May 23, 1933. W. W. SAYERS 1,910,860

TRAY FOR WATER SCREENS

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Fig. 1

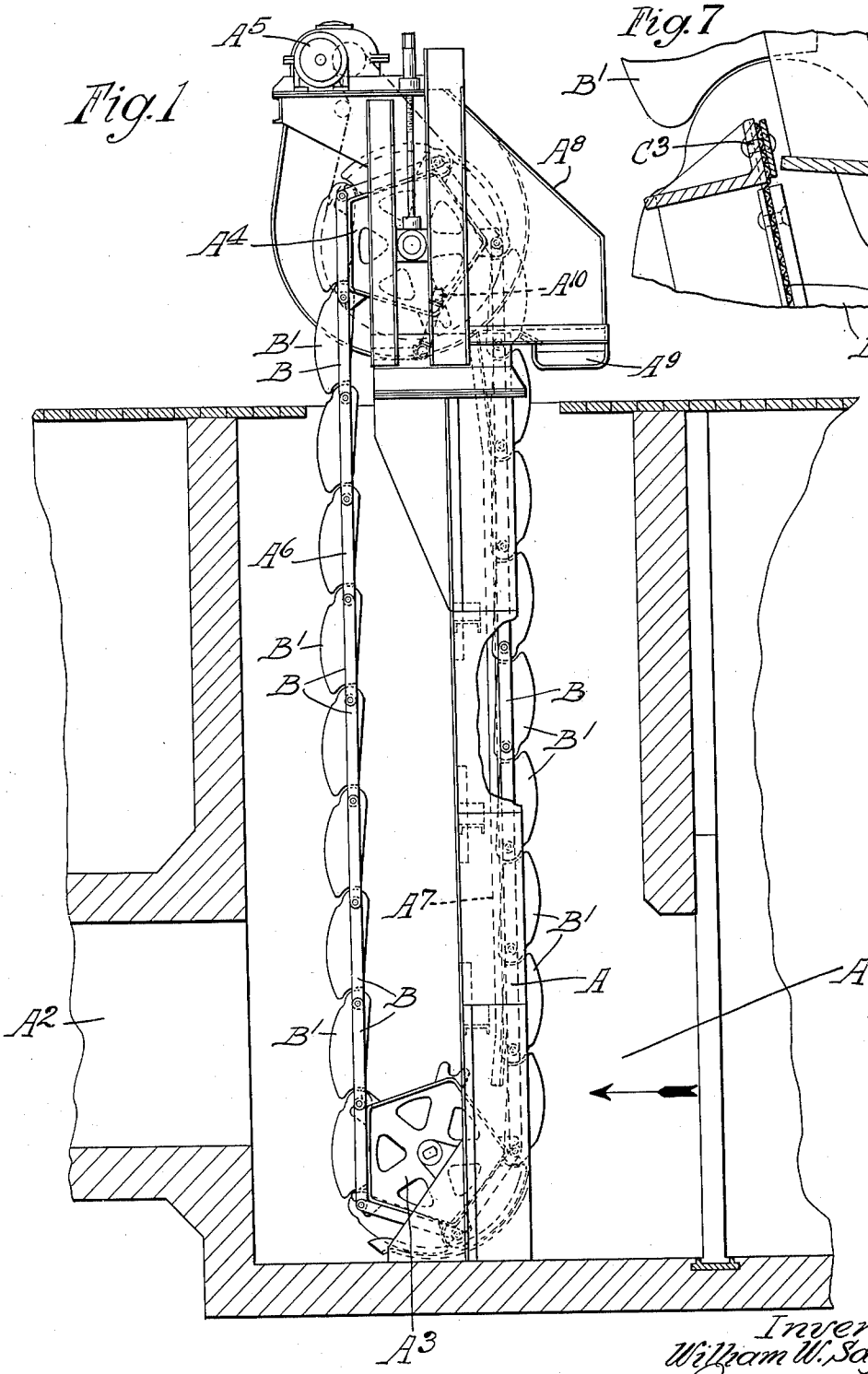


