March 26, 1935. C. J. HARTER 1,995,850

STRAINER

Filed Aug. 14, 1933

Fig. 1.

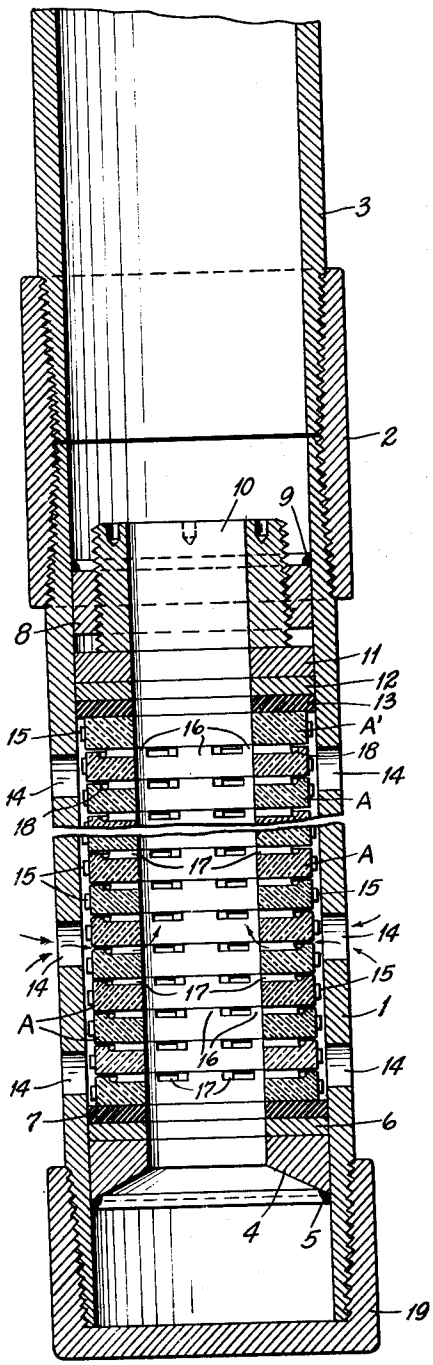


Fig. 2.

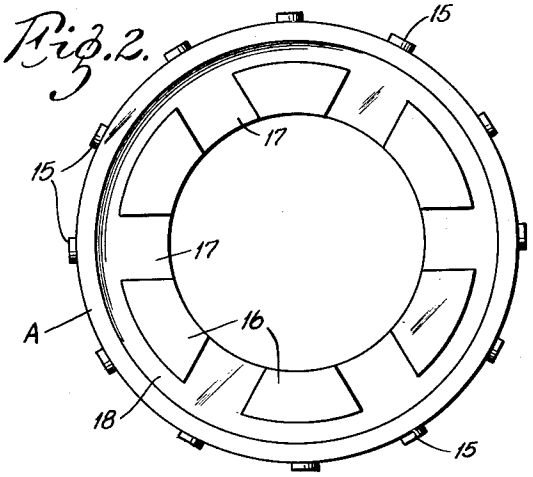


Fig. 3.

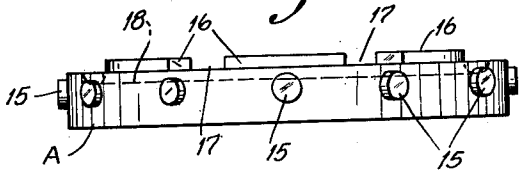
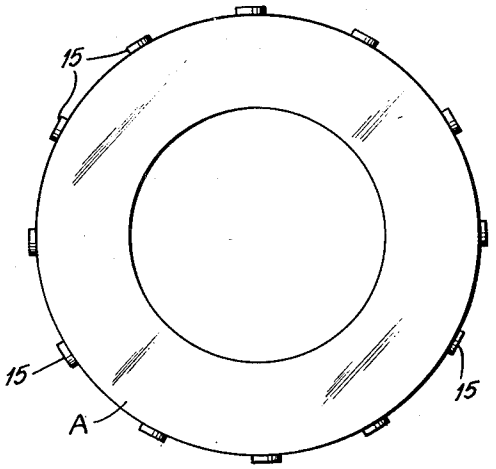


Fig. 4.



INVENTOR.
C. J. HARTER.
BY Albert J. McCauley
ATTORNEY.

Patented Mar. 26, 1935 1,995,850

UNITED STATES PATENT OFFICE

1,995,850

STRAINER

Charles J. Harter, Dallas, Tex.

