Dec. 16, 1952 A. C. KRACKLAUER 2,621,798

CLEAN-OUT MECHANISM FOR FILTERS AND THE LIKE

Filed July 13, 1951 2 SHEETS--SHEET 1

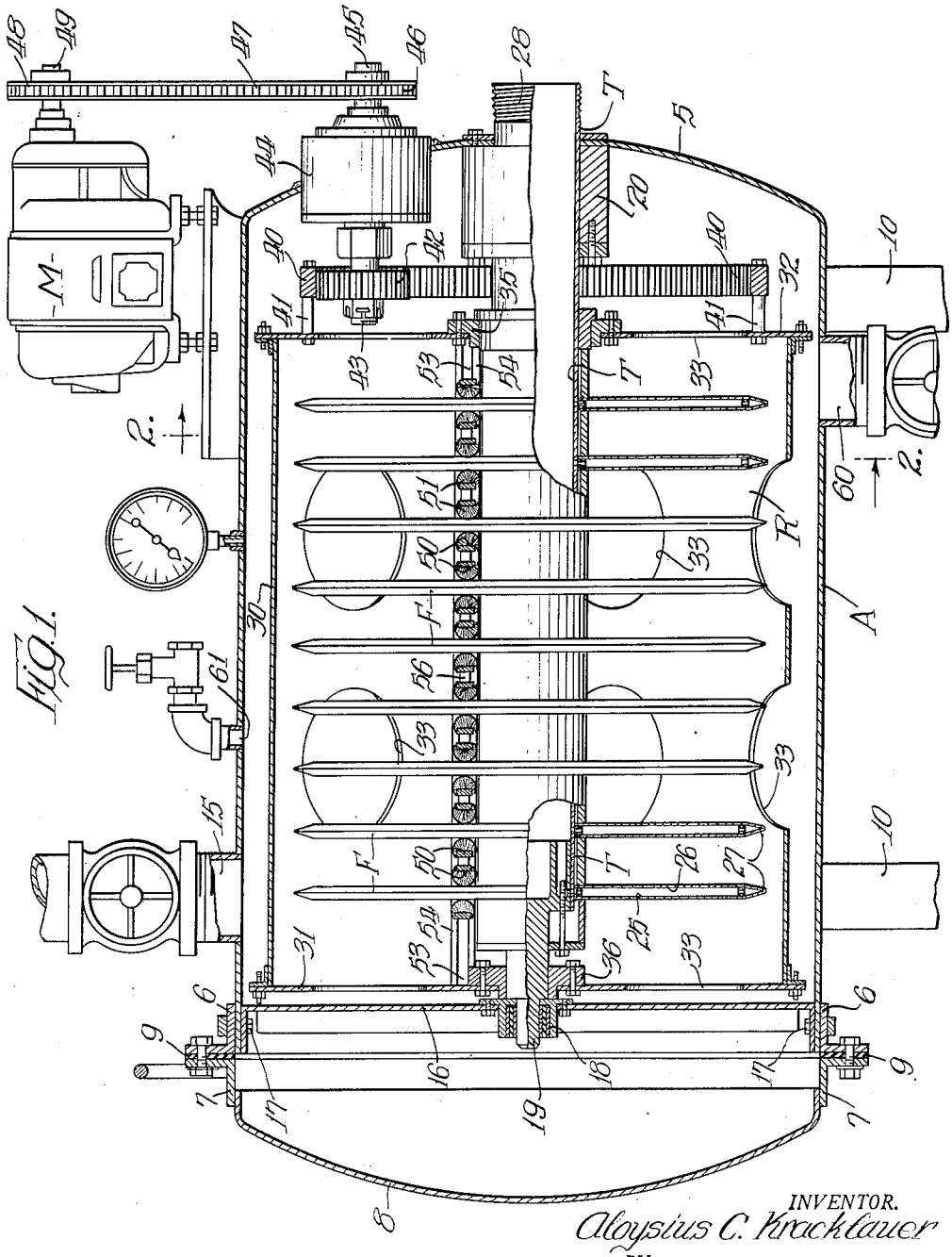


FIG. 1.