Fig. 7

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Fig. 2

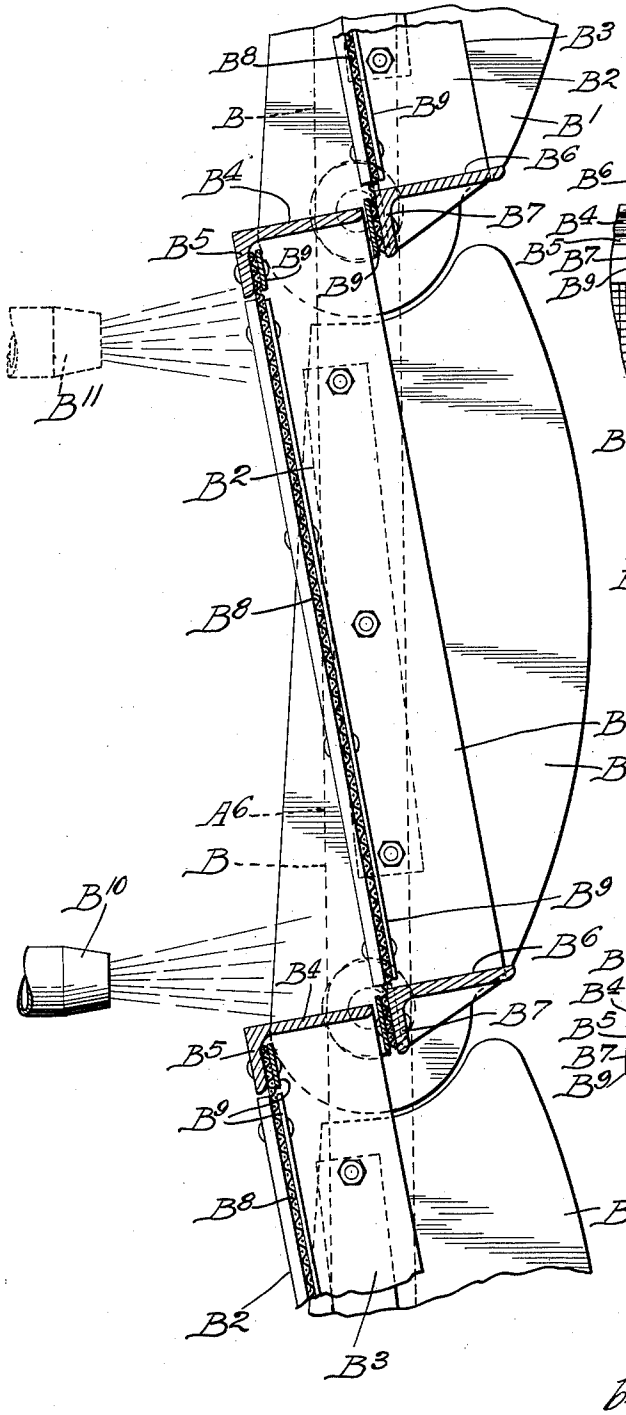
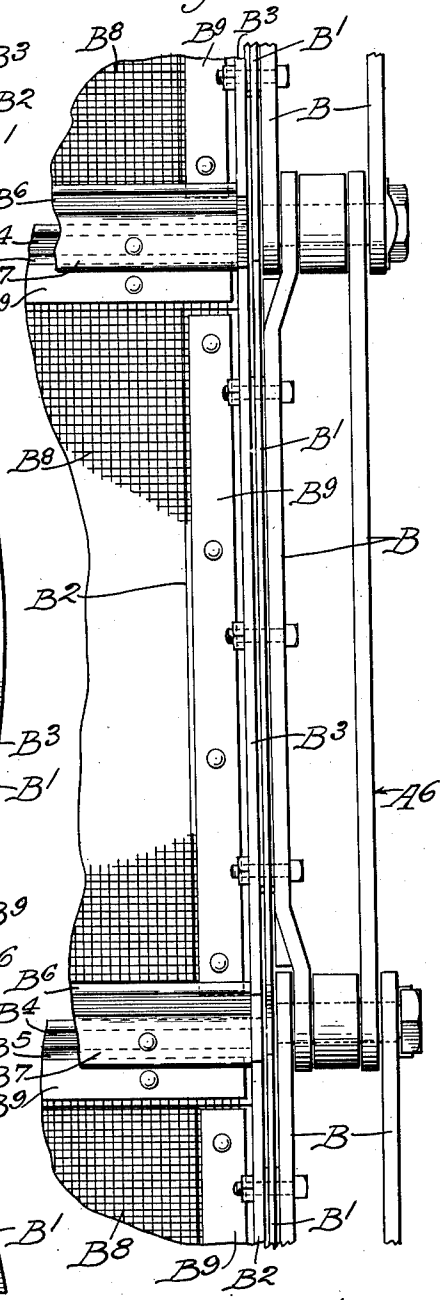