Application August 14, 1933, Serial No. 685,000

8 Claims. (Cl. 166—5)

This invention relates to strainers, and, as an illustration of the invention, I have shown a strainer adapted for use in oil wells to remove granular material, etc., from the oil.

Prior to this invention, oil well strainers have been made of metal such as wire screen, perforated pipes, and in some cases an iron or steel pipe is provided with relatively large inlet ports and wrapped with a coil of wire to form restricted inlets between adjacent portions of the wire.

In other cases, relatively large holes are formed in an iron or steel pipe, and strainers made of brass or copper are inserted into these inlets.

These strainers are subjected to abrasion, and also to the corrosive action of sulfurous acids, and in actual practice they have to be renewed from time to time, which involves the removal of a very long "string of pipe" from the well. This pipe may be several thousand feet long, and the strainer is located at the lower end of the pipe to exclude sand and other material from the incoming oil. The labor and expense of removing and replacing the pipe is a very troublesome factor, especially in the very deep wells wherein the length of the pipe is often more than one mile.

Furthermore, the old strainers, of which I am aware, are expensive, and they are made of metal which does not effectively withstand the destructive abrasion and corrosion to which the metal strainers are subjected. As a consequence, the restricted straining ports are gradually enlarged, which reduces the efficiency of the strainer, and eventually prevents the strainer from performing any useful function.

One of the objects of the present invention is to produce a strainer adapted to retain its efficiency for an indefinite period, thereby eliminating the usual troublesome procedure involved in removing and replacing the long pipe for the sole purpose of renewing a strainer.

More specifically stated, the new strainer may be provided with restricted straining ports having the dimensions desired for the highest efficiency, and instead of being quickly enlarged by corrosion and abrasion, these ports will retain their original dimensions for a very long period of time; and after the pipe itself is practically destroyed, or when it becomes necessary to renew the pipe, the old strainer may be used in the new pipe.

A further object is to accomplish these results in an inexpensive straining device that can be readily applied to an ordinary pipe, without forming any objectionable obstructions at the exterior of the pipe.

With the foregoing and other objects in view, the invention comprises the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawing, wherein is shown the preferred embodiment of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

In the preferred form of the invention, the strainer comprises a row of simple straining members adapted to lie within an ordinary pipe, or other casing, having an inlet for the mixture to be strained. These straining members are slightly separated from each other to form numerous restricted ports between them, and these ports exclude material to be strained from the mixture.

The straining members may be in the form of rings made of acid-resisting material, preferably glass or other vitreous material. Glass is not subject to the corrosive action which destroys the ordinary metal strainers, and it will withstand the abrasive action for a long period of time, without enlargement of the restricted straining ports. Furthermore, the glass straining rings can be so arranged in a long tier, that they are not likely to be broken in service, and as will be hereafter described, they may be yieldably united to permit the slight bending of the surrounding pipe, which often occurs in inserting a long pipe into deep wells that are not perfectly straight.

Fig. 1 is a longitudinal section illustrating one form of the invention wherein the straining members are located in the intake pipe of an oil well.

Fig. 2 is a top view, on a larger scale, showing one of the straining members illustrated in Fig. 1.

Fig. 3 is a side view of said straining member, and Fig. 4 is a bottom view of the same.

I will now describe details of the strainer shown in the drawing with the understanding that the invention is not limited to this specific combination and arrangement of details, and while I have stressed the value of the invention in overcoming the trouble and expense heretofore involved in using the ordinary corrosive strainers now employed in oil wells, it is to be understood that some features of the invention are not limited to a solution of this old problem.

1 designates a casing containing a row of straining members A. The casing herein shown is in the form of a vertical pipe, and it may be regarded as the intake pipe section at the bot-

tom of an oil well which may have a depth of several thousand feet. To form the so-called "string of pipe" having the required length, numerous pipes sections are ordinarily coupled together as suggested by the coupling 2 which connects the intake pipe sections to the next higher pipe section 3.

Each pipe section may be about 4½ inches in diameter and about 20 feet long, but insofar as the present invention is concerned, the exact dimensions are immaterial, and to illustrate the details upon a relatively large scale, I have merely shown the upper and lower portions of the intake pipe section 1 containing the straining elements.

It will also be understood that any desired number of the lower pipe sections may be designed and equipped as shown in Fig. 1 to form strainers for the oil.

Each straining member A is preferably in the form of a ring made of acid-resisting material. Glass is non-corrosive and it will withstand the abrasive action of very fine granular material which may pass through the strainer at a high velocity. Other material may be employed to make the straining members, but a vitrified material, such as ordinary glass, is inexpensive and it has the advantage of offering an extremely high resistance to the abrasion and corrosion which destroy the ordinary oil well strainers. Therefore, the straining members A are preferably made of vitrified glass.

