

July 6, 1943.

J. E. HARMON

2,323,713

METHOD OF MAKING A SCREEN

Filed July 14, 1941

3 Sheets-Sheet 1

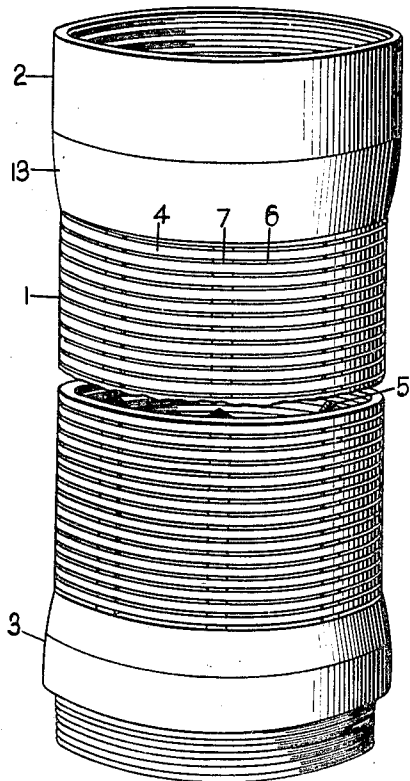


Fig. 1

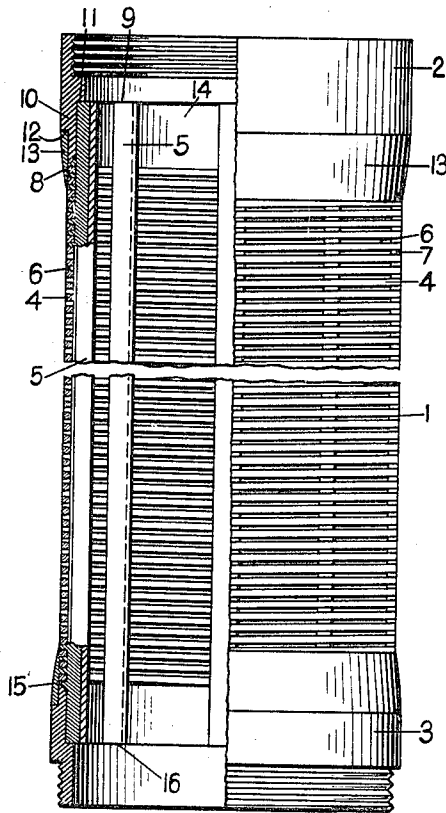


Fig. 2

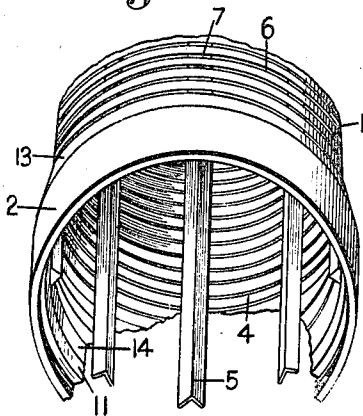


Fig. 3

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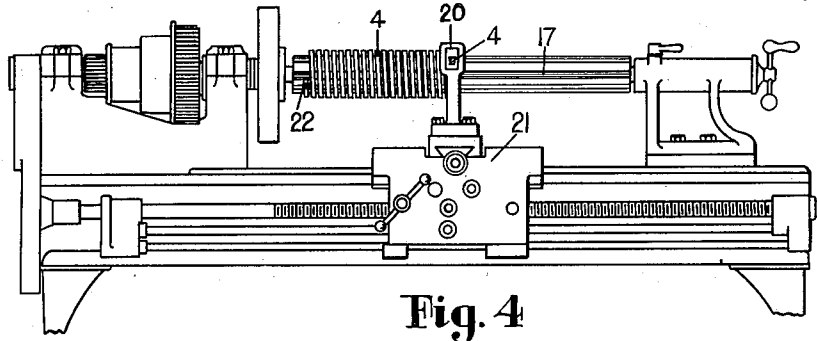
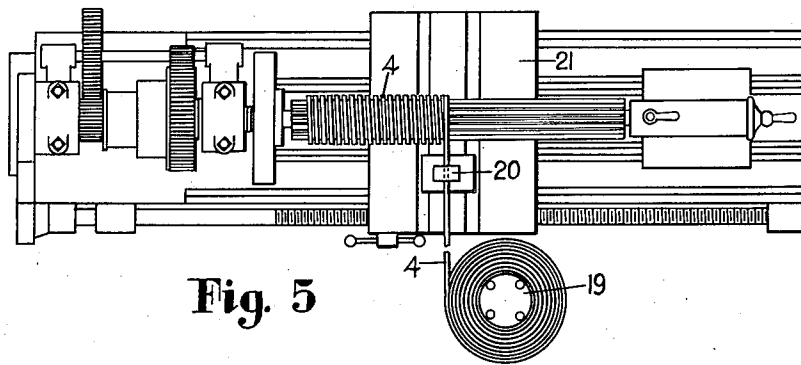
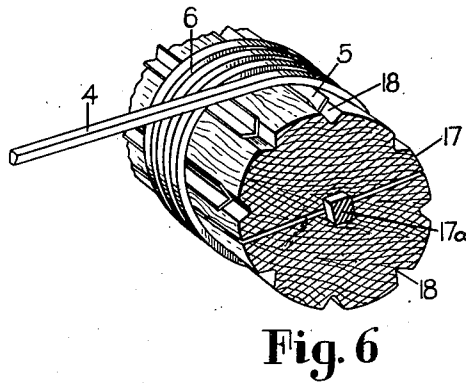
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

