hook means includes a bearing face which slidably engages said inside peripheral wall surface of the outer member;
- a frustoconical member forming a limited length of said inside peripheral wall surface; and said socket being connected to the major diameter of said frustoconical member; whereby:
- telescoping action between the inner and outer member causes the bearing face to ride longitudinally along the inside peripheral wall surface whereupon the configuration of the frustoconical member imparts pivotal motion to the hook.
3. The improvement of claim 2 wherein biasing means is included between said inner member and said hook to thereby maintain the hook bearing face against the inside peripheral wall surface.
4. The improvement of claim 2 wherein means forming a stop is located between said pivot means and the threaded member receiving terminal end of the inner member to thereby position the aperture of the threaded member adjacent to the engaging end of the hook when the inner member is positioned upon the threaded member.
5. The improvement of claim 1 wherein said fastener means is a pipe plug which includes spaced apart washers, a cylinder of resilient material located between said washers, means forming a central aperture through said washers and resilient material;
- said elongated threaded member includes a bolt with the bolt and said nut maintaining the washers and resilient material sandwiched therebetween; whereby, said wrench engages said plug to thereby enable the plug to be sealingly positioned within or retrieved from the inside passageway of a pipe.

6. The improvement of claim 5 wherein each said plate is comprised of saucer shaped washers, with the distance between the outer marginal edge portion of the washers being greater than the distance between the central portion of the washers when the washers are arranged in face to face relationship with respect to each other.

7. The improvement of claim 1, wherein said outer member includes an inside peripheral wall surface and said hook means includes a bearing face which slidably engages said inside peripheral wall surface of the outer member;

a frustoconical member forming a limited length of said inside peripheral wall surface; and said socket being connected to the major diameter of said frustoconical member; whereby telescoping action between the inner and outer member causes the bearing face to ride longitudinally along the inside peripheral wall surface whereupon the configuration of the frustoconical member imparts pivotal motion to the hook; biasing means included between said inner member and said hook to thereby maintain the hook bearing face against the inside peripheral wall surface; and means forming a stop is located between said pivot means and the threaded member receiving terminal end of the inner member to thereby position the aperture of the threaded member adjacent to the engaging end of the hook when the inner member is positioned upon the threaded member.

8. The improvement of claim 1 wherein said outer member includes an inside peripheral wall surface and said hook means includes a bearing face which slidably engages said inside peripheral wall surface of the outer member;

a frustoconical member forming a limited length of said inside peripheral wall surface; and said socket being connected to the major diameter of said frustoconical member; whereby telescoping action between the inner and outer member causes the bearing face to ride longitudinally along the inside peripheral wall surface whereupon the configuration of the frustoconical member imparts pivotal motion to the hook;

said fastener means is a pipe plug which includes spaced apart washers, a cylinder of resilient material located between said washers, means forming a central aperture through said washers and resilient material;

said elongated threaded member includes a bolt with the bolt and said nut maintaining the washers and resilient material sandwiched therebetween; whereby, said wrench engages said plug to thereby enable the plug to be sealingly positioned within or retrieved from the inside passageway of a pipe.

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