

Dec. 8, 1942.

L. H. KESSLER

2,304,573

SCREENING APPARATUS

Filed Nov. 22, 1939

2 Sheets-Sheet 1

Fig. 1.

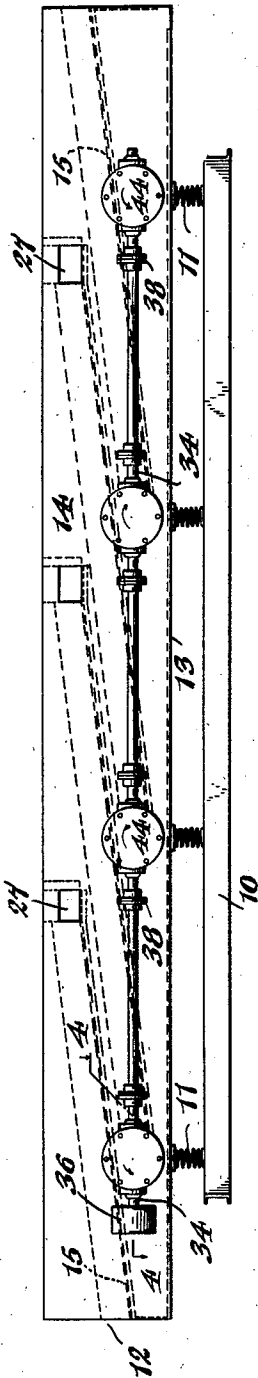


Fig. 2.

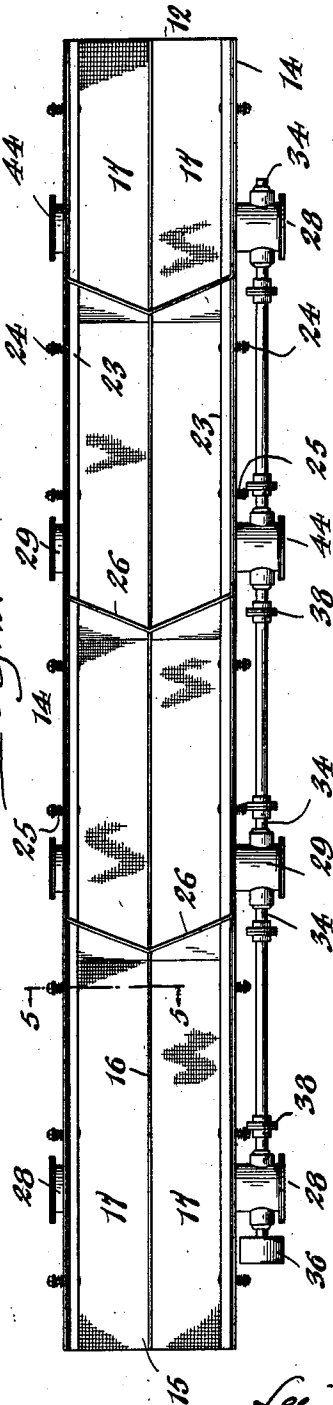
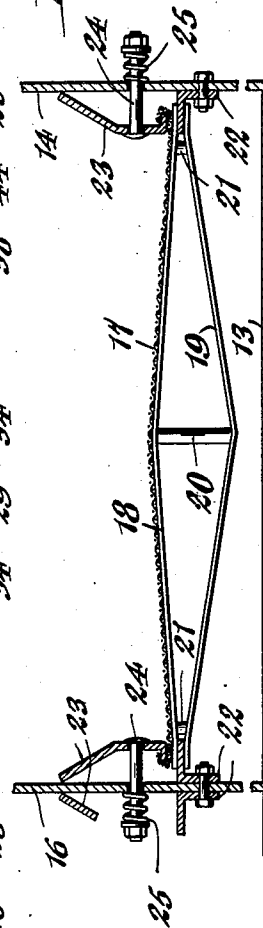


Fig. 5.



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2 Sheets-Sheet 2

Fig. 3.

