May 30, 1939. R. E. BRIGGS 2,160,534

CONVEYER

Filed Dec. 8, 1933 6 Sheets-Sheet 1

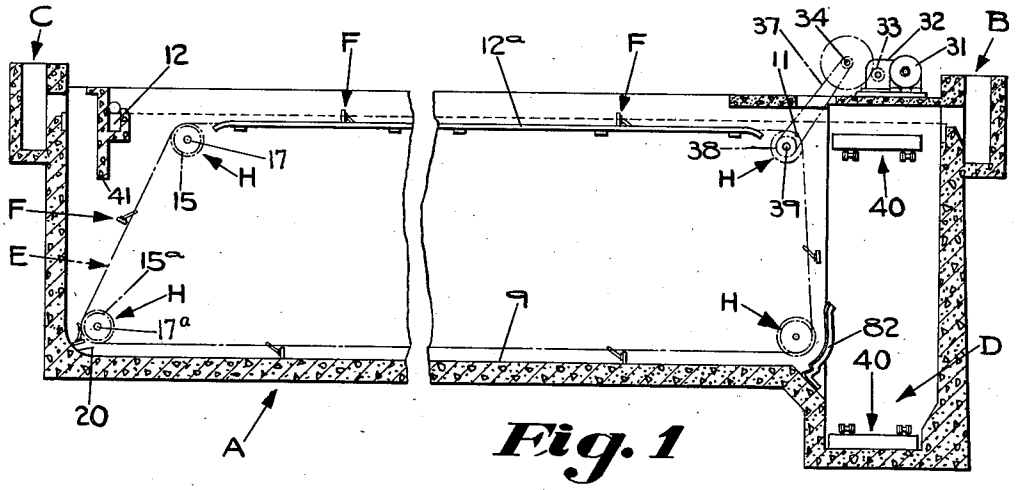


Fig. 1

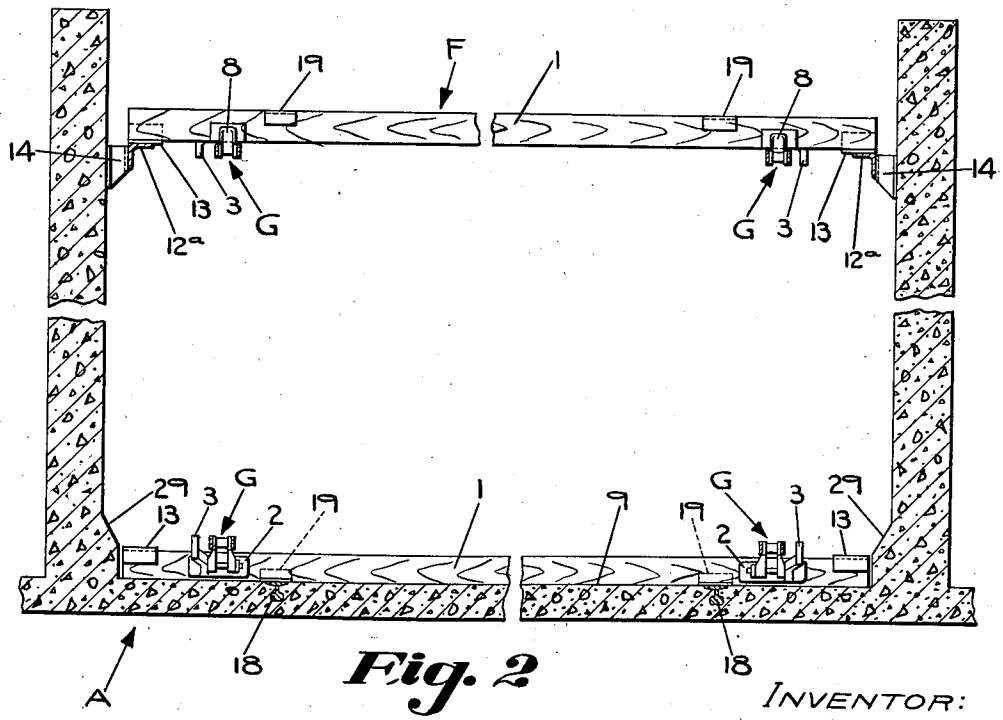


Fig. 2

INVENTOR:
Robert E. Briggs,
BY
Chas. M. Nissen,
ATT'Y.

May 30, 1939. R. E. BRIGGS 2,160,534

CONVEYER

Filed Dec. 8, 1933 6 Sheets-Sheet 2

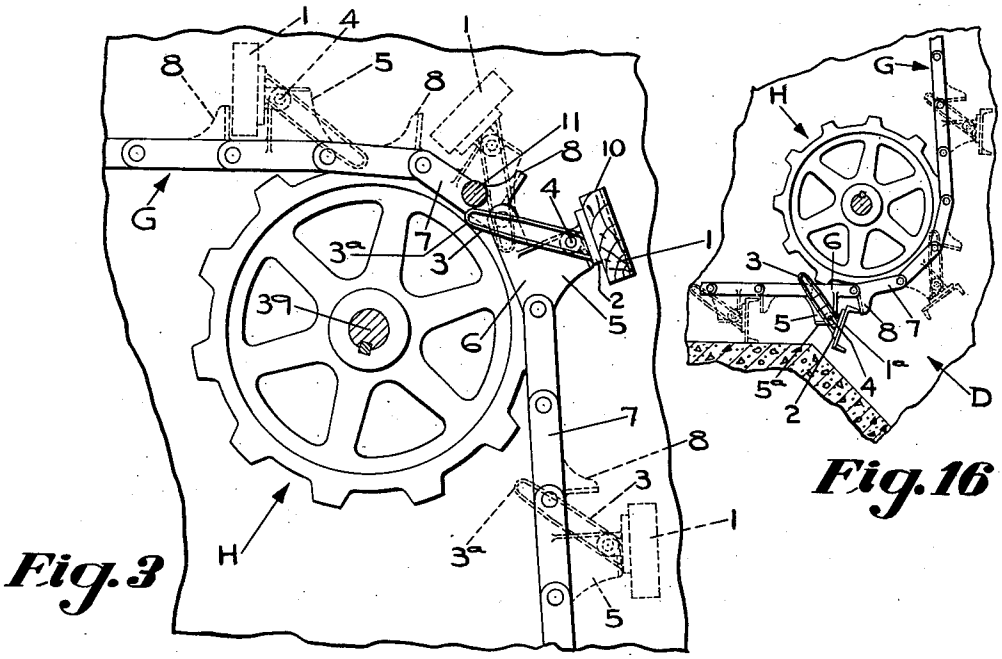
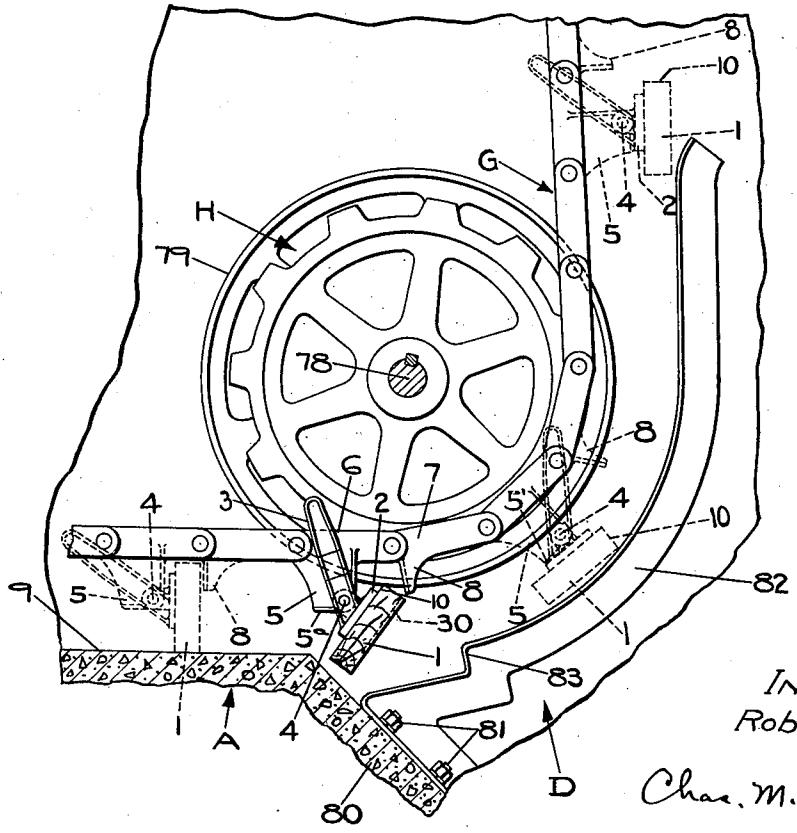


