H. M. GREEN.

SAND SCREEN FOR PUMPS.

APPLICATION FILED SEPT. 15, 1919.

1,338,829. Patented May 4, 1920.

Fig. 1.

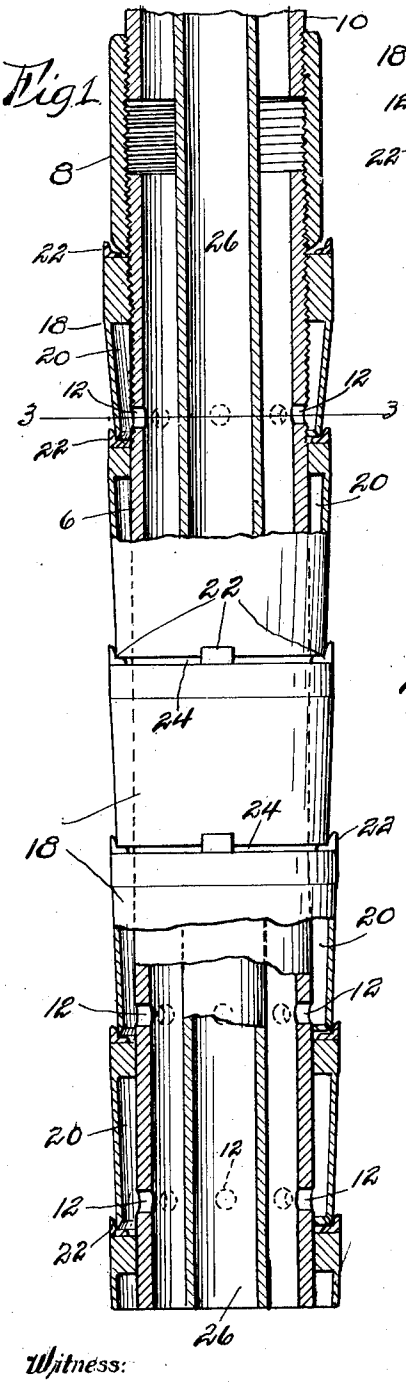
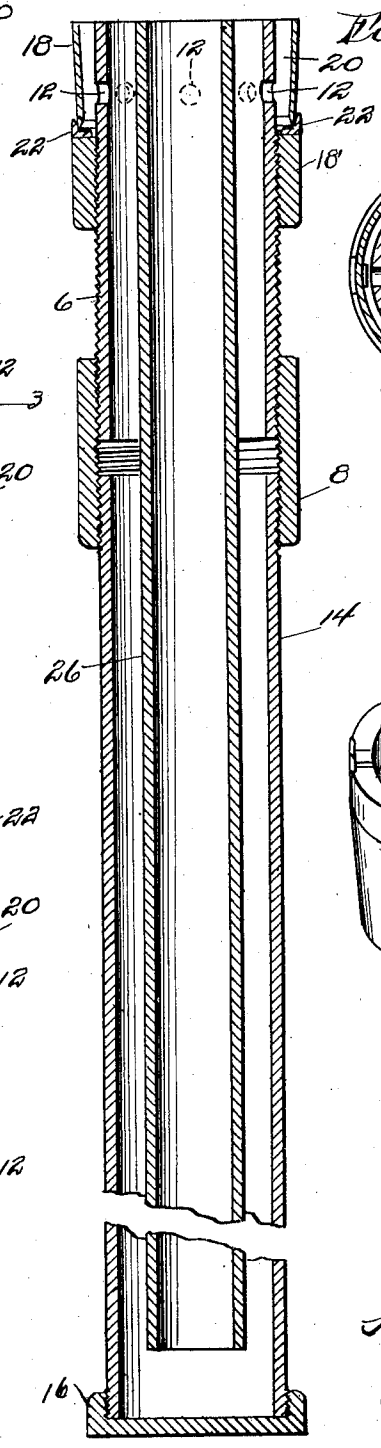


Fig. 2.



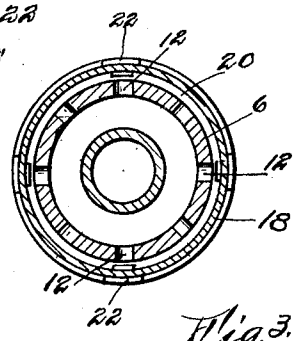


Fig. 3.

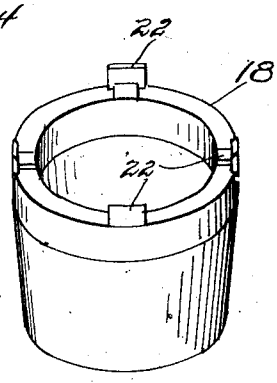


Fig 4.