Fig. 3

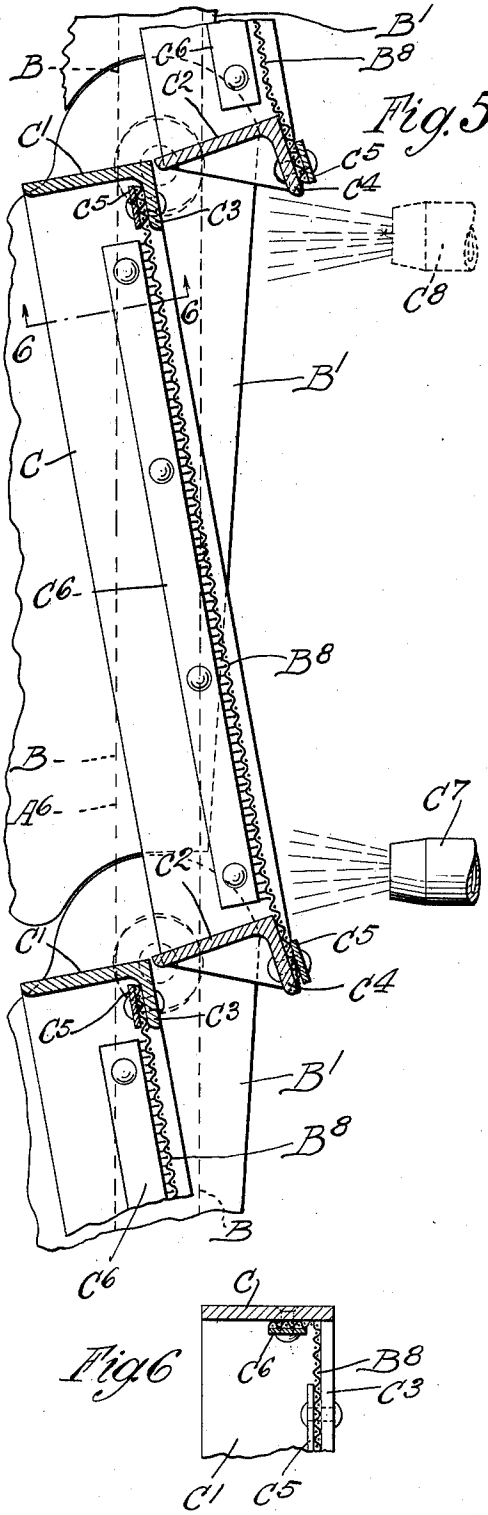


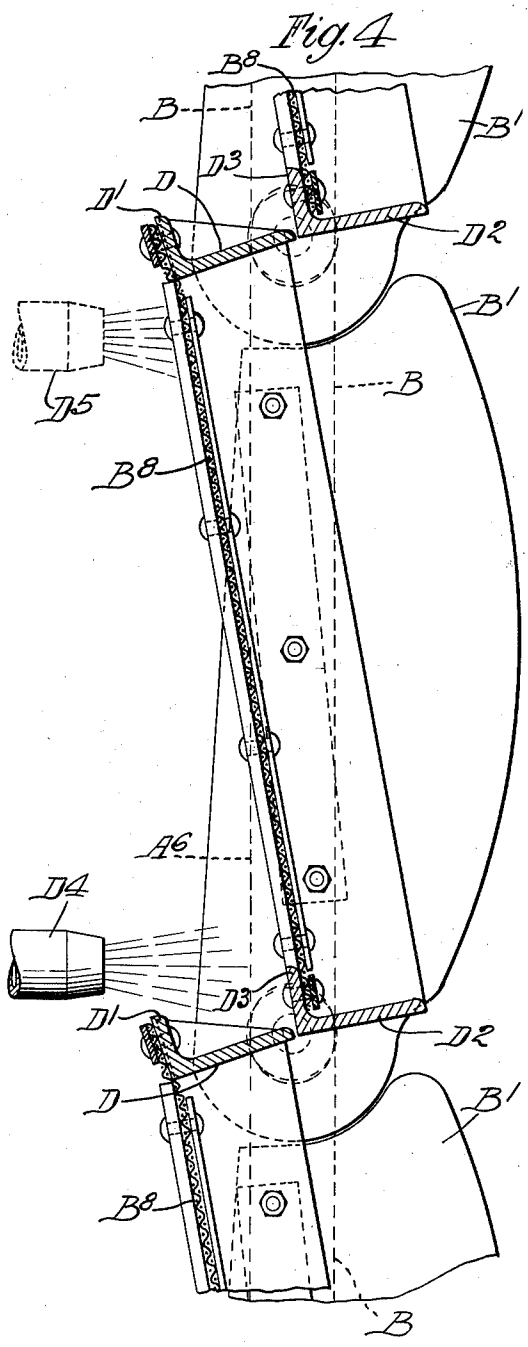
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UNITED STATES PATENT OFFICE