Fig. 3

Fig. 16



INVENTOR:
Robert E. Briggs,
BY
Chas. M. Nissen.
ATT'Y.

May 30, 1939. R. E. BRIGGS 2,160,534

CONVEYER

Filed Dec. 8, 1933 6 Sheets-Sheet 3

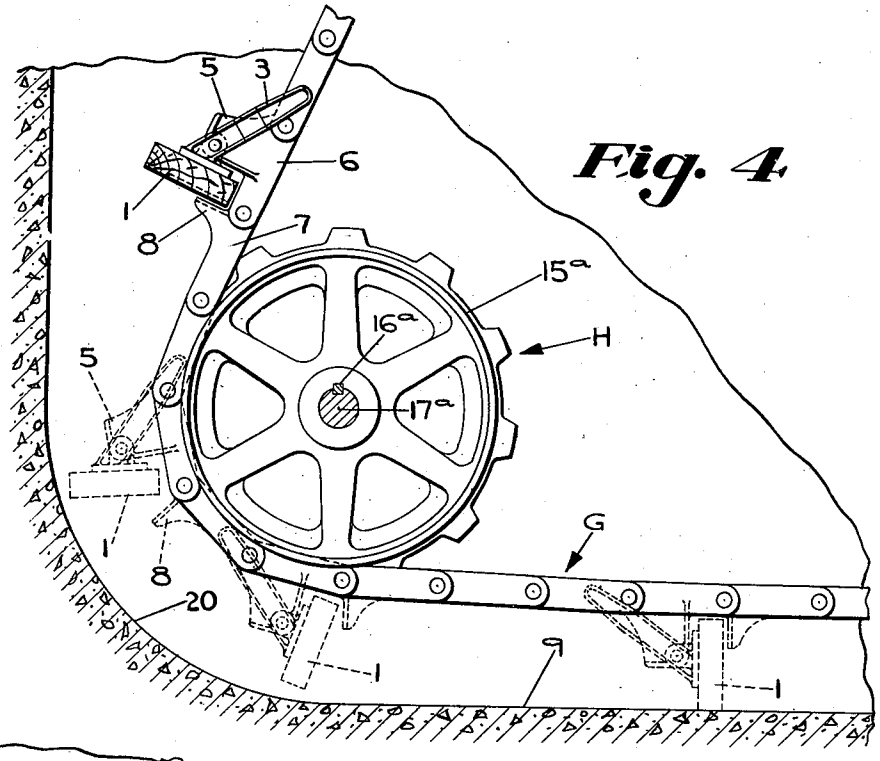


Fig. 4

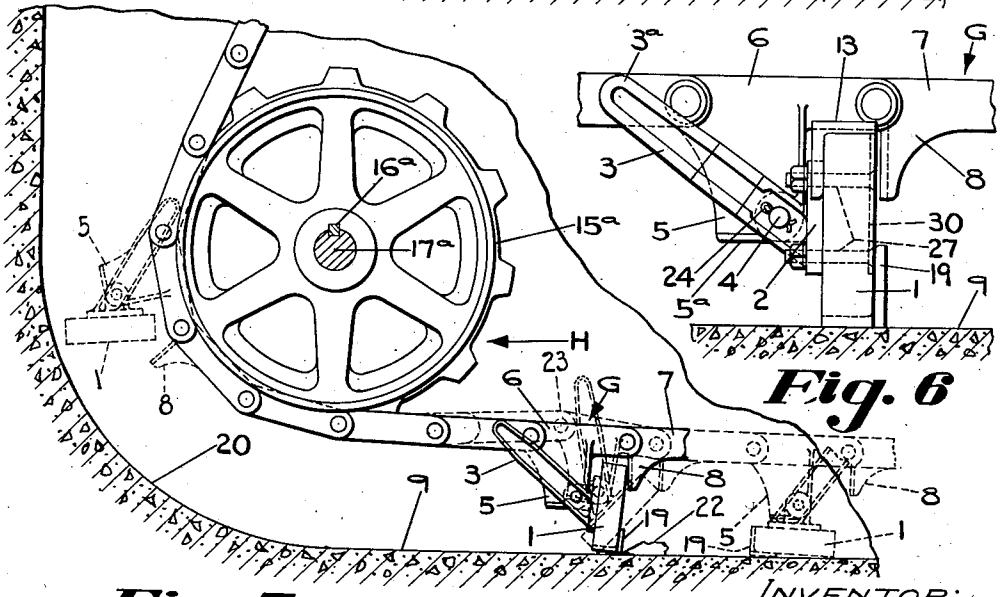


Fig. 6

Fig. 5

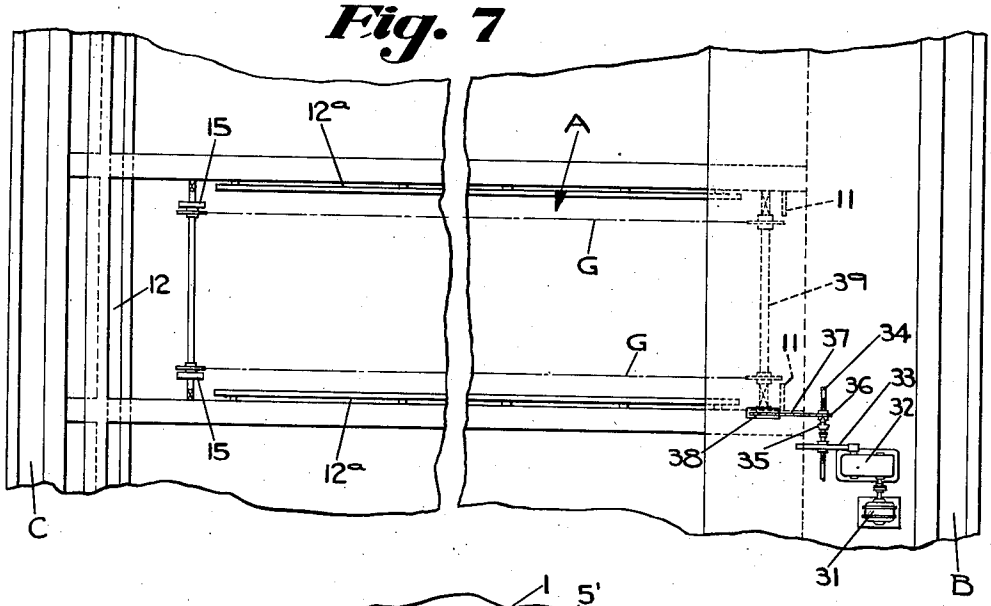
INVENTOR:
Robert E. Briggs,
