Oct. 2, 1928. 1,685,942

E. DEISTER

SCREENING MECHANISM

Filed May 24, 1926 3 Sheets-Sheet 1

Fig. 1.

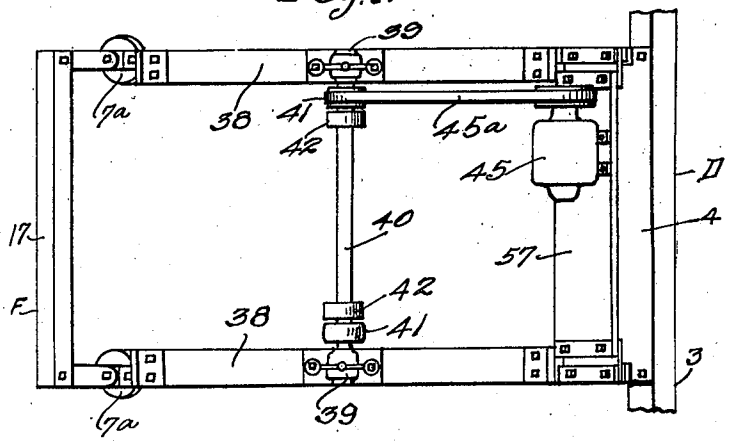


Fig. 2.

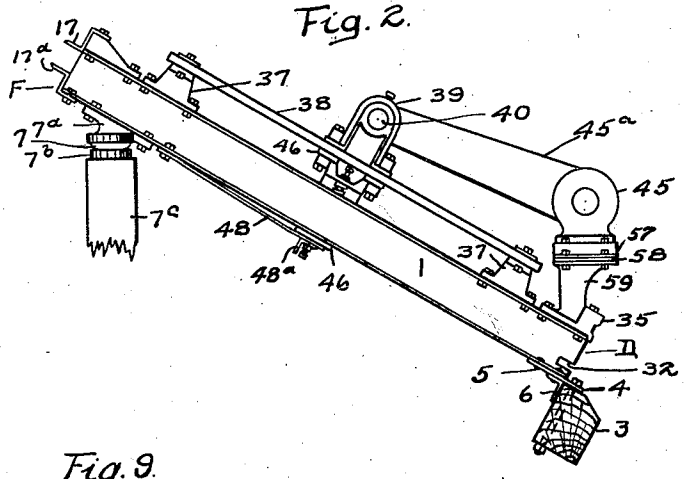
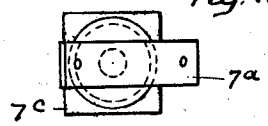


Fig. 11.



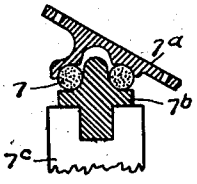


Fig. 12.

Fig. 9.

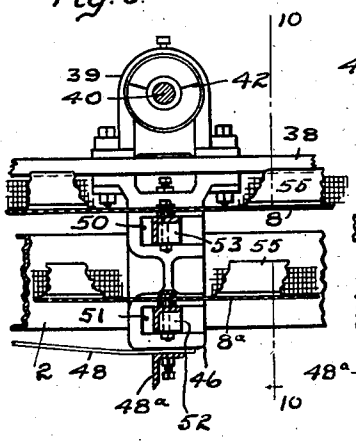
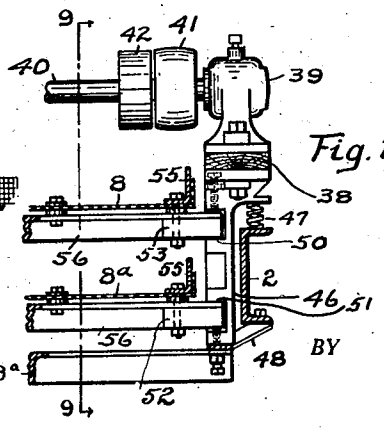


Fig. 10.