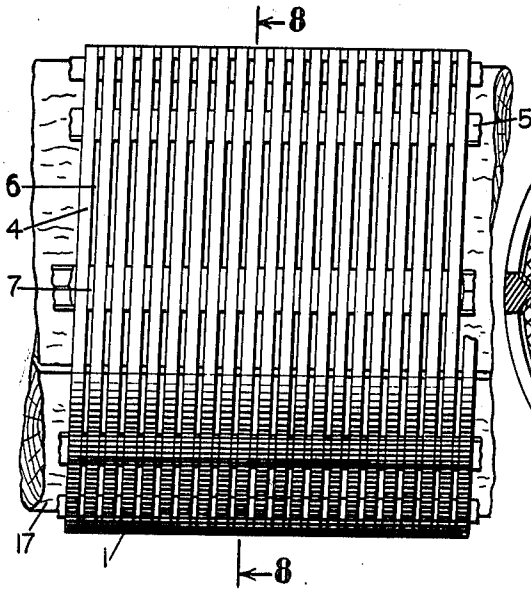


Fig. 7

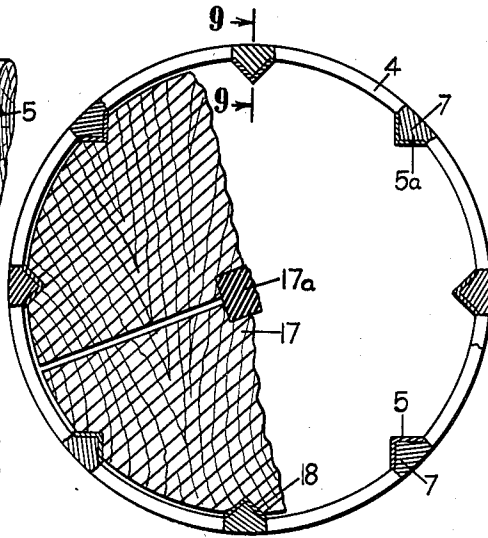


Fig. 8

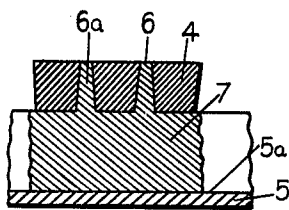


Fig. 9

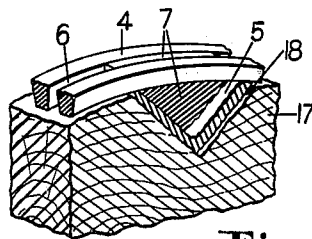


Fig. 10

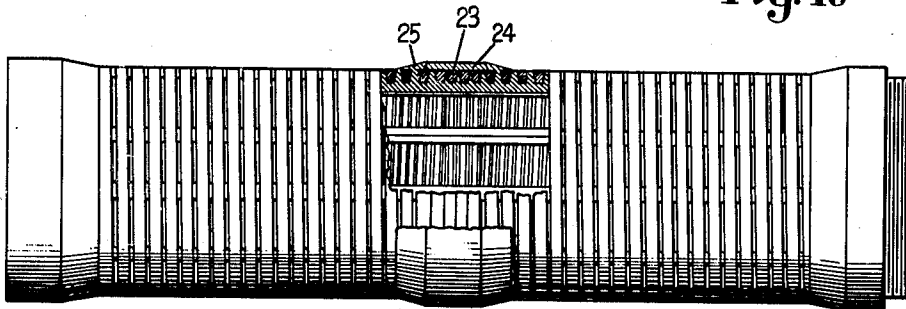


Fig. 11

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UNITED STATES PATENT OFFICE

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METHOD OF MAKING SCREENS

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Application July 14, 1941, Serial No. 402,308

1 Claim. (Cl. 29—163.5)

My invention relates to a screen and method of making the same. It has to do, more particularly, with a well screen and process of making it, although my invention is not necessarily limited thereto.