Witness:

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UNITED STATES PATENT OFFICE.

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SAND-SCREEN FOR PUMPS.

1,338,829. Specification of Letters Patent. Patented May 4, 1920.

Application filed September 15, 1919. Serial No. 323,970.

To all whom it may concern:

Be it known that I, HENRY M. GREEN, a citizen of the United States, and a resident of Kansas City, in the county of Jackson, State of Missouri, have invented certain new and useful Improvements in Sand-Screens for Pumps, of which the following is a complete specification.

The present invention relates to pumping apparatus, and one of the objects in view is to provide an improved screen construction for association with the lower end of the pump structure for the purpose of regulating the extent to which sand or similar solid material is allowed to be carried along with the flow of liquid being pumped.

To this end I have devised an improved form of screen structure adapted to be applied to the pump tube and providing screen passages so arranged as to modify the flow of liquid as it enters the pump tube and incidentally alter the capacity of said flow of liquid for conducting sand or other solid material into the pump tube.

It is a further object of the invention to provide a structure of this character which will include provision for adjustment whereby the screening capacity of the device may be appropriately varied to meet different pumping conditions.

It is also sought to devise a simple and compact as well as practical and efficient construction for carrying out the aforesaid objects and which will be inexpensive to apply to such pumping apparatus as requires a screening function of this character.

With these general objects in view, the invention will now be described by reference to the accompanying drawing wherein is illustrated an apparatus provided with a screen structure embodying the present features of improvement, after which the novel features thereof will be set forth and particularly defined in the appended claims.

In the drawing—

Figure 1 is a side view, partly in vertical section, showing the upper portion of a screen construction embodying the proposed improvements;

Fig. 2 is a broken vertical sectional view of the lower portion of the same;

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1; and

Fig. 4 is a perspective view of one of the screen sleeve sections.

Referring now to said drawing in detail, this shows the improved construction as comprising a pipe tube 6 adapted to be connected by means of a coupling 8 to the lower end of a pump tube 10, said pipe 6 having a plurality of vertically spaced sets of lateral openings 12. The lower end of the pipe 6 is connected by another coupling 8 to a plain section of pipe 14, the bottom of which is closed by a cap 16.

For each of the sets of openings 12, the pipe 6 is provided with a screen sleeve section 18, the upper portion of which is adapted to fit the pipe 6, while the lower portion of each sleeve section is of larger internal diameter than the top and downwardly tapered in such a way as to provide an annular chamber or passage 20 surrounding the pipe and the corresponding set of openings 12, the chambers 20 thus formed being larger in size at the top than at the bottom, as clearly shown in Fig. 1 of the drawing. The sleeves 18 are arranged in superposed relation, and the top of each sleeve carries a series of spaced angular lugs 22 for engaging the lower edge of the next upper sleeve, so that the sleeves are thus spaced slightly apart to leave the lower ends of the sleeves open and thereby providing inlet passages 24 affording communication between the chambers or passages 20 and the exterior of the construction. The angular lugs 22 also form retaining and guiding means for the sleeves engaged thereby. The uppermost sleeve 18 is attached to the pipe 6 by being screw-threaded thereon, as shown in Fig. 1, and the lowermost sleeve 18′ (shown as a plain collar) of the series is similarly secured to said pipe, as shown in Fig. 2, and the remaining intermediate sleeves are mounted in freely sliding relation upon the pipe; by this means the adjustment of the upper and lower threaded sleeves 18 and 18′ effects vertical adjustment of the whole series of sleeves in unison for varying the position of the sleeves and their chambers 20 with reference to the several sets of lateral openings 12 in the pipe 6. The object of this adjustment is to regulate the distance between each of said sets of openings 12 and the passages 24 between the sleeves, and the pipe 6 is threaded a sufficient distance for said threaded sleeves 18 and 18′ to allow adjustment of the sleeves to bring said passages 24 either directly opposite said

openings 12 or sufficiently below said openings to leave the latter at the upper ends of the several chambers 20.

Axially within the pipe 6 is arranged an air trap tube 26 extending from the pumping apparatus above the screen, down to a level below the lowermost openings 12, or, as shown in Fig. 2, into proximity with the lower end of the blank pipe 14. This guards against any air being drawn into the apparatus in case some of the upper openings 12 should be located above the level of the liquid being pumped and thus exposed to the atmosphere.

