May 17, 1927.

1,629,018

C. J. COBERLY

STRAINER

Filed Jan. 5, 1925

Fig. 1.

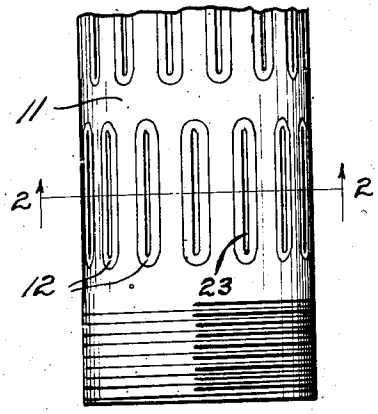


Fig. 2.

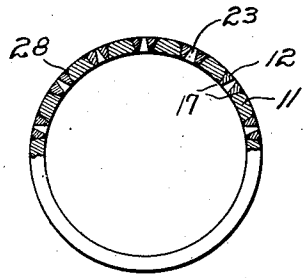


Fig. 3.

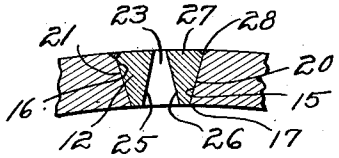


Fig. 5.

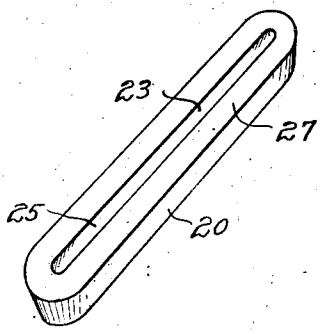
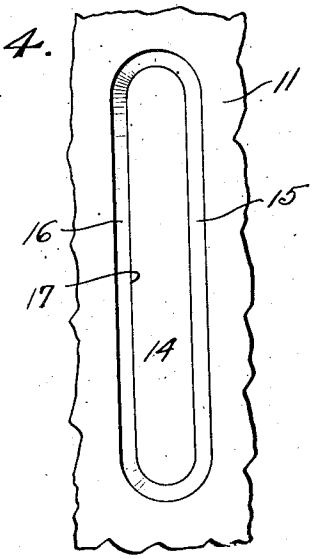


Fig. 4.



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Patented May 17, 1927. 1,629,018

UNITED STATES PATENT OFFICE.

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STRAINER.

Application filed January 5, 1925. Serial No. 736.

This invention relates to strainers, and it relates particularly to those types of strainers employing inserts. Strainers are employed in various arts and industries where fluid is separated from other materials.

My invention is adapted for use wherever strainers having slots or openings therein are used, and it is particularly adaptable where the walls of the slots are subjected to abrasive wear. My invention is of pronounced value in the oil industry as a screen casing or strainer. After a well has been drilled to the oil producing stratum, a casing is lowered into the well. A pump is lowered into the well inside the casing, by which pump the oil at the bottom of the well is elevated to the surface. A screen casing is situated at the lower end of the well casing. This screen casing, as now constructed, provides a multiplicity of narrow elongated slots through which the oil flows to enter the casing. These slots are of such a size and shape as to exclude any particles of sand or gravel which might cause injury to the pumping equipment. The abrasive effect of the minute particles on the wall of the slots tends to wear the walls away, and to enlarge the slots, and in time the larger particles will pass through these slots.

It is an object of this invention to provide a strainer having slots, the walls of which slots being capable of enduring considerable attritional action. I accomplish this object by providing areas around the slots which are extremely tough and will resist a maximum of abrasive wear.

It is another object of the invention to provide a strainer employing inserts which have slots therein. This permits the making of a strainer of a body of comparatively soft material and an insert of a comparatively hard or tough material. This is a very practical way to provide slots with high wear resisting walls owing to the fact that the inserts are of such a size that they may be very conveniently tempered or treated in any manner to acquire the desired hardness or toughness. In practice it is found that a keystone or wedge-shaped slot is most efficient in preventing particles of abrasive material from passing through the strainer. The slots are arranged so that the narrow face is positioned so that the fluid being strained will enter this face. This portion of the slot is comparatively narrow, and only the extremely minute particles may pass through this constricted opening. By providing the slots in wedge-shaped, the entering face of the slot is relieved and the danger of the slot clogging is reduced to a minimum. It is rather difficult to provide a wedge-slot of this character when the slots are provided in the body member of the strainer. In producing screen casing, it is necessary to cut the slots from the inside of pipe by use of a machine, which is extended into the pipe. This is rather difficult and expensive. By providing an insert as in my invention, it is very convenient to produce slots of this character. The inserts are small in size and may be conveniently produced in a machine at a very small cost.

It is another object of the invention to provide a novel means for holding these inserts in place. In the body of the strainer, I provide openings which have converging walls. In case of a screen casing, these walls converge at the inner face of the wall of the casing. The inserts are provided with an outer wall which is complementary to the shape of the slot. These inserts are placed in the openings and are secured by welding. The oil flows from the exterior of the pipe and the pressure of the oil tends to retain the inserts against the converging walls of the openings.

