Aug. 22, 1944. D. D. COX 2,356,653

HURDLE WASHER

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FIG. 1.

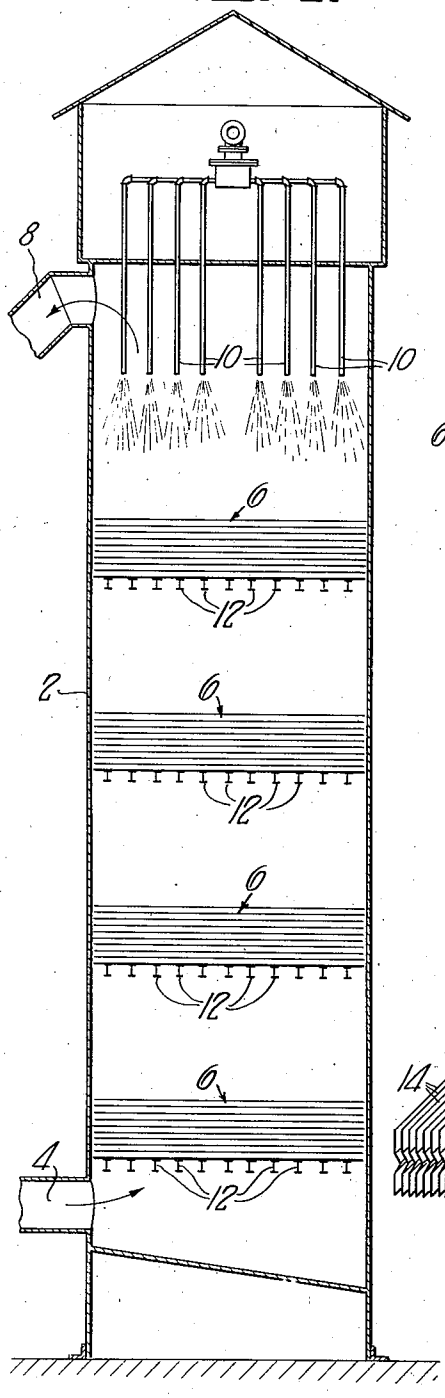


FIG. 2.

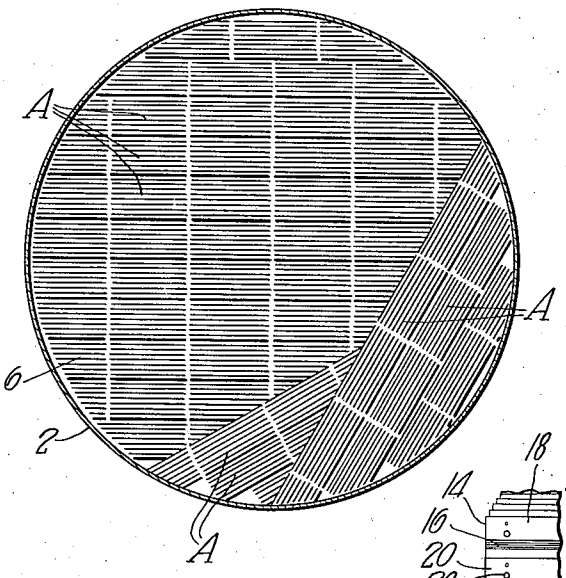
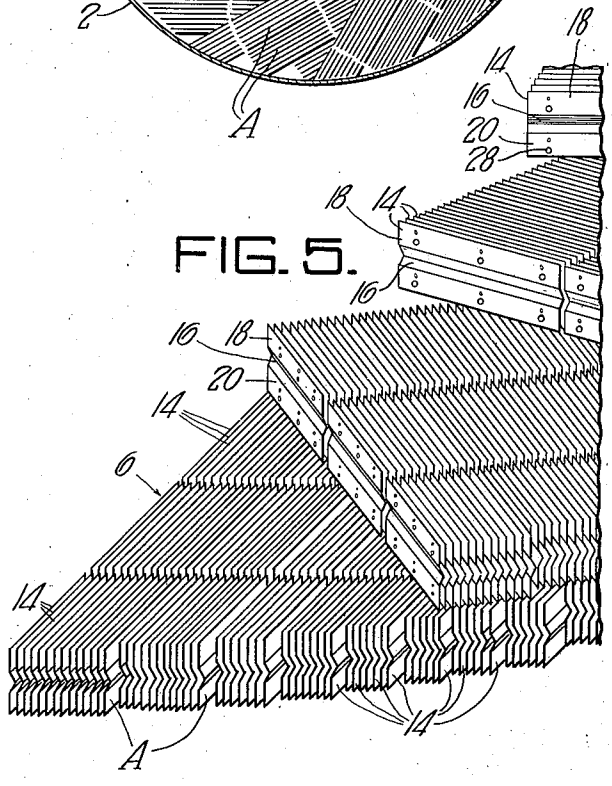


FIG. 5.