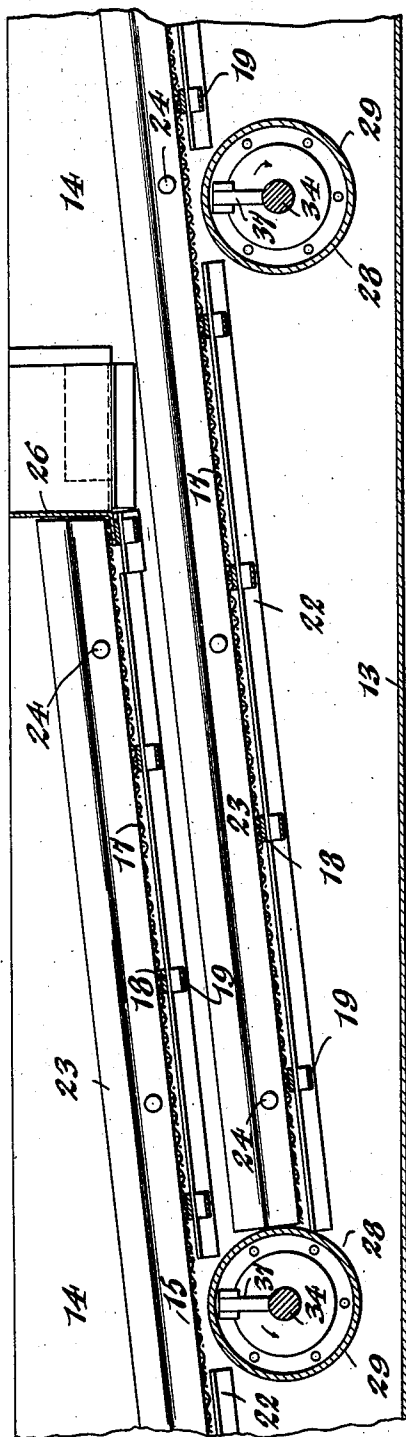


Fig. 6.

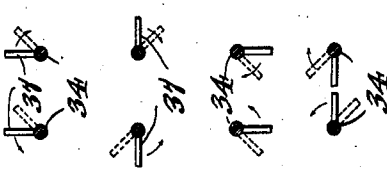
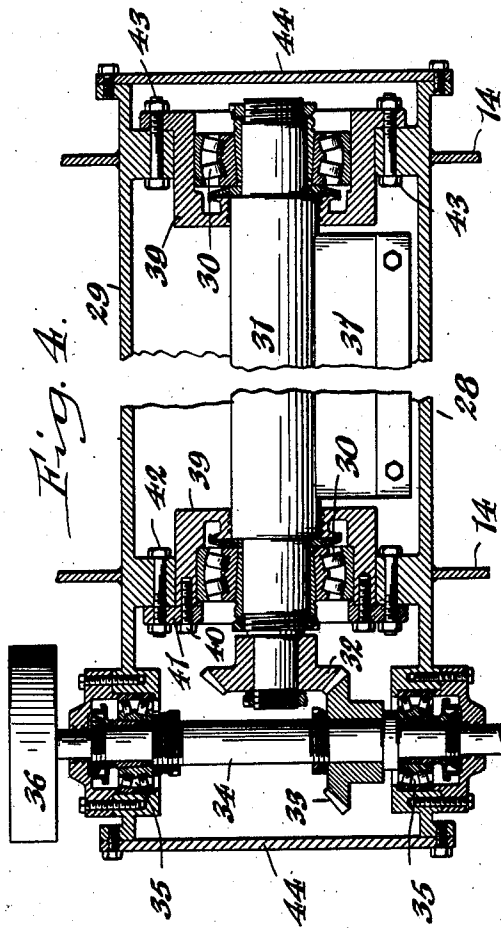


Fig. 4.



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SCREENING APPARATUS

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Application November 22, 1939, Serial No. 305,688

2 Claims. (Cl. 209—367)

This invention relates to new and useful improvements in vibrating screens but more particularly to an apparatus for separating or sizing the material as well as washing the material during its separating action.

It has for one of its objects to provide a simple and efficient screening apparatus of large capacity which is designed for screening different sizes of material in a minimum period of time, and which also permits different materials to be screened at the same time.

Another object of the invention is to provide a screening apparatus of this character having novel means distributed symmetrically from end to end thereof for effectually and uniformly vibrating the screen body throughout its length and which means are adjustable so that any desired directional vibrating stroke between the vertical and the horizontal may be transmitted to the screen body, depending upon the particular material being screened.

A still further object is to provide the apparatus with simple and effective screen cloth tensioning and attaching means, whereby the cloth may be easily and quickly changed and adjusted to the degree of tension desired.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a side elevational view of the screening apparatus embodying my invention. Figure 2 is a top plan view thereof. Figure 3 is an enlarged longitudinal section taken substantially in the plane of line 3—3, Figure 2. Figure 4 is an enlarged, fragmentary horizontal section taken on line 4—4, Figure 1, showing one of the vibrating units. Figure 5 is a transverse vertical section taken on line 5—5, Figure 2. Figure 6 is a diagrammatic view of a pair of vibratory units showing a complete cycle of operation thereof.