Other objects and advantages of the invention will be made evident hereinafter.

Referring to the drawings in which I show my invention in the form of a screen casing for wells solely for illustrative purposes,

Fig. 1 is a fragmentary view of a strainer of my invention.

Fig. 2 is a cross section taken as indicated by the line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary cross section taken through one of the inserts of my invention.

Fig. 4 is a plan view of one of the openings provided in the body of the strainer to receive an insert of my invention.

Fig. 5 is a perspective view of an insert member arranged for insertion in the openings shown in Fig. 4.

In the drawing, I provide the body of a strainer in the form of a tubular casing member 11 which carries inserts 12. The body 11 is provided with a multiplicity of openings like the one shown in Fig. 4. Each

opening 14 is of an elongated shape and has converging walls 15 and 16, which meet at the ends thereof, as shown. These openings 14 are arranged so that the narrow portions are at the inner face 17 of the body 11.

The inserts 12 are formed as shown in Fig. 5. Each insert 12 is elongated in shape, as shown, and has converging walls 20 and 21 which are of a convergence equal to that of the walls 15 and 16. The ends of the inserts 12 are curved, and the walls 20 and 21 meet thereat and form a shape complementary of the walls 15 and 16 of the openings 14. An elongated slot 23 is provided in each of the inserts 12. This slot 23 is wedge-shaped or keystone-shaped, as shown clearly in Fig. 3 of the drawings. The walls 25 and 26 of the keystone-shaped slot 23 diverge from the outer face 27 of the insert 12. When the insert 12 is in place, as shown in Fig. 3, the walls 20 and 21 thereof contact with the walls 15 and 16 of the openings 14. The insert is secured in place in the opening 14 as by welding 28, as clearly shown in Fig. 3.

The oil or liquid to be strained passes through the wedge-slots 23 from the outer faces 27 thereof. These slots are narrower at this face, and provide the necessary relief, as referred to hereinabove. The body 11 may be made of a comparatively soft material such as soft steel, which is comparatively cheap in price and is easy to work upon. The openings 14 in the member 11 may be provided in any suitable manner. I find it advantageous to provide the openings 14 by use of cutting torches, this method of forming the openings being presented to the Patent Office in a separate application. The inserts 12 are to be made of a very tough or hard material which will resist maximum abrasive wear. A material such as manganese steel is very good for this use. The inserts may be provided in any desirable manner and may be very cheaply produced by machine, owing to the fact that they are small in size and may be conveniently handled. By making the insert of a very tough material of this character, the walls of the slot 23 therein will have high wear resisting characteristics, and the size of the slot will remain the same for a very extensive period of time.

As previously mentioned, it is essential that the slots be of a definite size so as to prevent passage of any particles which might cause injury to a machine, or in the oil industry to the pump of the well. The manner of retaining the inserts in the body 11 is very simple, and the inserts may be quickly and economically installed.

I claim as my invention:

1. A well strainer comprising: a pipe having an elongated opening formed therein, said opening having converging walls; and an elongated insert having correspondingly converging walls and secured in said opening, said insert having a single elongated aperture disposed lengthwise thereof.

2. A well strainer comprising: a pipe having an elongated opening formed therein, said opening having smooth converging marginal walls; an elongated insert having correspondingly smooth converging perimetric walls adapted to closely engage said marginal walls when the insert is positioned in said opening, said insert having formed therein a single elongated aperture disposed lengthwise thereof; and means for securing said insert in said opening.

3. A well strainer comprising: a pipe having an elongated opening formed therein, said opening having smooth converging marginal walls; an elongated insert having correspondingly contoured smooth converging perimetric walls adapted to closely engage said marginal walls when the insert is positioned in said opening, said insert being of the same thickness as the wall of said pipe and having formed therein a single elongated aperture disposed along its major axis; and means for securing said insert in said opening flush with the surfaces of the pipe wall.

4. In combination: a plate of metal having an elongated opening formed therein, said opening having smooth converging marginal walls; an elongated insert having correspondingly contoured smooth converging perimetric walls adapted to closely engage said marginal walls when the insert is positioned in said opening, said insert being of the same thickness as said plate and having formed thereing a single elongated aperture disposed along its major axis; and means for securing said insert in said opening flush with the surfaces of said plate.

5. As a new article of manufacture: an elongated strainer insert having perimetric walls converging in the direction of its thickness and provided with a single elongated aperture disposed lengthwise thereof.

6. As a new article of manufacture: an elongated strainer insert having perimetric walls converging in the direction of its thickness and provided with a single elongated aperture disposed lengthwise thereof, said aperture having marginal walls diverging relative to and in the direction of convergence of said perimetric walls.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 30th day of December, 1924.

CLARENCE J. COBERLY.