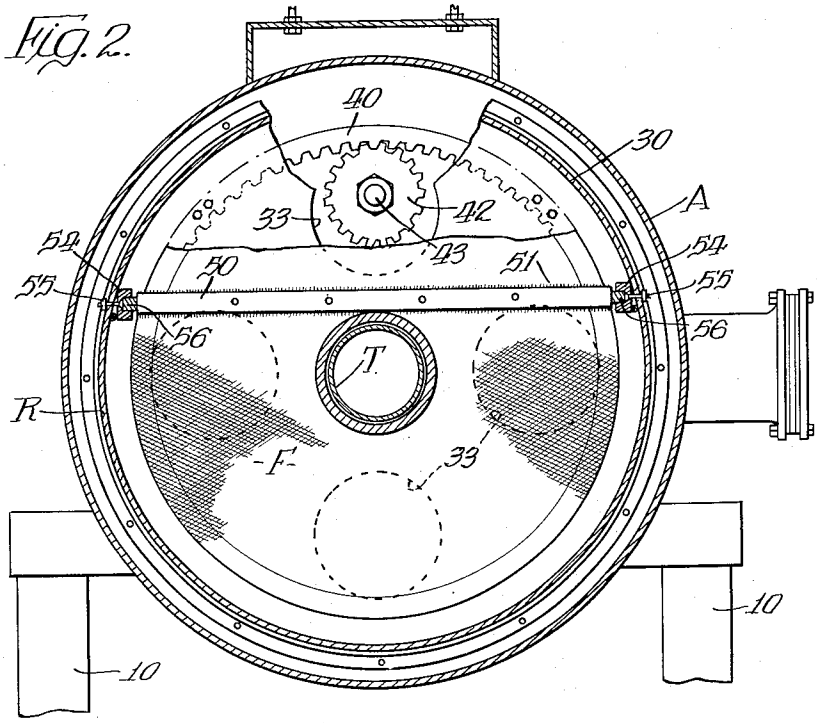
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Fig. 2.



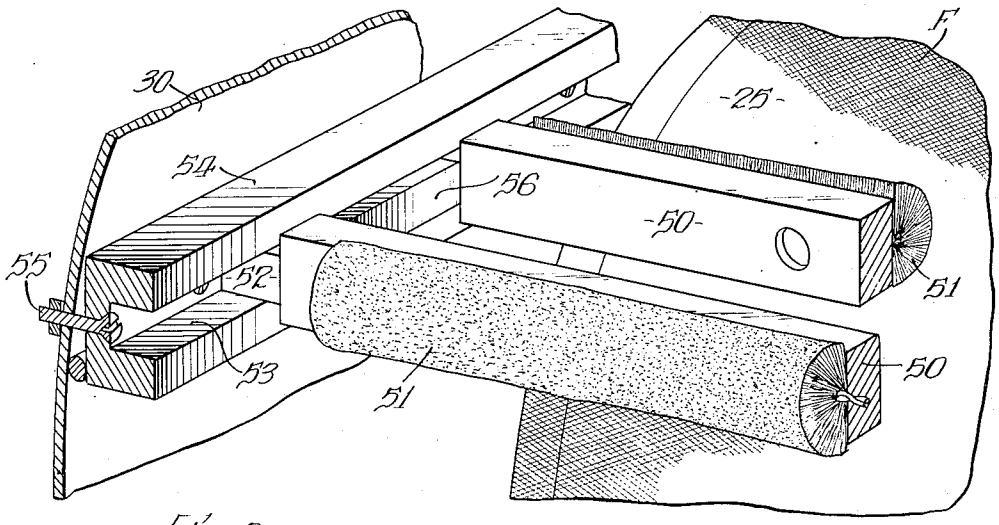


Fig. 3.