Similar characters of reference indicate corresponding parts throughout the several views.

In the preferred embodiment of the invention shown in the drawings, my improved screening apparatus comprises a suitable supporting frame 10 upon which is resiliently mounted, as by springs 11, a live frame or screen body 12. If desired, however, the latter may be yieldingly suspended from an overhead support. The screen body is comparatively long, as clearly shown in Figures 1 and 2, and is substantially trough-shaped, having a bottom wall 13 and side walls

14. Disposed between the side walls and above the bottom of the screen body 12 and overlapping one another lengthwise thereof in communicating relation are a plurality of screen decks indicated generally by the numeral 15. These decks may be of successively smaller mesh from the left hand to the right hand end of the machine, viewing Figure 1, to successively grade the material as it travels from the left or feed end to the right hand end of the machine. The screen body may be set level or at any angle desired, while the screen decks are preferably inclined upwardly, in the manner shown in Figures 1 and 3, so as to deliver the material at a higher point than that at which it is received, the plus material being delivered from the top surfaces of the respective decks and the minus material dropping onto the succeeding decks, with the bottom of the screen body functioning as a receiver or collecting trough for any material passing through the respective decks, and from which trough the material is conveyed to a suitable storage bin.

In the direction of its length, the screen body 12 is preferably divided to provide in effect two independent screening compartments so that the apparatus may be readily adapted for screening different materials at the same time or for screening different sized materials. To this end, there is associated with each screen deck 15 a central longitudinal partition 16 which extends from end to end thereof and each screen deck is composed of two screening sections 17, 17 which are independently supported between the partition and the respective side walls 14 of the screen body, and which may be of different sized mesh depending upon the material being handled at a given time. Each of the screening sections is detachably held in place under tension on a plurality of arched truss bars, each consisting of upper and lower bowed straps 18 and 19, respectively, held in spaced relation centrally between their ends by a vertical spacer 20 and adjacent their ends by similar spacers 21, as shown in Figure 5, the outer free ends of the truss-straps beyond the end spacers embracing the horizontal flanges of suitable supports or angle irons 22 applied to the opposing faces of the corresponding body wall 14 and partition 16. These truss bars are disposed in suitable spaced relation lengthwise of the screen body with the screen cloth stretched over them, the opposite edges of the cloth being removably hooked about anchoring or draw plates 23 secured to the body wall and par-

tition by bolts 24 having springs 25 applied thereto for exerting an outward pressure on the plates and a corresponding tensioning action on the screen cloth.

Disposed adjacent the upper or discharge end of each screen deck and between the partition 16 and the side walls 14 of the screen body, are deflectors or baffle plates 26 which intercept and direct the plus material to one side or the other of the screen body and through corresponding discharge openings 27 formed in the side walls of such body, as shown in Figures 1 and 2, and thence into suitable storage bins provided for receiving such material.

The means for imparting vibration to the screen body for effectually and efficiently screening the material are distributed uniformly from end to end of the body and consist of a plurality of pairs of self-contained gyratory or off-balance units 28 which are disposed in a row lengthwise of the screen body in suitable spaced relation, the number of pairs of units employed depending upon the length of the screen body. In the drawings, by way of example, four of such units or two pairs have been shown, and in operation one unit of a pair is driven in one direction while the companion unit is driven at the same speed in the opposite direction, means being associated with each vibratory unit for adjusting its directional vibrating stroke at any plane desired between the vertical and the horizontal, or for adjusting it to produce circular motion. In their preferred construction, each of these vibratory drive units is constructed as follows:

The numeral 29 indicates a cylindrical housing extending transversely of the screen body and suitably supported as by welding or otherwise in the side walls 14 thereof. Journaled lengthwise of this housing in appropriate bearings 30, is a driven shaft 31 provided at one end with a gear 32 meshing with a similar gear 33 fixed on a common drive shaft 34 extending lengthwise of the screen body in parallel relation to the adjoining side wall thereof and journaled at different points along the body in bearings 35 borne by the respective housings 29. At one end this common drive shaft is provided with a pulley 36 which may be connected by a belt (not shown) with a suitable force of power. Extending radially from the driven shaft 31 and operating within the housing 29, is a weight 37 which, jointly with the rotation of the corresponding weights in the other vibratory units, imparts the vibratory strokes to the screen body.

