

June 15, 1954

C. C. THOMPSON

2,681,111

UNIVERSAL MESH SCREEN FOR OIL WELLS

Filed April 8, 1949

FIG. 1.

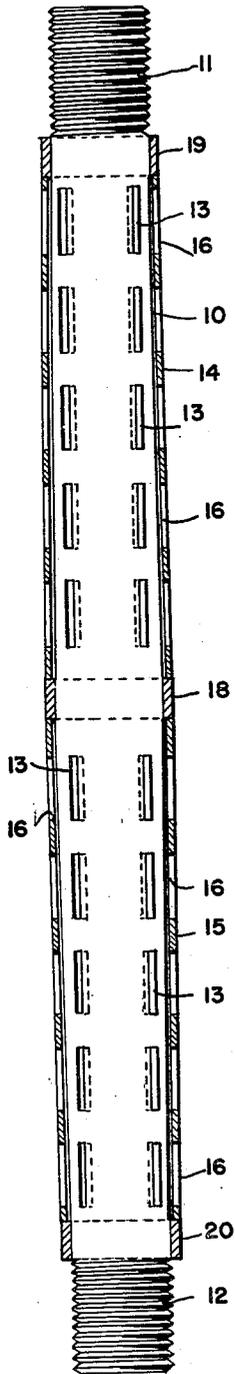


FIG. 2.

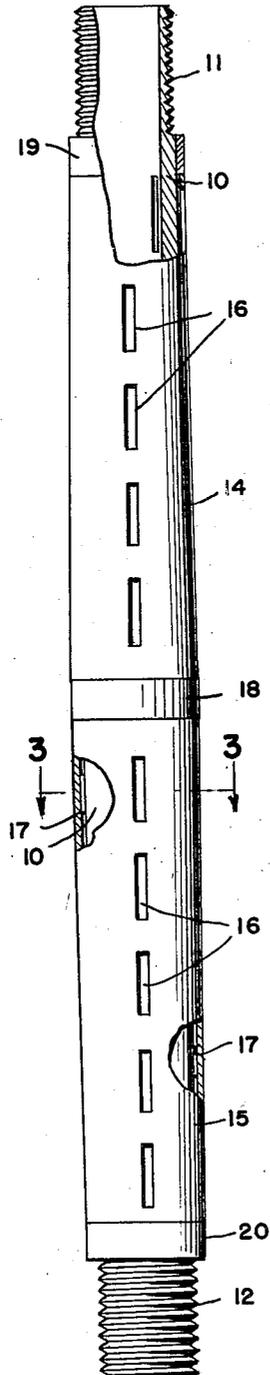


FIG. 3.

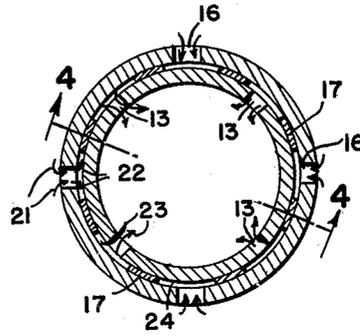
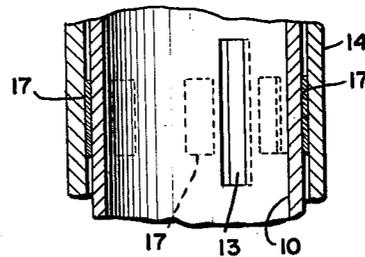


FIG. 4.



INVENTOR.

C. C. THOMPSON

BY

Wilkinson & Mawhinney  
ATTORNEYS

# UNITED STATES PATENT OFFICE

2,681,111

## UNIVERSAL MESH SCREEN FOR OIL WELLS

Claude C. Thompson, Baton Rouge, La.

Application April 8, 1949, Serial No. 86,249

1 Claim. (Cl. 166—235)

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The present invention relates to improvements in a universal mesh screen for oil wells and has for an object to provide an improved screen capable of being selectively set up with different size meshes or oil passages.

Heretofore, these oil screens have been manufactured with one fixed size of mesh. It is necessary, however, to vary the size of the mesh or oil passages to suit the individual well. Accordingly, a large number of screens having various size meshes had to be manufactured and kept on hand by suppliers and oil well companies. This not only entailed a relatively large outlay of money but also presented the problem of storage space and shipping facilities.

The present invention contemplates overcoming these difficulties by providing a tapered slotted mandrel and a slotted sleeve adapted to be driven onto the mandrel at various distances with shims of preselected gauge disposed between the mandrel and the sleeve to determine the size of the mesh or oil passages. It is, therefore, only necessary to have on hand a supply of different size shims.

Another object of the present invention is to provide an improved oil well screen which affords greater screening area and travel of the fluid for a given amount of cross sectional area. This is an important feature for oil producing screens as it offers greater resistance to cutting out by the oil producing sands.

The present invention aims to provide an improved screen of this type in which the screening surfaces are not exposed so that they are protected from damage.

With the foregoing and other objects in view, the invention will be hereinafter more fully described and more particularly pointed out in the appended claim.

In the drawings, in which the same parts are denoted by the same reference numerals throughout the several views,

Figure 1 is a vertical sectional view of the improved screen constructed in accordance with the present invention,

Figure 2 is a side elevational view, with parts broken away and parts shown in section, of the improved screen,

Figure 3 is a transverse sectional view taken on the line 3—3 of Figure 2, and

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Referring more particularly to the drawings, 10 designates a mandrel which tapers from its medial point towards both its ends. The op-

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posite end portions of the mandrel are of reduced outside diameter and are exteriorly screw or female threaded as at 11 and 12. The mandrel is provided with a number of slots or other openings 13 which may be formed by milling through the wall of the mandrel. These slots or other openings 13 extend in a row longitudinally of the mandrel 10 and any suitable number of slots or other openings may be provided in the row. Four such rows are provided at an angle of the order of 90 degrees or other uniform distances apart.