At the present time well screens are made which consist of helically wound flat wire which is disposed on longitudinally extending bars and is secured thereto. However, considerable difficulty has been encountered in the past providing suitable means for fastening the wire to said rods. The fastening means employed in the past has not been sufficient strength to the screen. Furthermore, such prior art fastening means has not been of such a nature as to effectively maintain the convolutions of the wire in a predetermined spaced manner. Furthermore, the longitudinally extending rods used in the past have been of such a type that they do not give sufficient strength to the screen unit. Another disadvantage with prior art screen structures of the general type indicated resides in the fact that they have been of such a structure that they have been difficult to produce by commercially practicable methods.

One of the objects of my invention is to provide a method of making a screen of the general type indicated which is of a simple structure and which is of an exceedingly strong structure.

Another object of my invention is to provide a method of making a screen consisting of longitudinally extending rods having wire helically wound thereon, the wire being secured to the rods by simple yet effective means.

Another object of my invention is to provide a method of making a screen of the type indicated in the preceding paragraph wherein the means for securing the rods and the wire together serves to effectively maintain the convolutions of the wire in a preselected spaced relationship.

Another object of my invention is to provide a method of making a screen of the type indicated which is of perfectly cylindrical form and which is of such a nature that a smooth run is provided at the interior thereof for bailers and other tools.

Another object of my invention is to provide a method of making a screen structure of the type indicated which is simple, effective and commercially practicable.

In its preferred form, my invention contemplates the provision of a screen structure which is of cylindrical form. This screen structure consists mainly of longitudinally extending circumferentially spaced rods or bars which have helically wound flat wire disposed in surrounding re-

lationship thereto. The rods are in the form of angle irons which are disposed with their two free edges in contact with the inner surface of the wire, forming channels beneath the wire. To secure the wire to the rods or angle irons, solder or other molten metal is poured through the wire, from the outside of the screen, into the channels until the channels are filled and the solder is disposed between the spaced convolutions of the wire. This will serve to effectively secure the wire to the rods and to keep the convolutions of the wire in spaced relationship.

In making this screen, I preferably provide a mandrel having longitudinally extending channels at circumferentially spaced intervals for receiving the angle iron rods. The wire is then wound around the mandrel and around the angle irons which are disposed in said channels. Then the solder is poured into the angle irons, as indicated above.

The preferred embodiment of my invention is illustrated in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a perspective view of a well screen unit made according to my invention.

Figure 2 is a view, half in vertical section and half in side elevation, of the unit shown in Figure 1.

Figure 3 is a perspective view, partly broken away, of one end of the unit.

Figure 4 is a side elevational view illustrating a lathe carrying a mandrel upon which the wire of the screen may be wound.

Figure 5 is a plan view of the structure shown in Figure 4.

Figure 6 is a perspective view of the angle iron supporting mandrel and showing the wire being wound thereon.

Figure 7 is a detail, in plan, showing the wire wound on the mandrel.

Figure 8 is a transverse section taken substantially along line 8—8 of Figure 7.

Figure 9 is a vertical sectional view taken substantially along line 9—9 of Figure 8.

Figure 10 is a detail in perspective showing how the solder anchors the wire to the angle irons.

Figure 11 is a side elevational view, partly broken away, of a long section of screen which is reinforced with additional means according to my invention.

With reference to the drawings, in Figures 1, 2 and 3 I have illustrated the completed well screen. It consists of a body portion 1 of cylindrical form having an interiorly threaded collar

2 on its upper end and an exteriorly threaded collar 3 on its lower end. The collars 2 and 3 are used in the ordinary manner for connecting adjacent sections of well screen together.

The body portion 1 is made from a strip of wire 4 which is helically wound upon a plurality of longitudinally extending circumferentially spaced rod members 5 which are in the form of angle irons. These angle irons have their diverging edges in contact with the inner surfaces of the wire 4 as illustrated in the drawings. As shown best in Figure 2, the wire strip 4 has flat inner and outer surfaces and decreases in thickness from its outer surface to its inner surface. The convolutions of the wire are in spaced relationship with the result that the spaces 6 therebetween are wider towards the inner surface of the screen than they are towards the outer surface of the screen. This will tend to prevent sand particles from lodging in the screen. As indicated in Figure 2, each angle member 5 is secured to the wire by means of solder 7 or other molten metal which fills the angle member and which extends outwardly into the spaces 6 between the convolutions of the screen.

The angle irons 5 extend at each end beyond the end of the body portion 1 of the screen. As shown in Figures 2 and 3, the upper end of the body portion of the screen terminates at the point 8 and the members 5 continue to the point 9. The collar 2 has a flange 10 which slips down over the extensions on members 5. It is provided with an inner annular shoulder 11 with which the ends of the members 5 contact. The outer surface of the flange 10 at its lower edge is provided with a reduced portion 12 which forms a continuation of the outer surface of the body portion 1. A substantial amount of solder or other similar metal, indicated by the numeral 13, is disposed on this reduced portion 12 and extends over the outer surface of the body portion 1 and into the spaces 6. Also, on the inner surface of the flange 10 solder, indicated by the numeral 14, is applied and extends from the shoulder 11 downwardly over the inner surface of the body portion 1 and into the spaces 6.