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Patented Dec. 16, 1952 2,621,798

UNITED STATES PATENT OFFICE

2,621,798

CLEAN-OUT MECHANISM FOR FILTERS AND THE LIKE

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Application July 13, 1951, Serial No. 236,619

6 Claims. (Cl. 210—201)

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This invention relates to a mechanism by which to clean the several filter units that are carried on a tube and which constitute therewith a circulation system that is enclosed within a tank wherein filtering is performed. The main objection achieved by my invention is the provision of means which will effectively clean in a short time the filter units whenever the occasion requires and which, when at rest, will not interfere with or impair the filtering operation.

The present clean-out mechanism, in a preferred form, is illustrated in the accompanying drawings in the manner following:

Figure 1 is a central longitudinal section vertically of a horizontal filter tank enclosing a circulation system comprising a tube mounting a plurality of parallel, spaced-apart, filter units and wherewith is combined a plurality of cleaning brushes in operative relation thereto to be driven by connections from a source of power exteriorly of the tank;

Fig. 2 is a transverse section, taken on line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary detail in perspective showing the mounting for a pair of brush bars which engage the filter units and which, when stroked through an annular path, act to dislodge accumulated material therefrom.

In Fig. 1 I have shown a conventional horizontal filter tank A having an outwardly bowed head 5 at one end. Secured to the tank at its opposite open end is a flanged ring 6, to which is bolted a second flanged ring 7 affixed to an outwardly bowed head 8. In some such way as this, the ring 7 is held tightly against a gasket 9 whereby to establish a liquid-tight connection between the removable head 8 and the open end of the tank A. A stand having legs 10 supports the tank in a fixed position.

In the tank top is a valved inlet opening 15. A flanged inner head 16 is fitted into the tank near its open end and secured in place as by bolts 17 which pass through openings in the tank wall and in the ring 6 upon its outer side. A central opening in this inner head is occupied by a mounting 18 wherein is supported an extension plug 19 projecting axially from one end of a tube T whose opposite end is carried in a mounting 20 that is supported on the fixed head 5. Suitable packing is provided to prevent leakage at the tube ends.

The tube T mounts a plurality of filter units F which are arranged coaxially and in spaced relation lengthwise of the shaft. These units which may be of conventional construction comprise in each case flat foraminous plates 25 and

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26 overlaid by a suitable filter media (such as nylon), the plates being spaced apart to provide therebetween a chamber which is in communication with the tube interior through suitable ports. At their circular outer margins the plates in each pair are inclined toward each other to meet at 27. A circulation system is established by the means described, in that liquid to be filtered enters through the valved inlet 15 to fill the tank interior from which it can escape only by passing into the interior of the filter units F and thence into the tube T for eduction therefrom through its outlet end 28.

The feature with which the present invention is concerned is a clean-out mechanism that is mounted for rotary movement within the tank T in operative relation to the several filter units F. As shown, this consists of a rack R having a cylindrical wall 30 with interconnecting heads 31 and 32 at its opposite ends. Large ports 33 are provided at various places in the cylindrical wall 30 and in the heads 31 and 32 so that there will be little or no interference to circulation of liquid in the tank. The cylindrical wall 30 surrounds the outer margins of the filter units F in spaced relation thereto and to the walls of the tank T to the outside thereof.

The heads 32 and 31 are connected to hubs 35 and 36, respectively, journaled for rotation on the tube T at one end and on its extension plug 19 at the other end. Means to rotate the rack is also provided, comprising an internal ring gear 40 which is carried on a plurality of posts 41 that are extended outwardly from the head 32. In mesh with this ring gear is a pinion 42 that is carried fast on a shaft 43 at the driven end of a reduction gear 44 whose housing is suitably mounted on the fixed head 5 of the tank T in sealing connection therewith. The driving shaft 45 of this reduction gear carries a sprocket wheel 46 over which is trained a chain 47 which passes over a second sprocket wheel 48 that is affixed to the shaft 49 of a motor M that is mounted on the top of the tank. With the motor in operation, power is transmitted through the reduction gear and pinion 42 to rotate the rack cylindrical wall 30 about the filter units F which are fixedly carried on the tube T. Alternatively a crank (not shown) may be connected to the pinion shaft 43 to provide for hand operation of the rack.