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TRAY FOR WATER SCREENS

Application filed October 31, 1930. Serial No. 492,483.

My invention relates to improvements in trays for water screens and the like and has for one object, to provide a new and improved form of perforated rigid tray which will have a maximum of screen area and wherein the adjacent trays and their reinforcing and supporting flanges will not interfere with one another when the screen is cleaned by a water jet.

It has in the past been customary to make water screens built up of a plurality of rigid screen trays of an angle or other construction with legs at the top and bottom angles extending inwardly and thereby reducing the total area of the screen panel. If this situation is reversed and at least one of the legs of the top or bottom angle turn outwardly we can have the same total cross sectional area measured between the legs of the angles and get a larger screen area, but the leg or flanges of the top or bottom tray member projecting outwardly from the screens will interfere with the adjacent screen, form pockets in which refuse material may be caught and will make it difficult to direct the cleaning jet of water against the entire screen area.

I propose, therefore, to arrange the top and bottom angles which form a part of the tray frame in such wise that at the top for instance, the leg extends inwardly and at the bottom it extends outwardly or vice versa, thus the two legs may be placed in register and a minimum of obstruction results.

Water screens are ordinarily made of a series of panels articulated and these panels are wider than they are high because their height is measured in the direction of screen or chain travel and in that direction, the height of the individual panel is ordinarily much less than the width of the screen made up by the panels. Therefore, in referring to the panels, I talk about the two long sides as top and bottom, the two short sides as the sides and that part of the screen panel which is at the top as the screen goes up is the top and that part of the panel which is low as the screen goes up is the bottom. When the screen has gone up over the pillow or sprocket and starts down, it is customary to still consider that part which was originally top as top and that part which was originally bottom, as bottom.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a diagrammatic section through a screen illustrating the application of my invention;

Figure 2 is a section on a large scale showing in greater detail the screen trays and their relation with one another when refuse is sprayed off in the ascending side;

Figure 3 is a part plan view of Figure 2 showing one end of the screen tray and chain;

Figure 4 is a section somewhat similar to Figure 2 showing a modified form of tray with the top and bottom flanges projecting upwardly instead of downwardly as in Figure 2;

Figure 5 is a view of a screen similar to Figure 4 but showing the arrangement when the screen is cleaned or washed on the descending instead of the ascending run;

Figure 6 is a section along the line 6—6 of Figure 5;

Figure 7 shows a detail of a slightly further modified form.

Like parts are indicated by like characters throughout the specification and drawings.

The screen comprises a supporting framework. A is a frame which rests in a well A^1 in a water conduit A^2. A^3 is a tail sprocket, A^4 a head sprocket. The motor A^5 drives the head sprocket and the link chain A^6 travels over the head and tail sprockets up and down along the frame, one side of the chain, the side which is doing the screening being guided, supported, and protected in the tracks A^7 in the frame, the other side hanging freely. At the upper end the head sprocket is enclosed in a housing A^8 which also includes a sluice channel A^9. A^{10} is a pipe having perforations adapted to discharge water against and through the screen cloth as they pass and to wash refuse off the screen into the sluice A^9. The water to be screened travels in the direction of the arrow and in Figures 2 and 4 the refuse is washed

from the screen as it travels up. It will be equally possible to have the water jets discharge against the screen panels after they pass over the head pulley and as they descend as in Figure 5. If this were the case, a slightly different arrangement of the tray and panels would be required but that is all.