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SCREENING MECHANISM

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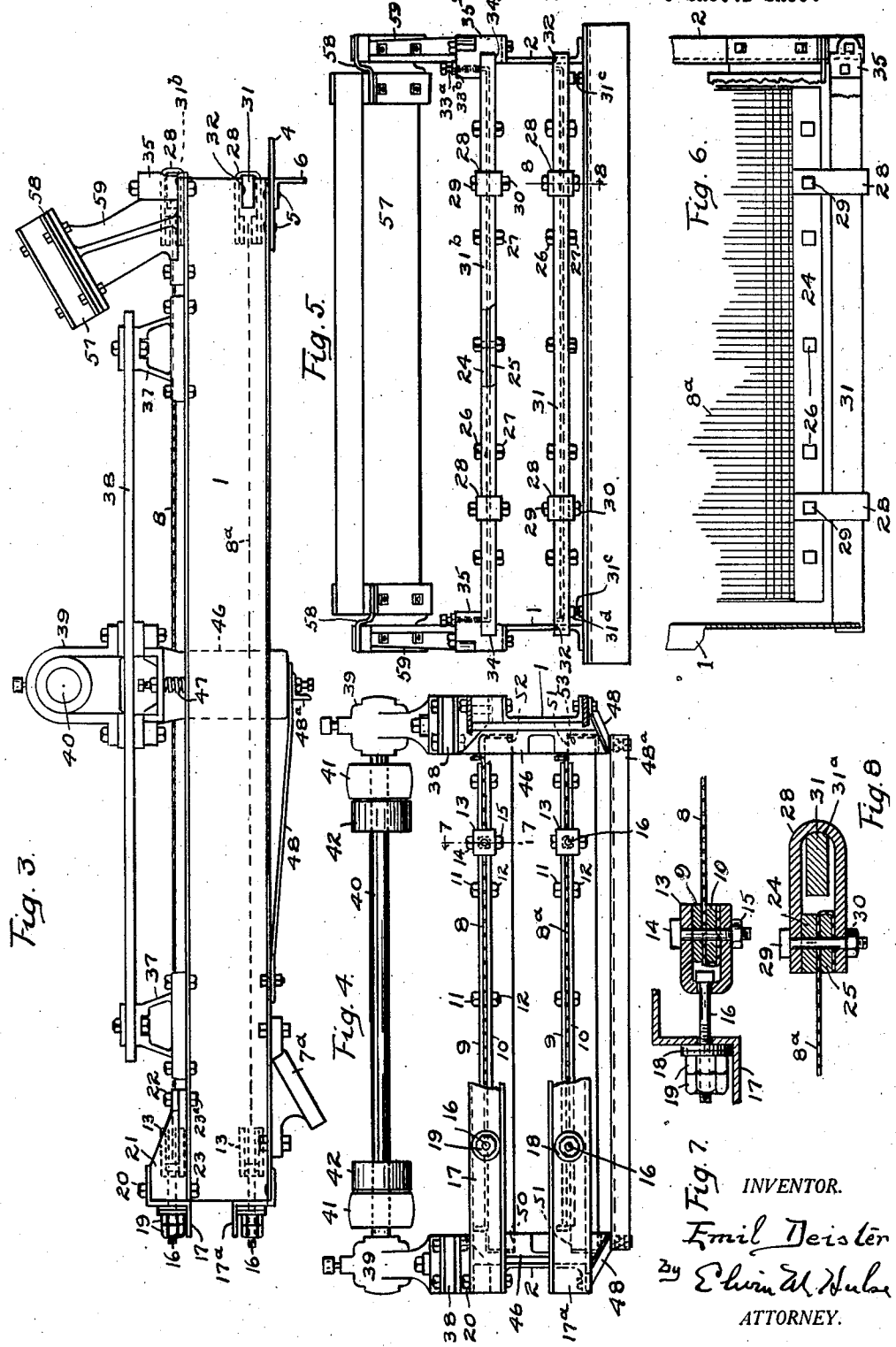


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8

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SCREENING MECHANISM

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Fig. 13.

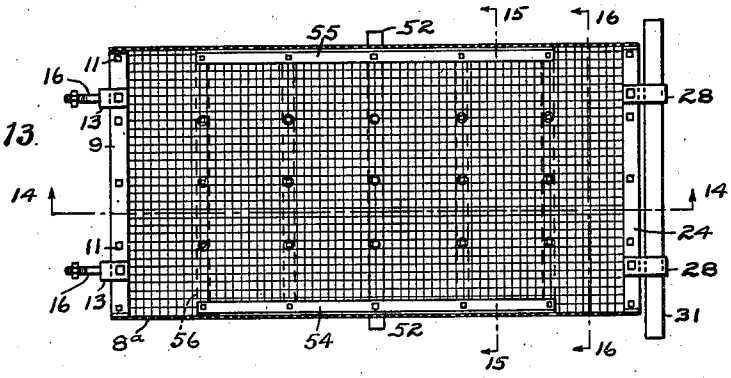


Fig. 14.

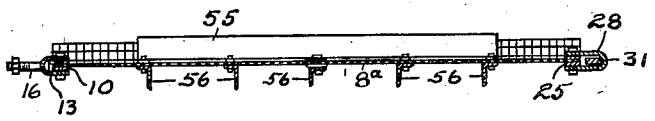




Fig. 15.



Fig. 16.

Fig. 20.

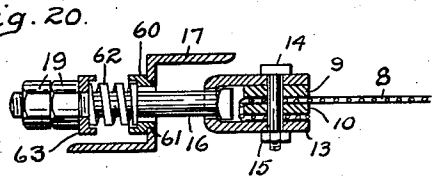


Fig. 21.