Any suitable means may be employed to secure the straining members. For example, a supporting collar 4 located below said straining members, may be welded to the pipe 1, as suggested at 5. A brass ring 6 is located on this collar, and a rubber ring 7 may be mounted on said ring 4 to form a yieldable seat for the tier of glass straining members.

Near the upper end of the pipe section 1, a metallic collar 8 may be removably secured in any suitable manner. It may be welded to the inner face of said pipe section, as indicated at 9, and in this event said collar 8 can be removed by cutting the weld. However, any suitable means may be employed to removably secure this collar.

A threaded metallic ring 10 is screwed into the collar 8 to provide an adjustable means for retaining the straining device in its predetermined operative condition. Metallic rings 11 and 12 are located immediately below the adjustable ring 10, and a yieldable ring 13 is interposed between the ring 12 and the tier of straining members. The ring 13 may be made of rubber, and the ring 12 may be made of brass.

After the various elements have been assembled, the ring 10 is adjusted to yieldably secure the glass straining members between the yieldable rings 7 and 13.

The intake pipe 1 may be provided with relatively large peripheral inlets 14 for the admission of the mixture to be strained. Each glass straining ring A is provided with separating members 15 extending from its periphery and adapted to engage the inner face of the intake pipe, so as to form a passageway for the delivery of oil from the inlets 14 to the peripheral faces of all of the glass rings.

The outer marginal portion of each glass ring A is separated from the next adjacent ring to provide a restricted inlet which excludes the material to be strained, while the oil passes between the rings and rises through the large central passageway within the rings, and thence through the adjustable ring 9 to the higher pipe sections.

The means for separating the outer margins of the glass rings, to form the restricted straining inlets, comprises separating lugs 16 extending from said rings, as shown most clearly in Figures 2 and 3. Radial passageways 17 are formed between said lugs 16, and an annular groove 18 is formed around said lugs to establish free communication between the radial passageways and the restricted spaces between outer margins of the rings.

The dimensions of these restricted spaces are determined by the separating lugs 16, and a high degree of accuracy can be readily obtained by forming these lugs integral with the glass rings. For very fine straining, the restricted spaces may be as small as one-thousandth of an inch, but they are usually larger, and after the dimension has been determined, the rings can be designed and cast in a mold, to form numerous rings exact duplicates of each other. The straining inlets will accurately conform to the predetermined dimension, and since there are numerous rings with restricted annular inlets between their peripheral edges, a very large straining area is obtained.

The strainer herein shown comprises a tier of straining members arranged to form a longitudinal intake passageway around their outer edges, and a longitudinal discharge passageway within the tier. The straining elements are interposed between said intake and discharge passageways, and while these passageways may be formed in any desired manner to transmit the oil in any direction through the strainer, a suitable closure should be employed to exclude the unstrained oil from the discharge passageway. For example, when the elements are arranged as shown in the drawing, this function is performed by the rubber rings 13 and 7 at the top and bottom of the intake passageway, and a cap 19 screwed onto the pipe 1 to close the bottom of the discharge passageway.

The ring A at the top of the tier may be flat on both sides to provide a smooth top face which contacts with the rubber ring 13, and a flat bottom face seated on the next lower ring.

The intake pipe section 1 is usually very long, for example, about 20 feet, and when passing through portions of an oil well it may be subjected to a slight bending action. However, the separating members 15 at the peripheries of the glass rings are not closely fitted to this pipe, and the yieldable rings 7 and 13 will permit such bending, or deflection, of the pipe, without breaking the glass rings.

While I have shown and described a simple and inexpensive strainer consisting of a specific combination and arrangement of glass straining members, adapted to withstand the action of corrosive and abrasive materials for a very long period of time, without materially reducing the efficiency of the strainer, it is to be understood that the invention extends to modifications within the scope of the following claims.

I claim:

1. An oil well strainer comprising an intake pipe, a tier of vitreous straining rings within said intake pipe, an inner longitudinal passageway being formed within said vitreous rings, the outer peripheral portions of said vitreous straining rings being provided with projections whereby they are spaced from the inner face of said

intake pipe, to form a longitudinal passageway around said peripheral portions, spacing elements separating portions of adjacent straining rings to provide numerous restricted straining ports between said longitudinal passageways, one of said longitudinal passageways being adapted to receive the mixture to be strained, and a closure located at one end of said tier to exclude said mixture from the other longitudinal passageway.