Between each pair of filter units there is arranged a pair of brush bars 50 each of which carries an associated brush 51 whose bristles

extend outwardly into engagement with the filter media covering the flat plates **25** or **26** of the proximate filter unit. The brush bars **50** extend chordwise of the plates **25** and **26** and tangential to the tube T, their opposite ends **52** being squared for sliding, non-rotatable reception within confronting channels **53** formed in supporting bars **54** which are carried by the cylindrical wall **30** of the rack and extended lengthwise thereof on its inner face. Bolts **55** may be employed to secure the supporting bars **54** in place, as best shown in Fig. 3. In such a floating mounting blocks **56**, desirably resilient, are inserted between the squared ends **52** of each pair of brush bars to assure the adjustment thereof, lengthwise of the supporting bars **54**, that is requisite for an equalized pressure-engagement of their brushes **51** with the confronting faces of all the filter units.

When the operation of filtering has continued to the point that the filter units require cleaning, the circulation of liquid within the tank is shut off by proper manipulation of the valve at the inlet **15**. A valved drain outlet **60** at the bottom of the tank T is also opened to free any liquid undergoing filtering from its confinement within the tank. Fresh water is then admitted through a valved inlet **61** at its top of the tank to flush out its interior. The motor M is then started to produce rotation of the rack R and of the brush bars **50** carried thereby. In this operation each bar is stroked through an annular path so as to engage with every portion of the confronting face of its associated filter plate thereby to mechanically dislodge from its covering filter media and remove therefrom any accumulated material tending to impair its filtering capacity. The fresh water admitted into the tank while this operation proceeds is effective to carry off the dislodged material which then escapes through the drain outlet **60**. After a few moments of this clean-out operation, the filter units will be cleansed and restored to their full capacity so as to be ready for resumption of further filtering operation. The motor is then stopped to halt rotation of the rack R and of the brush bars carried thereby, the flow of fresh water is shut off, the drain valve is also closed, and the inlet for admitting further liquid to be filtered is opened once again to initiate a further filtering operation which will then proceed as theretofore.

I claim:

1. In a filter apparatus of the type wherein a tank encloses a stationary circulation system comprising a tube mounting a plurality of parallel, spaced apart, filter units each having opposed flat faces terminating in an outer circular margin spaced inwardly from the tank walls, the feature of improvement which consists in an elongated brush arranged tangentially of the tube and extending chordwise of a flatface of each filter unit and in engagement therewith for the full length of the brush between spaced points on the outer margin of the filter unit, a common mounting for all the brushes, rotatable coaxially with the tube, to stroke each brush through an annular path defined by the tube on the inside and, on the outside, by the circular path at the outer margins of the filter units, thereby to engage each filter unit for the full area of its flat face for dislodgment of accumulated material therefrom, and means for rotating the brush mounting.

2. In a filter apparatus of the type wherein a tank encloses a stationary circulation system

comprising a tube mounting a plurality of parallel, spaced-apart, filter units each having opposed flat faces terminating in an outer circular margin spaced inwardly from the tank walls, the feature of improvement which consists in a pair of elongated brushes, arranged back-to-back and tangentially of the tube, each brush being extended chordwise of a flat face of one filter unit for engagement therewith, means between each pair of brushes to maintain the same in pressure-engagement with a flat face of one filter unit for the full length of the brush between spaced points on the outer margin of the filter unit, a common mounting for all of the brushes and supporting each brush individually with capacity to shift freely toward and from the filter unit face engaged thereby, the mounting being rotatable coaxially of the tube whereby to stroke each brush through an annular path defined by the tube on the inside and, on the outside, by the circular path at the outer margins of the filter units, each filter unit being thereby engaged for the full area of each of its flat faces for dislodgment of accumulated material therefrom, and means for rotating the brush mounting.