If desired, before solder 13 and 14 is applied, the ends of members 5 may be welded to member 2. Also, the lower edge of member 2 may be welded to body portion 1. Thus, member 2 is securely anchored to the body portion 1 of the screen. The lower end of the body portion of the screen terminates at the point 15 while the members 5 are continued downwardly to the point 16. Member 3 is anchored to the body portion 1 in exactly the same manner as member 2 is anchored thereto. Other fittings may be secured to the end of the body portion in a similar manner.

As indicated in Figures 4 and 5, this well screen unit may be produced on an ordinary lathe. A mandrel 17 is mounted on the lathe for rotation. This mandrel may be formed of wood or any other suitable material and is provided with longitudinally extending V-shaped grooves 18 which are circumferentially spaced in the mandrel and are adapted to receive angle members 5 in a number desired to support the wire 4. The wire 4 is carried by a reel 19 and a guide member 20 is provided for guiding the wire as it is unwound. The guide member 20 is carried by the screw-fed table 21 of the lathe. The free end of the wire is suitably attached to the mandrel and the mandrel rotated. As the mandrel ro-

tates and the wire 4 is unwound by the reel 19, the member 21 moves longitudinally of the mandrel. This causes the wire to be helically wound on the mandrel. The wire is attached to the mandrel at a point 22 spaced from the end of the mandrel and the winding is continued until a point spaced from the other end of the mandrel is reached. In other words, it is desired that the ends of the members 5 project from the ends of the body portion of the screen, as previously indicated.

When the wire 4 is completely wound on the mandrel, the structure will appear as in Figure 7. The next step is to fill with solder 7, or other molten metal, the channels 5a formed in the members 5 beneath the wire 4, as shown in Figure 8. The solder or other molten metal may be poured into these channels until they are filled, as shown in Figures 9 and 10, and until the solder projects up into the spaces 6, as indicated by the numeral 6a. Any excess solder on the outer surface of the body portion of the screen may be removed by a suitable tool such as a rasp. It is desired that the outer surface of the solder be flush with the outer surfaces of the wire 4, as shown best in Figures 9 and 10. The body portion 1 of the screen will thus be formed. If desired, members 5 may be filled with solder before the wire is wound on the mandrel. Then after winding the wire, it will merely be necessary to fill spaces 6 with solder. To complete the screen, it is merely necessary to remove it from the mandrel 17. Then the collars 2 and 3 are slipped into position on the projecting ends of members 5 and are anchored to these members in the manner previously described.

The members 5 being in the form of angle irons will give considerable strength to the unit since they extend practically the complete length of the unit and serve as trusses. Due to their channel shape and the fact that they face outwardly, it is a simple matter to pour the solder thereinto to secure the wire 4 to the member soldered. This solder will extend up into the spaces 6 between the convolutions of the wire and will serve to maintain these convolutions in preselected spaced relationship. The inner V-shaped edges of the members 5 will serve as longitudinal guides for ballers or other tools which might be passed through the screen. The angle members 5 anchored to the members 2 and 3 will give a strong truss effect. However, if long sections of screen are made, it may be desirable to reinforce such sections as in Figure 1. For this purpose, midway between the ends of the section, the convolutions of the wire are wound closely together to produce a substantially solid portion 23. Around this portion 23, a collar 24 is applied. This collar 24 is soldered or welded, as at 25, to the screen. Thus, member 24 will cooperate with the angle members to obtain greater strength of the screen section midway between its ends.

As shown in Figure 6, the mandrel 17 is split into two sections. These sections may be expanded by inserting a square rod 17a in a central longitudinally extending socket. The mandrel may be collapsed by withdrawing the rod.

It will be apparent from the above description that I have provided a well screen having many advantages. Furthermore, I have provided a simple and efficient process for producing this screen.

Various other advantages will be apparent from the preceding description, the drawings and the following claim.

Having thus described my invention, what I claim is:

A method of producing a screen of the type described which comprises providing a mandrel, supporting longitudinally, of and circumferentially spaced around the periphery of the mandrel a plurality of screen supports formed of metal angle members of substantially uniform cross section from end to end with the diverging edges of the angle members radially outwardly and projecting from the mandrel, helically wind-

ing a metal wire around said mandrel and screen supports with the inner edge of the wire in contact with the outer edge of said angle members and with the convolutions of the wire in spaced relationship, filling said angle members and the spaces radially outwardly thereof between the convolutions of said wire with solder by pouring solder between the convolutions and removing the mandrel.

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