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FIG. 3.

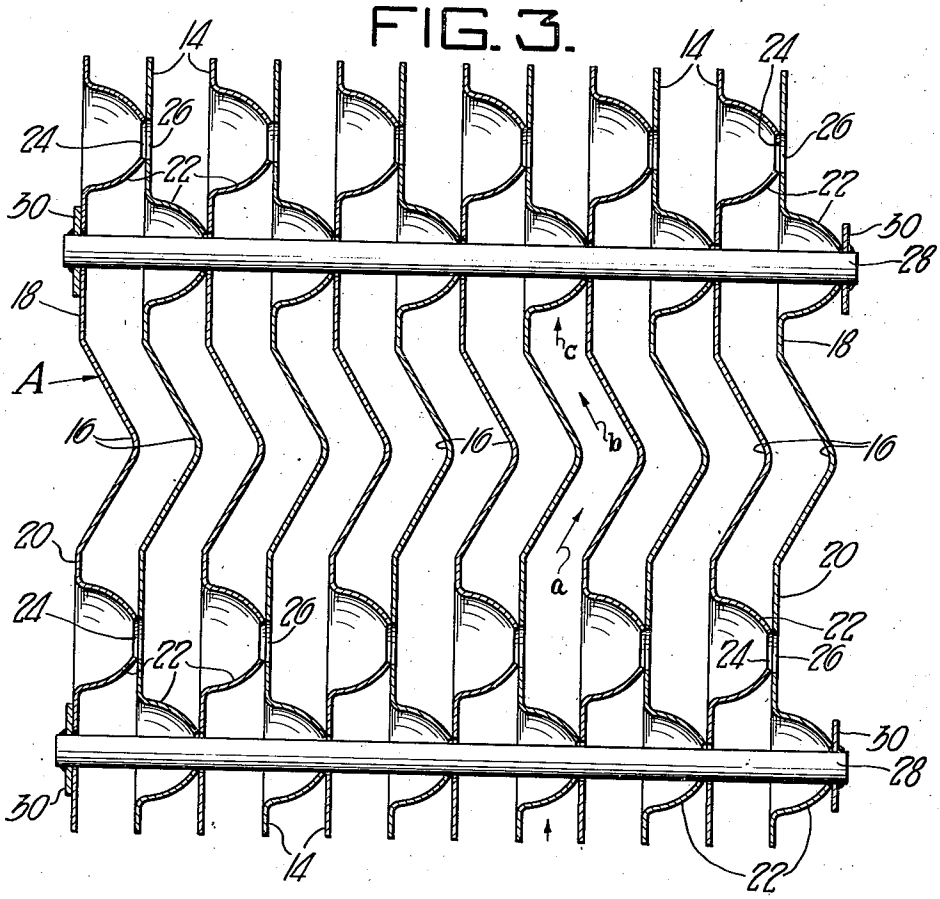
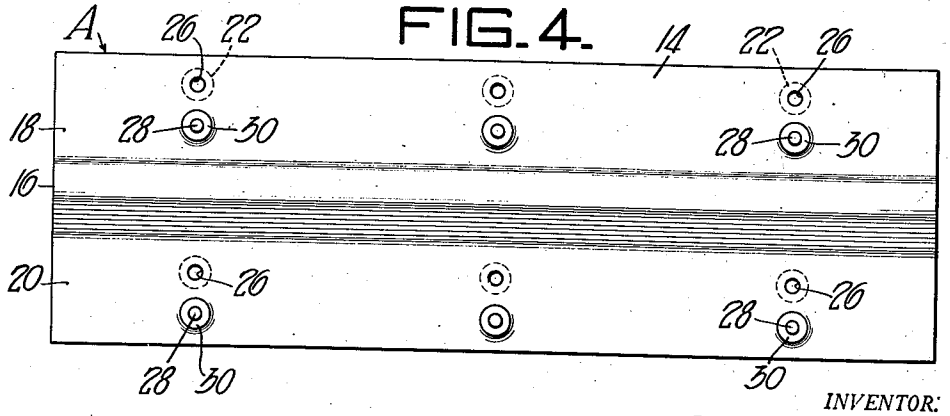


FIG. 4.



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HURDLE WASHER

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Application December 16, 1942, Serial No. 469,257

2 Claims. (Cl. 261—111)

This invention relates to hurdle washers and more particularly to a filling for use in packing wet tower type scrubbers. These scrubbers are extensively used in the by-product coke and petroleum industries for the removal of a gas or vapor of a liquid miscible in all proportions with the scrubbing liquid, as illustrated by the removal of light oils from coke oven gas.