BY
Chas. M. Nissen,
ATT'Y.

May 30, 1939. R. E. BRIGGS 2,160,534

CONVEYER

Filed Dec. 8, 1933 6 Sheets-Sheet 4

Fig. 7



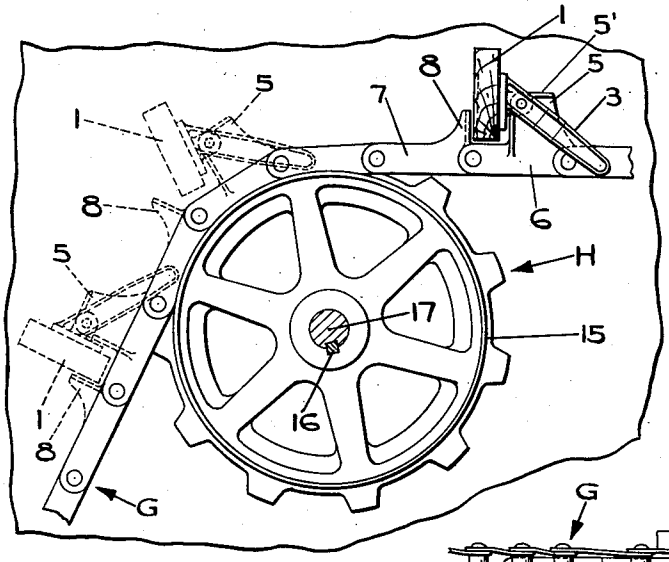


Fig. 8

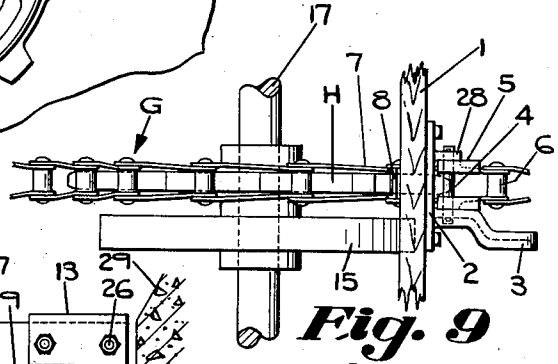


Fig. 9

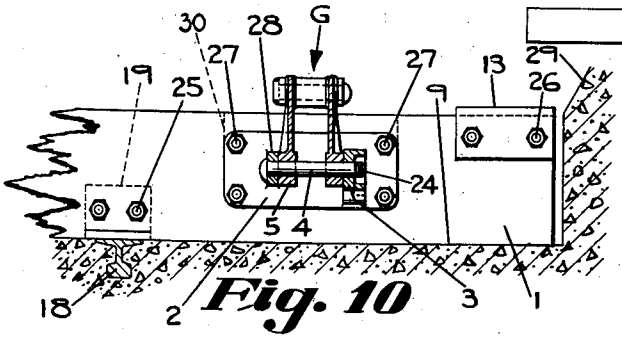


Fig. 10

INVENTOR:
Robert E. Briggs,
BY
Chas. M. Thiesen,
ATT'Y.