3. In a filter apparatus of the type wherein a tank encloses a stationary circulation system comprising a tube mounting a plurality of parallel, spaced-apart, filter units each having opposed flat faces terminating in an outer circular margin spaced inwardly from the tank walls, the feature of improvement which consists in a pair of elongated brushes, arranged back-to-back and tangentially of the tube, each brush being extended chordwise of a flat face of one filter unit for engagement therewith, for the full length of the brush between spaced points on the outer margin of the filter unit, a common mounting for all of the brushes and supporting each brush individually with capacity to shift freely toward and from the filter unit face engaged thereby, the mounting being rotatable coaxially of the tube whereby to stroke each brush through an annular path defined by the tube on the inside and, on the outside, by the circular path at the outer margins of the filter units, each filter unit being thereby engaged for the full area of each of its flat faces for dislodgment of accumulated material therefrom, and means for rotating the brush mounting.

4. In a filter apparatus of the type wherein a tank encloses a stationary circulation system comprising a tube mounting a plurality of parallel, spaced-apart, filter units each having opposed flat faces terminating in an outer circular margin spaced inwardly from the tank walls, the feature of improvement which consists in a rack comprising a wall surrounding the filter units in spaced relation thereto and to the tank walls and end walls rotatably mounted on the tube, means for rotating the rack about the axis of the tube, brush bars extending between the filter units chordwise thereof and tangentially of the tube, supports for opposite ends of the brush bars carried by the rack and providing therefor a floating mounting wherein the brush bars are free to slide toward and from the adjacent faces of the filter units, to position each brush for engagement for its full length with the confronting face of an adjacent filter unit for substantially the full distance between spaced points on its outer circular margin, the rack when rotated, acting to stroke each brush through an annular path defined by the tube on the inside and, on the outside, by the circular path at the outer

margin of the filter units, thereby to engage each filter unit for the full area of its flat face for dislodgment of accumulated material therefrom.

5. In a filter apparatus of the type wherein a tank encloses a stationary circulation system comprising a tube mounting a plurality of parallel, spaced-apart, filter units each having opposed flat faces terminating in an outer circular margin spaced inwardly from the tank walls, the feature of improvement which consists in a rack having a wall surrounding the filter units and in spaced relation thereto and to the tank walls, means supporting the rack for rotation about the axis of the tube, a plurality of elongated brushes having their ends supported by the rack and each arranged tangentially of the tube, one brush being extended chordwise of a flat face of each filter unit and in engagement therewith for the full length of the brush between spaced points on the outer margin of the filter unit, a ring gear affixed to the rack concentrically of its axis of rotation, a pinion in mesh with the ring gear, and means exteriorly of the tank in driving connection with the pinion for rotating the rack to stroke each brush carried thereby through an annular path defined by the tube on the inside and, on the outside, by the circular path at the outer margins of the filter units, thereby to engage each filter unit for the full area of its flat face for dislodgment of accumulated material therefrom.

6. In a filter apparatus of the type wherein a tank encloses a stationary circulation system comprising a tube mounting a plurality of parallel, spaced-apart, filter units each having opposed flat faces terminating in an outer circular margin spaced inwardly from the tank walls, the feature of improvement which consists in a rack having a wall surrounding the filter units and in spaced relation thereto and to the tank walls,

means supporting the rack for rotation about the axis of the tube, means for rotating the rack, a pair of supporting bars having confronting channels extending lengthwise of the rack wall upon its inner face and spaced apart to lie in a plane substantially tangential to the tube, a plurality of elongated brushes arranged tangentially of the tube and extending chordwise of the flat faces of the filter units and each in engagement with the flat face of one thereof for the full length of the brush between spaced points on the outer margin of the filter unit, opposite ends of each brush being receivable within the channel of the proximate supporting bar and engaging slidingly and non-rotatably therewith, the rack, when rotated, acting to stroke all the brushes through registering annular paths each defined by the tube on the inside and, on the outside, by the circular path at the outer margins of the filter units, thereby to engage each filter unit for the full area of its flat face for dislodgment of accumulated material therefrom.

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