A pair of sleeves 14 and 15 are adapted to be driven upon the mandrel from the opposite ends thereof. The interior surface of each sleeve may be reamed to the size and taper corresponding to that of the mandrel. The sleeves 14 and 15 are provided with slots or other openings 16 which may or may not correspond in number to that of the slots or other openings in the mandrel 10. The slots or other openings 16 of each sleeve extend in a row longitudinally of the sleeve and the selected number of such rows are provided at an angle of the order of 90 degrees or other uniform distances apart. It will be noted from Figure 3 of the drawing that the longitudinal rows of slots or other openings 13 and 16 are staggered with respect to each other so that the longitudinal rows are separated by an angle of the order of 45 degrees or other uniform distances.

In order to obtain the desired space or mesh between the exterior surface of the mandrel and the interior surfaces of the sleeves, shims or spacers 17 are provided. These shims or spacers are substantially rectangular in shape, as shown in Figure 4, and are laterally curved to conform to the outer and inner surfaces of the mandrel and the sleeves, respectively. The shims 17 are disposed in a circular row at suitable angular intervals on the outer surface of the mandrel adjacent each end thereof as well as at selected points along longitudinal mandrel. Similar rows of shims 17 are disposed on the outer surface of the mandrel adjacent to and on opposite sides of its medial point. Shims of different thicknesses are adapted to be used depending upon the size of the mesh desired and the thickness of the shims employed will determine the extent to which the sleeves 14 and 15 will be driven on to the mandrel from the opposite ends thereof so that the space between the inner ends of the sleeves will vary.

For filling the gap between the adjacent inner ends of the sleeves and to provide a snug fit

therebetween, a spacer ring 18 encircles the mandrel at its medial point. The sleeves 14 and 15 are driven on to the mandrel so that their inner ends are forced into firm engagement with the spacer ring 18. Retainer bands 19 and 20 are placed upon the mandrel at the opposite end portions thereof and are forced into engagement with the outer ends of the sleeves 14 and 15, respectively. These retainer bands 19 and 20 may be shrunk on the outer surface of the mandrel while butted against the outer ends of the respective sleeves for restraining the sleeves against longitudinal movement on the mandrel.

In the use of the device shims 17 of the required thickness to provide the desired space or mesh for the flow of the oil or other fluid will be selected. These shims 17 will be disposed about the periphery of the mandrel as described above. A spacer ring 18, having the desired width depending upon the thickness of the shims 17, is then disposed on the outer surface of the mandrel centrally thereof. The sleeves 14 and 15 are then driven on to the mandrel over the shims until the inner ends of the sleeves contact the spacer ring 18.

It should be made certain that the respective rows of slots or other openings 13 and 16 of the mandrel and sleeves, respectively, are disposed at an angle of 45 degrees or other uniform distances to each other. The retainer bands 19 and 20 are then secured upon the opposite end portions of the mandrel by shrinking or the like and in forming contact with the outer ends of the respective sleeves to secure them in cooperation with the spacer ring 18 against longitudinal movement on the mandrel. In addition to preventing longitudinal movement of the sleeves on the mandrel the spacer ring 18 and the retainer bands 19 and 20 will also assist the shims in preventing relative rotative movement between the sleeves and the mandrel so that the staggered relation of the rows of slots or other openings 13 and 16 will be maintained.

As many of these screens as desired may be similarly prepared and lowered with the well tubing into the well casing. The arrows 21, 22 and 23, shown in Figure 3 of the drawings, indicate the direction of flow of oil or the like. The oil flows into the slots or other openings 16 of the sleeves 14 and 15 to the space 24 between the mandrel 10 and the sleeves 14 and 15. From this space 24 the oil passes through the slots or other openings 13 in the mandrel 10 into the interior of the mandrel. The thickness of the shims 17 determine the size of the space 24 between the mandrel and the sleeves.

Mandrels and sleeves having different degrees of taper may be provided and each different size mandrel and sleeves are adaptable to several different size meshes by the use of shims of the proper thickness. The range of gauges of the mesh is limited by the amount of the taper of the mandrel. A taper of .003 per inch would

probably be used on oil field screens as there is a limit of the inside and outside diameter of the screen since the greater the taper a greater wall thickness is required.

The mandrel, sleeves, shims, spacer rings and bands may be hardened or chrome plated to render them further resistant to wear.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claim.

What is claimed is:

An improved universal mesh screen for oil wells and the like comprising a hollow mandrel portion tapered from its medial portion toward both ends and having a plurality of uniformly spaced slots or openings therethrough, a ring fixedly circumposed on the medial portion of the mandrel, tapered sleeves having uniformly spaced openings therethrough, receivable over said ends of the mandrel and abutting the ring at their inner ends with the openings therein registered with blank wall portions of the mandrel formed intermediate the slots therein, said sleeves being tapered from their inner ends outwardly, the taper of the sleeves corresponding to the taper of the respective mandrel portions, axially spaced sets of arcuate shims mounted on the outer surface of said mandrel in circumferentially spaced fashion for spacing said sleeves radially from said mandrel and defining therebetween an annular space, and retainer bands fixedly circumposed on the ends of said mandrel and abutting the outer ends of said sleeves to retain the sleeves against rotation and longitudinal movement with the openings of said sleeves in staggered relation to the slots in said mandrel whereby oil from the oil producing sand in entering the openings of the sleeves is retarded by the blank wall portions of the mandrel facing the openings of the sleeves to cause the oil and sand to travel the annulus defined between the mandrel and sleeves prior to entry into the mandrel through the slots.

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