May 30, 1939. R. E. BRIGGS 2,160,534

CONVEYER

Filed Dec. 8, 1933 6 Sheets-Sheet 5

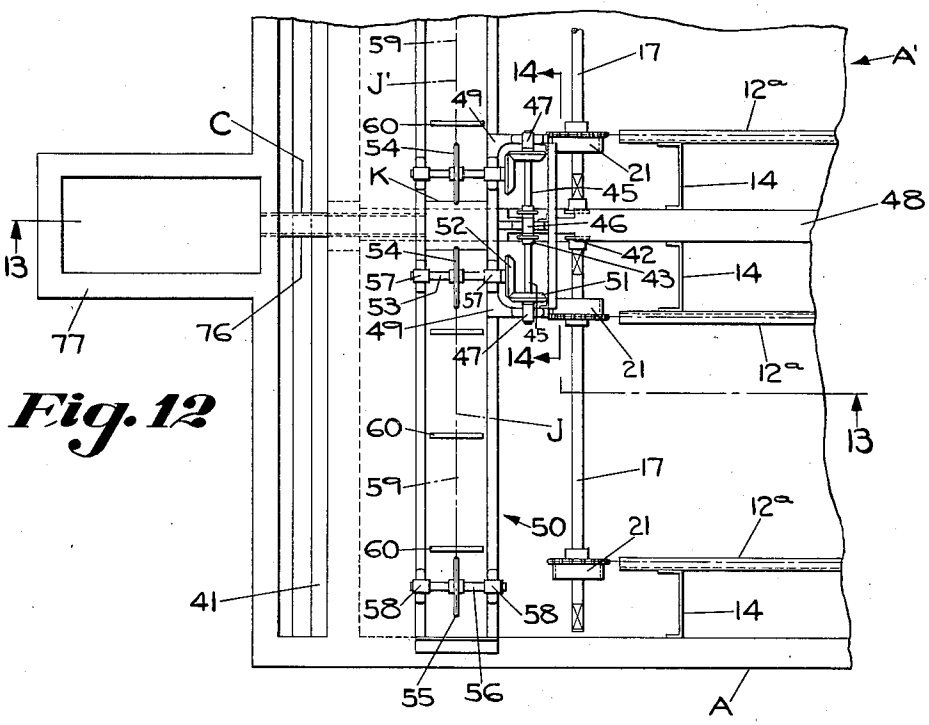


Fig. 12

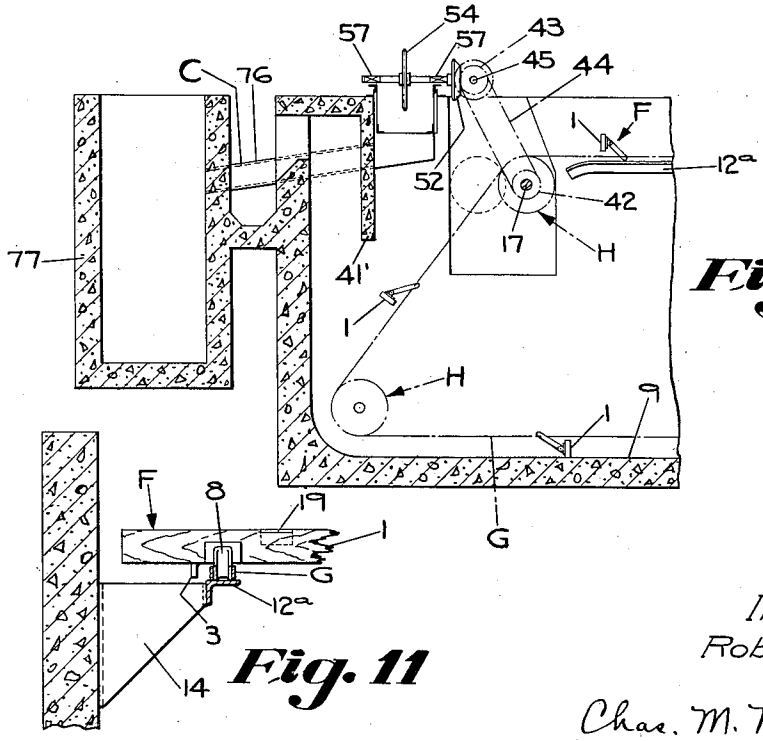


Fig. 13

Fig. 11

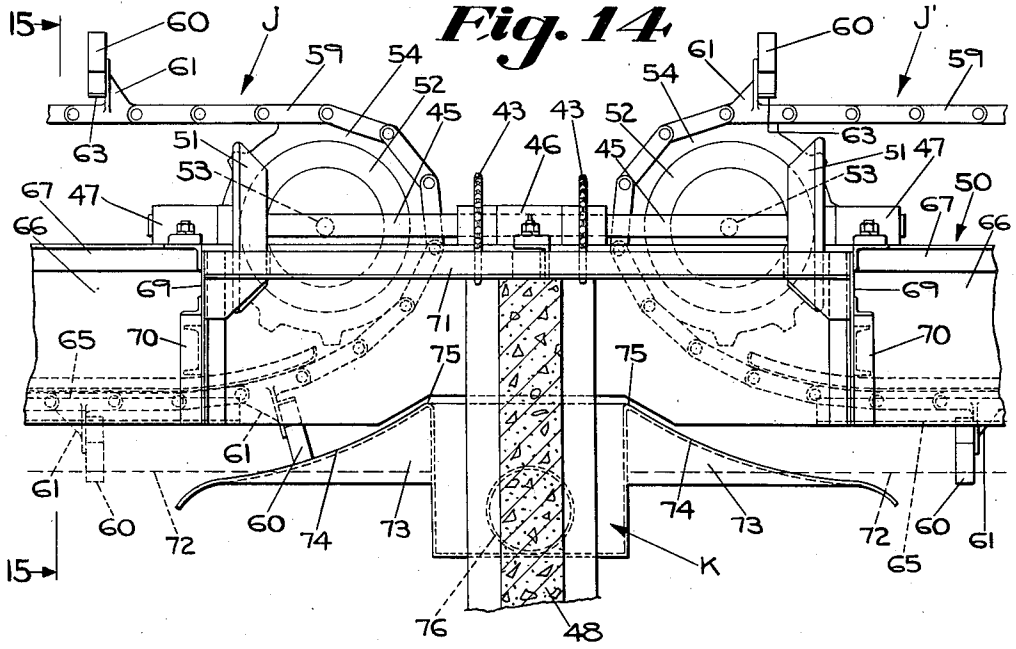
INVENTOR:
Robert E. Briggs
BY
Chas. M. Nissen,
ATT'Y.

May 30, 1939. R. E. BRIGGS 2,160,534

CONVEYER

Filed Dec. 8, 1933 6 Sheets-Sheet 6

Fig. 14



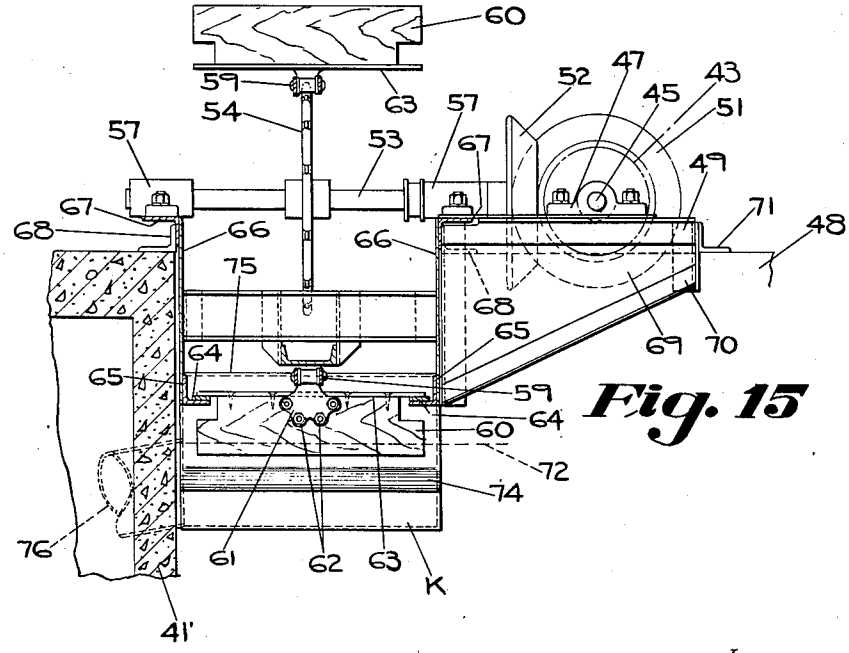


Fig. 15

INVENTOR:
Robert E. Briggs,
BY
Chas. M. Nissen,
ATT'Y.

Patented May 30, 1939 2,160,534

UNITED STATES PATENT OFFICE

2,160,534

CONVEYER

Robert E. Briggs, Columbus, Ohio, assignor to The Jeffrey Manufacturing Company, a corporation of Ohio

Application December 8, 1933, Serial No. 701,549

11 Claims. (Cl. 210—3)

The present invention relates to apparatus for removing solids from liquids and one of its objects is to provide improved and efficient conveyer mechanism in apparatus of this type.