In Figure 2, is shown in greater detail the trays illustrated in Figure 1. The chain is built up of a plurality of articulated links B. The links carry side plates B^1 which assist in preventing flow of refuse bearing water around the screen. Mounted between each pair of inside links is a tray B^2. The tray is built up of angles, the side members B^3 having their bottom flanges extending inwardly, the top member B^4 havings its bottom flange B^5 extended downwardly and so inwardly. The bottom member B^6 having its bottom flange B^7 also extending downwardly and so outwardly.

The flange B^7 projects outwardly from the frame and therefore does not obstruct the screening area, and as shown, the flange B^7 masks the flange B^5 and the top of the frame at B^6 is practically in line with the top of B^4 and so provides a smooth surface with the screen coming clear down to it and there permits the sprays to remove accumulated refuse from the screen cloth. The screen itself is indicated at B^8 and is held on the flanges by means of holding strips B^9 bolted or riveted in place.

When a jet of water is projected against the back of the screen cloth by the spray pipe indicated diagrammatically at B^{10}, it dislodges and washes the refuse off the screen cloth into the sluice trough. Any refuse accumulated on top of B^6 will be washed in the sluice trough in passing the sprays. When the spray pipe B^{10} is in the dotted position with respect to the trays, it will be noted that the flange B^7, being behind the flange B^5, does not interfere with the spray water removing the refuse from the top of B^6. As the flange B^5 is located at the top of the tray and as it travels upwardly, gravity prevents refuse from being deposited upon it and therefore it is not necessary to wash the side to which the screen cloth is attached. It will be noted that this water washing action is a positive and distinctly violent one. The water is projected against the screen at high pressure, perhaps one hundred pounds or more and it washes and projects the refuse violently off the screen discharging it into the solution.

Referring now to Figure 5 here we have a tray made up of side plates C which are unflanged, and plates or angles C^1 C^2, upper angle C^1 having a downwardly extended bottom flange C^3, the lower angle C^2 having a downwardly extended bottom flange C^4 so that the flange C^3 extends across a part of the tray area to carry the screen cloth, which is in this case fastened by means of a holding strip to the inside of the flange C^3 and by a strip C^5 to the outside of the flange C^4. The ends of the screen are turned up to be fastened to the face of the plate C by a similar strip C^6. This arrangement gives a maximum of screening area inside the tray. As the jet of cleaning water discharges against the back of the screen cloth from the position shown at C^7, the water and refuse is removed from the cloth, and angles C^2 and C^1 and discharged into the sluice trough. With the jet of spray water discharging from the dotted position of C^8, the flange C^4 interferes no more than does the flange C^3.

Referring to the arrangement shown in Figure 4, in this case the side and end frame arrangements are all flanged. The upper member D has a flange D^1 extending upwardly away from the screen panel. The lower member D^2 has a flange D^3 extending upwardly away from the screen panel. The spray jet, washes the screen cloth B^8 and discharges above the flanges D and D^2. With the spray jet D^7 discharging from the dotted position the same is true, the flanges D^3 and D^1 are in line and refuse which has accumulated on D^2 will fall off by gravity.

In the device shown in Figure 7, it will be noted that in order to gain added space under some circumstances one of the transverse members, that is, one of the members extending perpendicular to the line of travel of the screen is bent into a position slightly inclined to the plane of the screen so that such member overlies to a greater or less extent the clamping area or clamping means. It will be noted here that the screen panel B^8 is mounted on a flange E which flange is slightly inclined to the plane of the screen itself. The cross member upon which this flange is mounted at E^1 is also slightly inclined to the perpendicular of the screen so that it lies behind the clamping member C^3.

Attention is called to the fact that the spray nozzles D^4 and C^7, which are shown in dotted line position as D^5 and C^8 for the purpose of illustrating their operation, project or drive refuse material off the screen, the force with which the water strikes the cloth being sufficient to remove refuse and hurl it clear off the sluice.