It will thus be seen that I have provided a practical and efficient form of screen construction for accomplishing the desired objects of the invention. In some pumping conditions, as in the case of oil wells in certain fields, it is necessary to pump the sand materials in considerable quantities out of the wells, and unless the amount of sand allowed to be carried along with the liquid is regulated it frequently flows so fast as to clog up the action of the pump. The provision of the above screen construction modifies the flow of the liquid into the pump, and by breaking the current as it enters the pump retards the movement of the sand so that more or less of the sand is left behind. If the sleeves are positioned so as to bring the passages 24 more or less directly opposite the openings 12, the maximum amount of sand is carried into the pump, while the farther removed said openings 12 are from the passages 24 (by the adjustment above provided for) the less sand will be allowed to enter the pump, it being possible to practically exclude all the sand by adjusting said openings 12 and passages 24 to their maximum distance apart. The particular form of the chambers or passages 20, making them larger in size at the top than at the bottom, is for the purpose of affording no opportunity for the sand to bind or pack in its upward travel through said chambers or passages. Since the connection with the pumping apparatus above the screen is led down below the lowermost of the openings 12 (by the provision of the air trap tube 26), it is apparent that no air will be allowed to mingle with the flow of the material being pumped, even though some of the upper openings 12 should be only partially submerged in said material.

While I have illustrated and described what is now regarded as the preferred form of construction for embodying the proposed improvements, I desire to reserve the right to make such formal changes or modifications as may fairly fall within the scope of the appended claims.

What I claim is:

1. A sand screen construction for pumps, comprising a pipe adapted to be connected with the lower end of the pump tube and provided with lateral openings, and a screen element carried by said pipe and providing an annular space between said screen element and said pipe around said openings, said space being closed at the top and open at the bottom to the exterior of said screen element, said screen element also being vertically adjustable to vary its position with reference to said lateral openings.

2. A sand screen construction for pumps, comprising a pipe adapted to be connected with the lower end of the pump tube and provided with lateral openings, and a screen element carried by said pipe and providing an annular space between said element and said pipe around said openings, said space being closed at the top and open at the bottom to the exterior of said screen element and being also of greater size at the top than at the bottom of said space, said screen element being vertically adjustable to vary its position with reference to said lateral openings.

3. A sand screen construction for pumps, comprising a pipe adapted to be connected with the lower end of the pump tube and provided with a plurality of sets of lateral openings spaced at different heights along said pipe, and a plurality of screen elements, one for each set of said openings, carried by said pipe and providing annular spaces between said screen elements and pipe and surrounding said openings, said spaces being each closed at the top and open at the bottom to the exterior of said screen elements, and said screen elements being vertically adjustable in unison for varying their position with reference to said sets of openings.

4. A sand screen construction for pumps, comprising a pipe adapted to be connected with the lower end of the pump tube and provided with a plurality of sets of lateral openings spaced at different heights along said pipe, and a plurality of screen elements comprising a set of sleeves, one for each of said sets of openings, carried by said pipe in superposed relation and providing annular spaces between said sleeves and pipe and surrounding said openings, each space being closed at the top and open at the bottom to the exterior of said sleeves, said sleeves being vertically adjustable in unison for varying their position with reference to said sets of openings.

5. A sand screen construction for pumps, comprising a pipe adapted to be connected with the lower end of the pump tube and provided with a plurality of sets of lateral openings spaced at different heights along said pipe, a plurality of screen elements comprising a set of sleeves, one for each set of said openings, carried by said pipe in

superposed relation and providing annular spaces closed at the top between said sleeves and pipe and surrounding said openings, and means for spacing said sleeve slightly apart for providing inlet passages to said spaces at the bottom of each sleeve, said sleeves being vertically adjustable in unison for varying their position with reference to said sets of openings.

6. A screen construction for pumps, comprising a pipe adapted to be connected to the lower end of the pump tube and provided with a plurality of sets of lateral openings spaced at different heights along said pipe, and a plurality of screen elements comprising a set of sleeves, one for each set of said openings, carried by said pipe in superposed relation and providing annular spaces between said sleeves and pipe and surrounding said openings, each space being closed at the top and open at the bottom to the exterior of said sleeves, the uppermost and lowermost of said sleeves being threadedly connected with said pipe and the intermediate sleeves sliding freely thereon, whereby said uppermost and lowermost sleeves may be adjusted to vary the position of the sleeves in unison with reference to said sets of lateral openings.

7. A screen construction for pumps, comprising a pipe adapted to be connected with the lower end of the pump tube and provided with a plurality of sets of lateral openings spaced at different heights along said pipe, a plurality of screen elements, one for each set of said openings, carried by said pipe and providing annular spaces between said screen elements and pipe and surrounding said openings, said spaces being closed at the top and open at the bottom to the exterior of said screen elements, and an air-trap pipe extending from the pump tube through said pipe to a level below the lowermost of said lateral pipe openings.

In witness whereof I hereto affix my signature.

HENRY M. GREEN.