Another object of the invention is the provision of conveyer flights which are adapted to act as collectors, carriers, scrapers and pushers, in a sedimentation tank containing liquids with solids in suspension.

Another object of the invention is to provide improved conveyer flights which are adapted to act as skimmers to collect materials floating on the surface of a liquid in a tank, such as a sedimentation tank employed in sewage disposal installations, the flights acting to collect and push floating scum and other materials to a point of discharge.

More particularly, it is the object of the present invention to provide imperforate flights for traveling conveyers acting as a scraper and pusher along the bottom of a sedimentation tank containing a liquid with solids in suspension therein, in combination with mechanism for shifting the position of the flights as they are lifted through the liquid so as to avoid, so far as possible, a lifting of fibrous solids through the tank, as the flights are transferred from the bottom of the liquid to the surface thereof, the original position of the flights being restored incident to their reaching the surface of the liquid so that the flights may transfer some floating material on the surface of the liquid in the tank to one end thereof for removal therefrom.

Other objects of the invention will appear hereinafter, the novel combinations and features being set forth in the appended claims.

In the accompanying drawings:

Fig. 1 is a longitudinal sectional elevation of apparatus adapted to remove solids from liquids and embodying the present improvements;

Fig. 2 is a transverse sectional elevation of the structure shown in Fig. 1;

Fig. 3 is a detail fragmentary elevation illustrating the position taken by the flights when rising through the sedimentation tank and illustrating one form of mechanism for transfering these flights from operative to inoperative position, and again into operative position;

Fig. 4 is an enlarged fragmentary sectional elevation showing the position of the flights on their descent through the sedimentation tank and their return into scraping engagement with the bottom of the tank;

Fig. 5 is a fragmentary sectional view illustrating the movement of a flight and chain incident to the flight engaging an obstruction in the bottom of the tank;

Fig. 6 is an enlarged elevational view showing the means for securing the flights of Fig. 4 in operative position as the flights move along the bottom of the tank;

Fig. 7 is a fragmentary plan view of a sedimentation tank provided with the improved conveyer;

Fig. 8 is an enlarged elevational view illustrating the position of the flights as they begin their descent through the sedimentation tank;

Fig. 9 is a fragmentary plan view of the parts shown in Fig. 8;

Fig. 10 is a fragmentary view of the rear right-hand end of the lower flight as viewed in Fig. 2;

Fig. 11 is a fragmentary view of one end of the flight during its upper course of travel through the tank, the view illustrating another form of supporting runway for the conveyer chains for preventing sag in the chains;

Fig. 12 is a plan view of the effluent end of two adjacent tanks provided with the improved conveyer, the view illustrating cross conveying means for removing scum or other material floating on the surface and collected by the longitudinal conveyer;

Fig. 13 is a sectional view, somewhat diagrammatic in character, taken on the line 13—13 of Fig. 12 looking in the direction of the arrows;

Fig. 14 is a sectional view illustrating further details of the cross conveyers, the view being taken on the line 14—14 of Fig. 12 looking in the direction of the arrows;

Fig. 15 is a further sectional view, taken on the line 15—15 of Fig. 14 looking in the direction of the arrows;

Fig. 16 is a fragmentary view of the lower corner of the tank, as viewed in Fig. 3, showing the construction when steel flights are employed.

Referring more particularly to the drawings, the sedimentation tank is indicated generally at A, the tank being shown as formed of concrete, the liquid carrying the suspended solids entering at B, and flowing out from the tank at C. At the intake end of the tank there is provided a sump D, for the collection of settled solid matter.

Where the material being treated contains suspended solids of a light, flocculent character, a speedy sedimentation will not be possible, so that the suspended solids will be carried by the fluid currents beyond the sump D, and will settle throughout the extent of the sedimentation tank.

In order to collect these solid materials in the

sump D, there is provided within the tank A a slowly moving conveyor E, conveniently of an endless type, which conveyer carries a plurality of flights F adapted to travel through the liquid with the minimum of agitation thereof.

As will be seen from the drawings, the conveyer E comprises a plurality of flights F, as aforesaid, these flights extending through substantially the transverse width of the tank A, being supported adjacent each end on corresponding sprocket chains G, which chains are driven and guided by sprocket wheels H positioned generally in the upper and lower corners of the tank A.

In addition to flocculent solids of not substantially higher specific gravity than the medium in which they are suspended, where the liquid being treated is sewage, it frequently contains materials of a fibrous and putrescible character, which tends to cling to the flights and be carried thereon around the tank. For preventing this action, certain improvements have been incorporated in the structure of the conveyer, which improvements will now be explained in detail.

It will be observed from the drawings that the flights comprise essentially elongated bars 1, of wood, or 1*a* of steel, which extend substantially across the entire width of the sedimentation tank. Wood, however, is preferred because of its buoyancy and resistance to the action of the liquid in the tank. The buoyancy of wood flights is such that friction between the flights and the bottom of the tank is virtually eliminated, the flights being just held down by the weight of the chains and the metal wearing plates used to protect the flights as will be hereinafter described in detail. The rear surface of each flight is provided with a casting 2 including an elongated arm 3 positioned at a suitable angle to the conveyer flights 1, and pivotally connected at 4 to projecting lugs or extensions 5 which extend from links 6 of the sprocket chains G which carry the flights. The flights may be of any suitable number and positioned at any suitable interval along the chains.

It will also be noted that links 7 of the chains G are provided with abutments 8, these abutments being spaced sufficiently far from the extensions 5 to form an opening with such extensions 5 to receive therebetween the flights 1, the lugs 5 and 8 forming front and rear abutments for the flights as the conveyer moves through the sedimentation tank.

From Figs. 3 and 16, it will be apparent that the flights 1 or the flights 1*a* scrape along the bottom 9 of the tank A, thereby pushing settled sediment along the bottom and into the sump D. Abutments 5 serve as pivotal supports for the flights 1 or 1*a*, and when the lower edges of the flights 1 or 1*a* engage the bottom of the tank, the flights tend to rotate on the axis of pivot 4. This tendency to rotate is resisted by the abutments 8, so that the flights 1 or 1*a* are confined to a vertical position when moving along the bottom of the tank, so that the long faces of the flights will act upon the settled solid materials. It will also be observed from Figs. 3 and 16, that as the chains G pass around the lower sprockets H, the abutments 8 and 5 spread, releasing the flights 1 or 1*a* allowing the flights to drop by gravity incident to the vertical change in direction of the conveyer chains, thereby giving an additional push on the sediment as the latter reaches the sump D, so that this sediment will more readily fall into the sump.

As the progress of the conveyer advances in a vertical plane, it will be observed from Figs. 3 and 16 that the weight of the flights 1 or 1*a* causes them to swing about the pivots 4 so as to present the upper edge faces, 10 of flights 1, to the suspended materials as the flights move upwardly through the tank. It will be noted that during the vertical travel of the conveyer, the flights are supported on the abutment surfaces 5*a* of the abutments 5 in a plane parallel to the path of the chains G as the chains move upwardly through the tank. This turning movement of the flight dislodges substantially all of any fibrous material clinging to the flights.