For the purpose of adjusting the angular displacement of the drive unit weights 37 to meet a given directional stroke desired to be imparted to the screen body, the drive shaft 34 is divided or made into sectional form, as shown in Figure 2, and mating coupling collars 38 are provided for detachably connecting the shaft-sections at points adjoining the gyratory units 28. By disconnecting these collars and independently turning those portions of the shaft-sections contained within the housings 29, the companion driven shafts 31 are correspondingly turned and their weights readily adjusted to the angular positions desired. After the several adjustments are made the coupling collars 38 are again assembled.

In Figure 4 I have shown the driven shaft assembly so constructed as to enable it to be adjusted to impart a given directional stroke to

the screen body, and in this modified embodiment of the adjusting structure the shaft-bearings 30 are contained in companion front and rear collars 39, the front collar being secured by bolts 40 to a retaining ring 41 which is in turn bolted, as indicated at 42, to the housing 29, while the rear bearing-collar is secured by bolts 43 to the housing. By this construction, should it be desired to adjust the angularity of the weight 37 to suit a given directional stroke to be imparted to the screen body, the gear 32 is moved out of mesh with its companion gear 33, and this is accomplished by disconnecting the bolts 40 and 43 to free the companion bearing-collars 39 to enable the shaft 31 and such bearing collars to be shifted bodily lengthwise of the housing. After the proper adjustment has been effected, the parts are then restored to normal and the bolts 40 and 43 reassembled. Access to the interior of the housing for adjusting purposes is had by removing the covers 44 applied to the opposite ends thereof.

As heretofore stated, the weight-bearing shafts 31 of a pair of vibratory units are driven in opposite directions with the result that the companion weights 37 thereof will at one time turn away from each other and at another time come toward each other to jointly create a vibrating stroke in a predetermined direction, depending upon the initial angular adjustment of the weights. In Figure 6 I have diagrammatically shown, by full lines, a complete cycle of a pair of the vibratory units with the initial setting of the weights substantially vertical to impart a vibratory stroke to the screen body in a vertical plane. By dotted lines in the same figure, a like cycle is depicted wherein the initial adjustment of the weights is at an angle to the vertical so that an angular vibratory stroke will be imparted to the screen body. The shafts 31 are driven uniformly at a comparatively high speed and the respective pairs of vibratory units, so timed that their companion weights reach their respective given points at the same time to impart a uniform vibratory stroke to the screen body from end to end thereof. By setting all of the weights of the several vibratory units in parallel relation and connecting the gears 32, 33 in such a manner as to rotate the respective shafts in the same direction, a circular or gyratory movement may be imparted to the screen body.

By making the screen body 12 in the form of a trough, water may be introduced into the same for effectually washing and cleaning the material during screening operations. In this connection it should be stated that the front ends of the several screen decks or those portions thereof which do not overlap succeeding decks are of a fine mesh so that the minimum fines in the material drop directly into the bottom of the trough-shaped body and are ultimately discharged at the right hand end thereof. When screening damp material, hot air may be introduced into and circulated through the screen body to effectually dry and clean the material during the screening operation. Under such conditions, the top and ends of the screen body may be suitably enclosed.

I claim as my invention:

1. A screening apparatus of the character described, comprising a comparatively long, resiliently-supported screen body, a plurality of pairs of housings extending transversely of and uniformly spaced lengthwise of the screen body, shafts journaled in said housings transversely of

the screen body and having offset weights symmetrically mounted thereon to assume positions in parallel relation to each other at predetermined times in the rotation of their respective shafts, a drive shaft extending lengthwise of said body and operatively connected to said weight-bearing shafts for driving them in unison and the shafts of a pair in opposite directions, and means for adjusting the weight-bearing shafts to radially displace the weights thereof in predetermined initial set positions between the vertical and the horizontal to control the angle of vibration of the screen body.

2. A screening apparatus of the character described, comprising a comparatively long, resiliently-supported screen body, a plurality of pairs of housings extending transversely of and uniformly spaced lengthwise of the screen body,

shafts journaled in said housings transversely of the screen body and having offset weights symmetrically mounted thereon to assume positions in parallel relation to each other at predetermined times in the rotation of their respective shafts, a sectional drive shaft extending lengthwise of said body and operatively connected to said weight-bearing shafts for driving them in unison and the shafts of a pair in opposite directions, said drive shaft including sections journaled in said housing and sections disposed between the same, and means for detachably coupling said shaft-sections whereby to permit the independent angular adjustment of the weight-bearing shafts to predetermined initial set positions to govern the angle of vibration of the screen body.

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