2. A strainer comprising a casing having an inlet for the mixture to be strained, non-corrosive straining elements including a row of vitreous straining rings located within said casing to provide an inner longitudinal passageway through the row of rings, separating members spacing peripheral portions of said rings from the inner face of said casing to form an outer longitudinal passageway between said rings and casing, said straining rings being adjacent to each other and provided with spacing members to form numerous restricted straining ports between the vitreous rings, and said ports being in communication with both of said longitudinal passageways to permit delivery of the strained liquid from one of said passageways to the other, and means for yieldably securing said vitreous rings in said casing, said means including a screw-threaded securing member whereby longitudinal pressure is imparted to the row of rings to provide a unitary strainer with substantially uniform straining ports between the rings, and a yieldable member between said rings and screw-threaded member permitting displacement of the vitreous rings.

3. A strainer comprising an intake pipe having peripheral inlets for oil, and non-corrosive straining elements including a row of vitreous straining rings within said pipe, an abutment in the lower portion of said pipe forming a support for said vitreous rings, a threaded ring screwed into the upper portion of said pipe to force said rings into contact with each other, and a yieldable ring interposed between said threaded ring and the vitreous rings to permit displacement of the vitreous rings in response to bending movements of the pipe, each of said vitreous straining rings having separating members extending outwardly from its outer periphery to engage the inner face of said pipe, to provide a space for the delivery of oil from said inlets to the peripheral faces of all of said straining rings, separating members spacing the outer marginal portion of each of said vitreous straining rings from the next adjacent ring to provide a restricted inlet which excludes the admission of material to be strained from the oil, each of said straining rings also having passageways radiating from its inner face, and an annular groove establishing communication between said radiating passageways and the restricted inlet.

4. An oil well strainer comprising an intake pipe, yieldable members within said pipe and a tier of glass straining rings yieldably confined between said separating members spacing yieldable members, said glass straining rings from the inner face of said intake pipe to form an outer passageway between said glass rings and the inner face of the pipe, an inner passageway being formed within the tier of glass rings, and each of said glass straining rings being provided with separating members whereby portions of each glass ring are spaced from the next adjacent ring to provide a restricted straining port extending from said outer passageway to said inner passageway, and said restricted straining port being entirely between the adjacent rings.

5. An oil well strainer comprising an intake pipe, and a tier of glass straining rings located within and confined by said intake pipe to provide an internal passageway through the rings, said glass straining rings having annular peripheral edges, separating members spacing said annular edges from the surrounding pipe to form an outer passageway around the tier of rings, and separating members spacing said annular peripheral edges from each other to provide annular straining inlets for the oil flowing from said outer passageway to said inner passageway.

6. An oil well strainer comprising an intake pipe, yieldable members within said pipe and a tier of glass straining rings yieldably confined between said yieldable members to permit displacement of said glass rings in response to bending movements of the surrounding pipe, separating members spacing peripheral portions of said glass rings from the inner face of said pipe to form an outer longitudinal passageway around said glass rings, an inner longitudinal passageway being formed within said glass rings, each of said glass rings being provided with an approximately annular face, and separating members spacing said approximately annular face from the next adjacent ring to form a restricted passageway for the oil flowing from one of said longitudinal passageways to the other.

7. An oil well strainer comprising an approximately vertical intake pipe having peripheral inlets for the oil, a vertical row of glass straining rings located within and confined by said pipe, an abutment in said pipe forming a support for said confined glass rings, separating members spacing peripheral faces of said glass straining rings from the inner face of said pipe to provide a longitudinal passageway for the delivery of oil from said inlets to the peripheral faces of said glass rings, an inner longitudinal passageway being formed within said rings, each of said glass straining rings being provided with separating members, integral therewith, and contacting with an adjacent ring to form a straining port extending from one of said passageways to the other, and said straining port being entirely between the adjacent rings.

8. An oil well strainer comprising an approximately vertical intake pipe having peripheral inlets for the oil, a vertical row of glass straining rings located within and confined by said pipe, an abutment in said pipe forming a support for said confined glass rings, separating members spacing peripheral faces of said glass straining rings from the inner face of said pipe to provide a longitudinal passageway for the delivery of oil from said inlets to the peripheral faces of said glass rings, an inner longitudinal passageway being formed within said rings, each of said glass straining rings being provided with separating members, integral therewith, and contacting with an adjacent ring to form a straining port extending from one of said passageways to the other, said straining port being entirely between the adjacent rings, and the annular outer marginal portion of each of said glass rings being relatively close to the next adjacent ring, so as to form a restricted annular inlet for the oil to be strained.

CHARLES J. HARTER.