Very frequently, especially in the treatment or handling of sewage, the solid materials are so light and flocculent and settle with such a degree of slowness that there may be comparatively large amounts of such materials floating at or near the surface of the liquid as the conveyer moves therealong. In order to collect such floating particles, the flights are again turned into operative position as the conveyer assumes a horizontal direction of travel. In order to effect this turning, there are provided pins, or similar abutment members, 11, which extend from the side walls of the tank and engage the rounded ends 3*a* of the arms 3, as will be apparent from Figs. 3 and 7, the arms 3 and rounded ends 3*a* acting as cams to positively turn each of the flights 1 back into operative position. Therefore, as the conveyer chains pass around the upper right-hand sprocket H, as viewed in Figs. 1 and 3, for example, the engagement of the arms 3 with abutments 11 will turn the flights 1 around the pivots 4 and deposit the flights between the brackets 8 and 5 so that each flight will be again in operative position for pushing such floating particles of sediment as may be encountered at or near the surface of the liquid, along through the liquid, and bank the collected particles at a sump 12 adjacent the discharge end of the tank A.

It will be observed that as the conveyer moves along through the upper portion of the tank, the flights extend above the surface of the liquid in the tank. Scum and floating solids are thereby skimmed off and conveyed by the flights to the sump 12, where the materials are banked by the flights. The opening of the sump 12 being above the liquid level in the tank, the floating materials thus collected may be removed by manually raking them into the sump; or the sump may be replaced by conveyer mechanism or the like, of a type illustrated in Figs. 12 to 15 inclusive and which will be described in detail hereinafter.

For supporting the flights 1 in their upper level of travel, the tank A is provided with supporting rails 12*a* adapted to engage the flights 1 under their ends, the flights being provided with renewable wear plates or shoes 13 for protecting the wood of the flights from wear as they move along the rails 12*a*. The rails 12a are conveniently mounted on brackets 14 secured to the walls of the tank A.

After the flights have completed their upper course of travel, they pass around the sprockets H at the left-hand upper corner of the tank A as viewed in Fig. 1 and begin their descent through the tank. Adjacent each of these upper left-hand sprockets H, which sprockets turn with shaft 17, there is mounted on the shaft 17 a cam pulley 15, each of which pulleys is keyed, as indicated at 16, to the sprocket shaft 17.

These cam pulleys 15 are arranged in the path of travel of the arms 3 of the flights, so that these arms engage the pulleys which guide the arms 3 so that the flights 1 will be brought suc-

cessively into position to drop between the abutments 5 and 8 as these close following the passage of the conveyer chains around the sprockets H, the abutments 5 and 8 having spread during travel of the conveyer chains around the sprocket and the flights I becoming released from between the abutments during passage thereof around the sprockets. The pulleys 15 guide the arms 3 so that the flights I come into position between the abutments as the abutments close and the conveyer travels downwardly through the tank.

The lower left-hand sprocket shaft 17a carrying the lower left-hand sprockets H as viewed in Figs. 1, 4 and 5, also is provided with cam or guide pulleys 15a adjacent the sprockets H, and keyed as at 16a to the shaft 17a. These pulleys 15a correspond to the pulleys 15 described above, and are also engaged by the arms 3 as the conveyer passes around the lower sprockets H to travel horizontally along the bottom of the tank.

As the conveyer chains pass around these lower sprockets, the successive abutments 5 and 8 spread, releasing each flight I as the successive flights pass around the sprockets. As the flights are released, the arms 3 thereof engage the pulleys 15a and the arms are guided thereby as they travel around the pulleys so that the flights are held continuously adjacent to the abutments, and in such position that continued engagement of the arms 3 with the pulleys 15a will cause a corresponding turning of each of the flights I about its pivots 4 so that each flight comes into position between its abutments 5 and 8 to scrape the bottom of the tank as the conveyer proceeds on its horizontal course along the bottom of the tank.

It may be here noted that were the guide pulleys 15 and 15a not provided, the buoyancy of the flights in the liquid would tend to prevent proper turning thereof as the conveyer travels downwardly and then horizontally through the tank.

From Fig. 12 it will be seen that sprockets H may be provided with flanges 21, which flanges replace the pulleys 15 and 15a described above. These flanges 21 are positioned in the path of travel of the flight arms 3 and guide the arms and flights as do the pulleys 15 and 15a in the above described operation.

To prevent excessive wear between the flights I and the bottom 9 of the tank, the latter may have inverted rails 18 embedded therein, the flights I being provided with renewable wear plates 19 for engaging the rails 18, the surfaces of which rails are substantially flush with the bottom of the tank.

It will be seen from Fig. 6, that the flights I are closely engaged by the bracket 5 and abutment 8 as the flights move horizontally through the tank, and that the arms 3 are secured on their pivot shafts 4 by means of suitable cotter pins, or the like, 24. It will also be seen that the wear plates 19 and 13 are secured to the flight I by suitable bolts 25 and 26, and that the casting 2 is secured by suitable bolts, or the like, 27.

The construction of this casting 2 is well illustrated in Fig. 10. It will be seen from this figure that the pivot 4 is passed through a lug 28 and through the arm 3, the lug 28 and arm being integral with the casting 2. The bracket 5 serves to connect the chains G with the pivot pin or shaft 4.

The flights I are constructed so as to clear the rounded corner 20 of the tank, but coming sufficiently close thereto so as to effect cleaning of any collected particles which may have settled therein.

It will be also observed that the walls of the tank slope inwardly as indicated at 29 (Fig. 2), the resulting sloping surfaces serving as guides for facilitating the directing of settling particles into the path of travel of the conveyer flights.

The front surfaces of the flights I are provided with removable wear plates 30, secured to the flights by the bolts 27 which bolts pass through the castings 2 and flights I and also through the plates 30, being secured in place by nuts or equivalent fastening devices. The plates 30 are mounted on the front of the flights to take the wear incident to engagement of the flights with the brackets 8.

The conveyer E is driven by a suitable motor 31 acting through a standard type of speed reducer 32, power from which is transmitted through gearing 33 to a countershaft 34 provided with clutch mechanism 35. A sprocket 36 is mounted on shaft 34 and a sprocket chain 37 connects sprocket 36 with a drive sprocket 38 on the conveyer drive shaft 30.

A cross conveyer 40 operating in the sump D removes collected solids from the sump.

As will be seen from Fig. 5, if any one of the flights I should encounter, in the course of its operation, some obstruction in the tank, designated generally at 22, the chain G will buckle, as shown at 23, allowing the flight to be released from abutment 8, whereupon, because of the pivotal mounting of the flight, it drops over on its face and is carried along on its wear plate 19. As soon as the flight is released from its abutment 8, the chain G snaps back into position, and the flight being carried along on its face is already in position to be lifted as shown in Fig. 3, so that the mounting of the flight in the manner described acts as a safety feature in the event that such an obstruction is encountered.