By the use of the word "masks" or "masking" in the claims, I have reference to one of the important characteristics of my invention which is that when viewing the screen in its screening position either from upstream or down, the parts are so positioned that the lower edge of one frame or panel masks or hides the upper edge of the one below. It is this masking effect which characterizes my invention and makes it possible to provide a submerged screen area whose effective height is such that it equals, not the total submerged height of the structure which is the ideal, not

the total height less twice the number of panel frames submerged which would be the case if the frames were placed edge to edge but the effective height of the screening area is the total height of the submerged screen, that is,—the height of one panel times the number of panels submerged, less the width of one top or bottom frame element, not two, for each panel.

The water screen which is the subject matter of my application is used primarily for preventing leaves, twigs, grass, fish, etc., from passing the screen and reaching the condenser pumps or condensers where they are likely to either injure the pumps or greatly decrease the efficiency of the condensers. This type of screen is used primarily for screening the water passing to the condensers of a power house.

The water passes through the screen at a low velocity approximately two feet per second. Therefore, there is ordinarily only a slight drop in the head of the water between the up side of the screen and that on the down side or side near the condensers of the screen when the screen openings are not clogged by foreign substances. There is, however, a slight drop and it is extremely desirable to have the drop in head as small as possible to cause the condenser pumps to use as little power as possible in drawing the water through the screens.

With this background the desirability of providing screens with the greatest possible amount of net screening area for a given width and length of screen trays which make up the screening surface becomes most apparent. The invention of this application provides the greatest amount of screening surface that I know of in combination with a rugged tray frame suitable for screens up to ten feet or twelve feet in width, for digging at times more or less solid material that accumulates at the bottom of the screen.

I claim:

1. A screen comprising a plurality of screen trays supported in articulated relation and so related that one tray may change its angular relation with respect to an adjacent tray without appreciable separation of the edges thereof, each tray having flanges approximately parallel with the axis about which it is articulated, the flanges in the plane of the screen portion of the tray on the opposed sides of each tray projecting in the same direction, and means for mounting the trays in such articulated relation with the inwardly projecting flanges on each tray masking the outwardly projecting flanges of an adjacent tray when viewed in a direction perpendicular to the tray.

2. A screen comprising chains, a plurality of screen carrying trays supported by the chains in articulated relation and so disposed that travel of the chains and trays about a sprocket may take place without longitudinal separation of the trays, flanges on the sides of each tray perpendicular to the plane of the screen portion thereof, a flange on one side of the tray parallel with the plane of the screen portion thereof projecting toward the interior thereof, a flange on the other side of the tray parallel with the plane of the screen portion thereof projecting outwardly from the tray, a screen fabric mounted on the flanges, the relative positions of the flanges parallel with the plane of each tray being such that the outwardly projecting flange on one tray masks the inwardly projecting flange on an adjacent tray, the frame members being arranged generally side by side so as to form an unobstructed surface for outflow of material from the screen.

3. A water screen comprising a plurality of trays disposed along the length of the screen, each tray comprising a supporting framework and a pervious screen surface mounted thereon, means including the framework for clamping the pervious screen surface in position, the trays being relatively associated so that the clamping means on one tray masks the clamping means on another tray to provide an increased effective screen area in the length of the screen.

4. A screen panel for water screens and the like comprising a rectangular frame member, the top and bottom sides of which are flanged in general parallelism with the plane of the screen, one flange extending away from the frame, the other inwardly toward it, a screen panel mounted on the frame, one edge of the panel being mounted on the outside of the outwardly extending flange, the opposed edge of the panel being mounted on the inside of the inwardly extending flange, the other two sides of the screen at their edges extending generally perpendicular to the plane of the screen panel and mounted on and in parallelism with the sides of the frame.

5. A screen panel for water screens and the like comprising a rectangular frame member, the top and bottom sides of which are flanged in general parallelism with the plane of the screen, one flange extending away from the frame, the other inwardly toward it, a screen panel mounted on the frame, one edge of the panel being mounted on the outside of the outwardly extending flange, the opposed edge of the panel being mounted on the inside of the inwardly extending flange.

Signed at Chicago, county of Cook, and State of Illinois, this 1 day of Aug., 1930.

WILLIAM W. SAYERS.