A conventional scrubber consists of a tall steel shell in which the filling is packed in layers of desired thickness. The gas to be scrubbed is admitted at the bottom and passes upwardly through the filling and leaves the top of the unit. The scrubbing medium or absorbent liquid is pumped to the top of the scrubber and is distributed uniformly over the top surface of the filling and flows downwardly through the same. As it comes in contact with the ascending gas, it absorbes the light oil component.

Coke, tile, wood or steel shavings, expanded metal lath and sectional wood trays have been used for packing materials. The hurdle sections are placed in layers one above the other to the desired height. In most types of filling, the open area of scrubber for the passage of gas and absorbent medium is approximately 50% of the scrubber area, and thus a high pressure drop is experienced. Increased scrubbing efficiency is obtained through breaking up the gas into more finely divided streams, increasing the absorbing wetted area of the filling, and eliminating stagnant films of gas or liquid on the surface of the filling material.

An object of the invention is to greatly increase the wetted area of the scrubber filling.

Another object is to provide a filling having a low pressure loss therethrough.

Still another object is to increase the efficiency of the scrubber.

These and other objects will be more apparent from the following details of disclosure when read in connection with the attached drawings in which:

Fig. 1 is a sectional elevation of a scrubber embodying the present invention;

Fig. 2 is a plan showing the arrangement of hurdles in the scrubber;

Fig. 3 is a sectional view of a hurdle section;

Fig. 4 is an end view of the hurdle section and

Fig. 5 is a perspective view of the arrangement of the hurdles.

Referring more particularly to the drawings, the numeral 2 indicates a vertical tower scrubber. The gas to be cleaned enters the tower at 4, passes up through the hurdles 6 and out of the tower at 8. The scrubbing medium from the sprays 10 passes down through the hurdles absorbing light oil component from the gas, and then passes out of the bottom of the tower.

The hurdle consists of a plurality of layers of vertical parallel plates. The first layer of plates are laid at right angles to the I-beams 12 and each succeeding layer is laid at an angle of between 20 and 70 degrees to the layer beneath as clearly shown in Figs. 2 and 5. Each layer of hurdles consists of a plurality of sections A as best shown in Fig. 2. Each hurdle section consists of a plurality of plates 14 arranged as shown in Fig. 3. As shown in Figs. 3 and 4, each plate has a crimp or valley 16 therein. On each side of this valley there are substantially straight portions 18 and 20, having a plurality of spacers 22 thereon. Each spacer has a hole 24 therein. The portion 18 has holes 26 in the outer portion thereof and portion 20 has similar holes adjacent the valley portion. The spacers in portion 18 are formed adjacent the valley portion and those in portion 20 adjacent the edge of the plate. The spacers and holes are symmetrical with respect to the vertical center line of the plate and so formed that upon turning the top to the bottom the holes 26 will match with the holes 24.

In assembling the hurdle section the first plate is placed in position with the portion 20 lowermost. The next plate has the portion uppermost. The third plate is arranged the same as the first. This arrangement is continued until the entire section has been arranged as shown in Fig. 3. By this arrangement each of the spacers 22 are staggered and therefore determine the horizontal distance between the plates. The plates are fastened together by means of rods 28 which pass through the holes in the plates as shown. Washers 30 are welded to the ends of the rods to hold the plates in assembled position.

The operation of the hurdle is as follows: As the gas ascends through the hurdles the crimp or valley produces three changes in the direction of gas flow, as indicated by the arrows *a*, *b*, and *c* in Fig. 3, thus breaking up the gas stream and causing impingement against the wetted surfaces of the plates. This greatly reduces the stagnant films of gas and absorbent, and brings them into direct and intimate contact, thus obtaining maximum absorption for unit area. Since there are no horizontal surfaces therein, there are no deposits of carbonaceous material which ordinarily clog the gas and oil passages. The vertical surfaces also enable the units to be

cleaned by steaming or washing. By making the hurdles in sections as shown in Fig. 2, they may be easily handled in assembling and one section may be replaced at a time.

While one embodiment of the invention has been shown and described, it will be apparent that other modifications and adaptations may be made without departing from the scope of the attached claims.

I claim:

1. A hurdle section of the class described comprising a plurality of plates, each of said plates having a valley portion centrally disposed therein and a relatively straight vertical portion on each side thereof, at least one spacer on each vertical portion, the spacers of one portion being adjacent the end of the plate and the spacers of the other portion being adjacent the valley portion, the plates being arranged in vertical parallel rows with the last named portion at the top in alternate plates and means for fastening the plates together.

2. A hurdle section of the class described comprising a plurality of plates, each of said plates having a valley portion centrally disposed therein and a relatitvely straight vertical portion on each side thereof, at least one spacer on each vertical portion, the spacers of one portion being adjacent the end of the plate and the spacers of the other portion being adjacent the valley portion, the plates being arranged in vertical parallel rows with the last named portion at the top in alternate plates, the straight portions and spacers having holes therein for receiving a rod when in assembled position, and means attached to the rod for holding the plates in assembled position.

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