Furthermore, sagging of the chains G in the upper run of the conveyer desirably is to be avoided, in order that the flights I may be secured in position to perform efficiently the skimming action previously referred to. For this purpose, the rails 12a may be positioned beneath the chains G as indicated in Fig. 11, so that the chains run on the rails and are supported thereby against sagging.

It has been said above that the scum and the like collected by the skimming action of the flights, may be removed by cross conveyers substituted for the sump 12. The details of the cross conveyer mechanism are shown in Figs. 12 to 15 inclusive.

From these views, it will be seen that the sump 12 has been omitted, the baffle wall 41 being retained, however. Fig. 12 shows two sedimentation tanks A and A' positioned side by side, each of the tanks being provided with improved conveyer mechanism described herein. In each of these tanks there is provided cross conveyer mechanism indicated generally at J and J', operating in opposite directions so as to convey collected floating material to a common trough K. The conveyers J and J' being alike in construction, only one need be described in detail.

First considering the driving mechanism for these conveyers, it will be observed that the mechanism includes a sprocket 42 mounted on shaft 17, which sprocket 42 drives a sprocket 43 by means of a sprocket chain 44. Sprocket 43 is

mounted on a shaft 45 journalled in bearings 46 and 47, the bearing 46 being illustrated as mounted on the dividing wall 48 between the settling tanks A and A', while the bearing 47 is mounted on a bracket 49 carried by the framework 50 of the conveyers. Shaft 45 has mounted thereon a bevel gear 51 which meshes with and drives a bevel gear 52 mounted on the end of shaft 53 carried by conveyer frame 50 and which drives the conveyer sprocket 54. Adjacent the outer end of the conveyer frame 50 is mounted a second conveyer sprocket 55 on shaft 56. Shafts 53 and 56 are mounted in bearings 57 and 58 respectively, on the conveyer frame 50.

Conveyers J and J' proper include an endless conveyer chain 59 operating on the sprockets 54 and 55 and carrying the flights 60, preferably of wood, by means of a casting 61 secured to the chain 59 and bolted at 62 to the flights 60. The flights 60 are each provided with a backing plate 63 of steel or other suitable metal, which plate is adapted to ride along tracks 64 carried by angles 65 on the plates 66 of the conveyer frame 50. These plates 66 and angles 67 are bolted to clips 68 anchored in the concrete of the settling tanks. It may be noted at this point that each of the brackets 49 carrying the drive shaft 45 is reinforced by a plate 69, braced by angle 70 and angle 71 as illustrated in detail in Fig. 15.

From Fig. 14, it will be seen that the flights 60 extend just beneath the liquid level indicated by line 72 in Fig. 14 and convey floating material collected by conveyer E into the trough K which is common to the tanks A and A'. This arrangement may be duplicated, of course, as many times as a given installation may require. For facilitating the transfer of these floating materials, inclined guide plates 73 are provided along each side of the trough. The flights 60 scrape the accumulated material along the surface 74 of these plates and over the edge 75 of the trough K, whence the material drops into the trough and empties therefrom through pipe 76 into a well or sump 77, from which the material is removed in any suitable manner.

The conveyers J and J' are of course independently operable, responsive to operation of each conveyer E. The adjacent ends of the shafts 45 are journalled in the bearing 46.

As shown in Fig. 2, the flights F of the upper run of the main conveyer approximately span the space between the inner side walls of the tank. The main conveyer comprises an upright run at the influent end of the tank and along such upright run the flights are moved edgewise or feathered upwardly through the liquid in the tank, as shown in Fig. 3. The main conveyer also comprises a downwardly inclined run spaced below the auxiliary cross conveyer at the effluent end of the tank as shown in Fig. 13. The space between the scum removing run of the auxiliary conveyor and the downwardly inclined run of the main conveyer is free and unobstructed and consequently buoyant material submerged by the flights I of the main conveyer and released when under the auxiliary conveyer may float upwardly directly into the zone of influence of the auxiliary conveyer.

The main and auxiliary conveyers in each compartment of the tank structure are connected by the sprocket chains 44 to operate in unison. As the upper runs of the main conveyers concentrate the floating material across the surfaces of the liquid between the inner walls of the compartments toward and into the zones of influence of the auxiliary conveyers the latter effect further concentration thereof in co-operation with the closely adjacent baffle walls 41' before the material is discharged into the wall supported receiving trough common to the two auxiliary conveyers. The flights I of the main conveyer move along the surfaces of the liquid at their normal levels in the tank compartments rectilinearly toward the baffle walls 41' which extend entirely across the tank compartments in spaced relation to the effluent end walls as shown in Fig. 13.

Where wooden flights are employed, the buoyancy of the flights may counteract, or tend to counteract, the pivotal movement of the flights as the conveyer passes around the lower right-hand sprockets H. Where wooden flights are employed, in order to overcome this tendency and to assure the flights turning edgeways as the conveyer travels upwardly from the tank, the lower right-hand sprocket shaft 78, see Fig. 3, carries a cam pulley 79 mounted centrally of the tank, which engages the edge of the flights I, and moves each flight around pivot 4 until the flight clears abutment 8 as the conveyer chains pass around the sprockets in their ascending travel.

Bolted to the inclined wall 80 of the sump D, by bolts 81, is a stationary arcuate guide 82, Fig. 3, provided with an abtment 83, which abutment is engaged by the flights I as the flights move upwardly through the tank. Abutment 83 acts as a cam to complete the edgeways turning of the flights about the pivot 4; and the arcuate guide 82 is sufficiently close to the path of travel of the flights to prevent the flights from tending to turn broadside to the liquid, and is shaped to follow the path of travel of the flights, thereby guiding the flights into their proper positions until full vertical movement of the flights is assumed. The arcuate guide 82 may be positioned substantially midway between the side walls of the tank, but it is preferred to locate one of these guides adjacent each wall. Likewise, one middle cam pulley 79 may be employed but it is preferable to use two pulleys one adjacent each chain. Where steel flights are employed, the guide 82 is not required, since the weight of the flights is sufficient to cause them to turn about their pivots 4.

It is also to be noted, as best illustrated in Fig. 3, that the releasing of the flight I for pivotal movement is due to the articulation of adjacent chain links 6 and 7 with the consequent withdrawal of the abutment 8 from its contacting relation with the forward face of flight I. Thus, abutment 5 is not an essential element to provide for this normal maintaining of the flight I in an operating position at right angles to the direction of the chains G.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I wish therefore not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

1. Apparatus for separating sediment from liquids comprising the combination with a battery of sedimentation tanks, of a conveyer in each tank adapted to travel longitudinally through the tank, the said conveyer including flights adapted to skim the surface of the tank and to collect in an end portion of the tank materials floating on the

surface thereof, a skimming cross-conveyer in each tank adapted to remove from the respective tanks the materials so collected and to convey the materials to a common discharge point, a trough common to the cross-conveyers for receiving the materials from the cross-conveyers, inclined guide plates for guiding the materials moved by the respective cross conveyers from the tanks into the trough, and mechanism for driving the cross-conveyers from the respective longitudinally traveling conveyers.

2. In sedimentation apparatus, a plurality of elongated settling tanks arranged side by side and having a common dividing wall, an influent opening at one end and an effluent opening at the opposite end of said tanks, a scum trough common to two of said tanks, and supported in a position in said common wall at the effluent end of said common wall and partially above the normal level of the liquid in said tanks, a scum conveying means arranged along said effluent end of said tanks to convey scum along the surface of liquid in said tanks in a direction perpendicular to the longitudinal axis of the individual tank and into said scum trough.

3. In sedimentation apparatus, the combination with tank structure having a plurality of elongated settling compartments arranged side by side and having a common wall, of means providing for influent and effluent at opposite ends of said tank structure, a scum receiver common to the two compartments and supported by the said common wall with the edges of said receiver located above the normal level of the liquid in the compartments, and scum conveying means adjacent to the effluent end of said tank structure in position to convey scum along the surfaces of the liquid in said compartments in directions perpendicular to the longitudinal axis of each individual compartment and into said scum receiver.

4. In sedimentation apparatus, the combination with a tank structure having a plurality of elongated settling compartments arranged side by side and having a common wall, said tank structure having for said compartments an influent opening at one end and an effluent opening at the opposite end, a scum receiver common to said compartments and supported by said common wall in position to extend partially above the normal level of the liquid in said compartments, scum flight conveyer mechanism extending across the tank structure adjacent the effluent end thereof and operable to convey scum to said scum receiver along the surfaces of the liquid in said compartments in opposite directions perpendicular to the longitudinal axis of each individual compartment.

5. In sedimentation apparatus, the combination with a settling tank, of a main conveyer adapted to convey sludge by its lower run and scum by its upper run, a scum receiver, an auxiliary scum flight conveyer comprising a flight projecting downwardly through the surface of the liquid in the tank in position to act positively on the scum moved along the surface of the liquid by the upper run of the main conveyer, means for supporting said auxiliary scum conveyer in position to give said downwardly projecting flight a rectilinear path of travel at right angles to the path of travel of the upper run of said main conveyer, and means for operating said auxiliary scum flight conveyer to effect such positive movement of the scum at right angles to the path of travel of the upper run of the main conveyer and rectilinearly toward said receiver.

6. Apparatus for separating sediment from liquids comprising the combination with tank structure having adjacent compartments, of a conveyer in each compartment adapted to travel longitudinally therethrough, each conveyer including spaced flights adapted to skim the surface of the liquid in the compartment in which located, a skimming cross-conveyer in each compartment adapted to remove from the respective compartments the materials so collected and to convey such materials to a common discharge point, a trough common to the cross-conveyers for receiving the materials from the cross-conveyers, inclined ramps for guiding the collected materials as they are moved by the cross-conveyers from said compartments into said trough, and means for driving said longitudinal conveyers and said cross-conveyers.

7. In sedimentation apparatus, the combination with a settling tank, of a main conveyer spanning the space between the inner side walls of the tank and adapted to convey sludge by its lower run and scum by its upper run, a scum receiver comprising a trough in one side wall near one end of the tank, an auxiliary scum flight conveyer comprising a flight projecting downwardly through the surface of the liquid in the tank in position to act positively on the scum concentrated at said end of the tank by the upper run of the main conveyer, means for supporting said auxiliary conveyer in position for its flight to have a rectilinear path of travel substantially entirely across said end of said tank at right angles to the path of travel of the upper run of the main conveyer, and means for operating said conveyers to cause the upper run of the main conveyer to positively transfer floating material from the entire width of the liquid surface in the tank toward said auxiliary conveyer to there concentrate such material into the zone of influence of such auxiliary conveyer and to cause the latter to take control of the concentrated material and still further concentrate the same by such right angle transfer toward and into said scum trough in the side wall of the tank at said end thereof.

8. In sedimentation apparatus, the combination with a settling tank, of a sludge well adjacent the effluent end of said tank, a main conveyer having a sludge removing run movable along the bottom of said tank toward the influent end thereof and a scum removing run movable along the surface of the liquid in the tank toward the effluent end thereof, an auxiliary cross-conveyer adjacent the effluent end of the tank, means comprising a scum trough in one of the side walls of the tank adjacent the effluent end of the tank for receiving conveyed floating material from said auxiliary conveyer, means affording a passageway for receiving effluent discharged from said tank free of floating material, and means affording a conduit extending from said trough through one end of said side wall and transversely of said effluent passageway into said sludge well, and means for operating said conveyers to concentrate floating material into the zone of influence of said auxiliary conveyer and further concentration by the latter before discharge into said scum trough for passage from the latter through said conduit into said well while sludge is conveyed toward the influent end of the tank and effluent free of floating material flows into said effluent receiving passageway.

9. In sedimentation apparatus, the combina-

tion with a tank, of a main flight conveyer having a lower run movable along the bottom of the tank to convey settled matter toward one end of the tank and an upper run for conveying floating material along the surface of the liquid in the tank toward the other end of the tank, said runs being connected by an upright run at that end of the tank toward which settled matter is moved and by an inclined run at the other end of the tank, said conveyer embodying means for effecting feathering of the flights along the upright run and the holding thereof for flatwise movement along the other runs, an auxiliary conveyor having a scum removing run along the surface of the liquid in the tank above said inclined run, and means for operating said conveyers to cause the upper run of the main conveyer to concentrate floating material toward and into the zone of influence of said auxiliary conveyer and to cause the auxiliary conveyer to further concentrate such floating material preparatory to discharge from the tank, the zone of influence of the auxiliary conveyer being above the said inclined run with the space between the scum removing run of said auxiliary conveyer and said inclined run free and unobstructed to permit buoyant material submerged by said inclined run to float upwardly when released into the zone of influence of said auxiliary conveyer.

10. In sedimentation apparatus, the combination with a tank having a plurality of elongated settling compartments arranged side by side and having a common wall, of influent and effluent means for said tank structure, a scum receiver common to said compartments and supported by said common wall, scum conveyer mechanism extending across the tank and operable to convey scum to said scum receiver in opposite directions perpendicular to the longitudinal axis of each individual compartment.

11. In sedimentation apparatus, the combination with a tank structure having a plurality of elongated settling compartments arranged side by side and having a common wall, of influent and effluent means for said tank structure, a main conveyer in each settling compartment adapted to convey sludge by its lower run and scum by its upper run, a scum receiver common to said compartments and supported by said common wall, auxiliary scum conveyer mechanism extending across the tank structure in position to act positively on the scum moved along the surface of the liquid by the upper run of the main conveyer and operable to convey scum to said scum receiver at right angles to the upper run of the main conveyer and rectilinearly toward said receiver.

ROBERT E. BRIGGS.