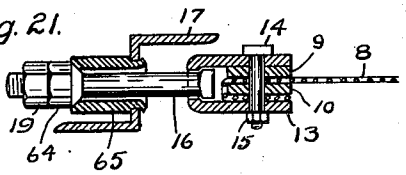


Fig. 19.

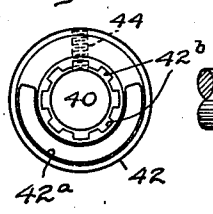


Fig. 17.

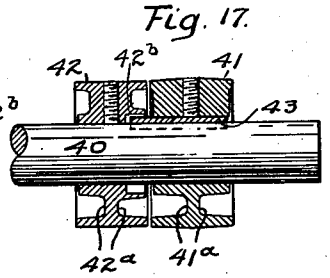
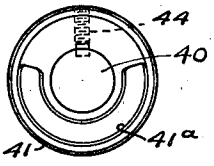


Fig. 18.



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Patented Oct. 2, 1928. 1,685,942

UNITED STATES PATENT OFFICE.

EMIL DEISTER, OF FORT WAYNE, INDIANA.

SCREENING MECHANISM.

Application filed May 24, 1926. Serial No. 111,225.

The invention relates to mechanisms for screening ores, coal, gravel and various other materials.

The object of the invention is to provide a durable and efficient mechanism of few parts and one which is economical to construct and operate.

Another object is to provide a mechanism in which the screening medium is supported and vibrated in novel manner.

Another object is to provide a mechanism in which one screening medium or a plurality of mediums may be used, each medium being removable or attachable as a unit.

The invention consists of a frame upon which one or a plurality of screening mediums are flexibly supported in tension and means to vibrate the mediums so mounted on the frame supporting the mediums that the vibrating movement generated by said means is transmitted directly to the mediums independently of the frame.

The invention is illustrated in the accompanying drawings, in which

Figure 1 is a plan view of a mechanism embodying the invention, the screening medium being omitted; Fig. 2 a side elevational view of the same; Fig. 3 a side elevational view of the mechanism on an enlarged scale; Fig. 4 an end view of the mechanism partly broken away and taken at the feed or upper end thereof; Fig. 5 an elevational view of the discharge or lower end of the mechanism; Fig. 6 a fractional plan view of the discharge end of the mechanism; Fig. 7 a cross-section on line 7—7 of Fig. 4; Fig. 8 a cross-section on line 8—8 of Fig. 5; Fig. 9 an elevational view of the transmitter member taken on line 9—9 of Fig. 10; Fig. 10 a view of the transmitter member taken on line 10—10 of Fig. 9; Fig. 11 a plan view of one of the supports for the upper end of the frame; Fig. 12 a central vertical cross-section of the same; Fig. 13 a plan view of one of the screening mediums; Fig. 14 a cross-section of the medium on line 14—14 of Fig. 13; Fig. 15 a cross-section on line 15—15 of Fig. 13; Fig. 16 a cross-section on line 16—16 of Fig. 13; Fig. 17 a cross-sectional view of one set of the unbalanced members of the vibrating mechanism; Fig. 18 a side elevational view of one of the said members; Fig. 19 a side elevational view of the other of said members; Fig. 20 a cross-sectional view of a modified form of the tension device for the screening mediums, and Fig. 21 another modified form of the said device.

Referring to the illustrative embodiment of the invention, 1 and 2 represent two channel irons that form the side members of the main frame of the device. These channel irons in use rest at their lower ends on a suitable support 3. A tie plate or bar 4 is secured by the rivets 5 to the lower end of the lower flange of each channel by which plate the frame members are tied together, the plate being also bolted to the support 3. An angle iron 6 is secured to the plate and to the lower flanges of both channel irons by one of each of the sets of rivets 5. This angle iron 6 engages the upper side of the support 3 so that the lower end of the main frame is held firmly in its inclined position as shown in Fig. 2. The upper or feed end F rests on cushion rings 7 which in turn are held in their respective positions by means of the socket castings 7^a bolted to the lower flange of each channel, and the cushion ring carrier castings 7^b suitably secured to the posts or beams 7^c. This particular arrangement relieves considerably the extreme strains on the screening mediums and tension bolts during the operation of the device and especially in the starting and stopping of the device. It also materially reduces the amount of objectionable vibration which would otherwise be carried into the sub-structure or supporting foundation of the device.

In operating position the device is inclined quite sharply so that the feed end F is much higher than the discharge end D, the material to be treated being fed adjacent to the end F. In the drawings I illustrate a device having two screening mediums 8 and 8^a, each medium being insertable or removable as a unit. I may adapt the mechanism, however, for any desired number of screening mediums. At the upper end of each medium two bars 9 and 10 are disposed upon opposite sides of the medium and rigidly secured thereto by the bolts 11 and nuts 12, the extremity of the medium being bent over and under the lower bar 10. At selected points in the bars 9 and 10 clevises or loops 13 are secured to the bars by the bolts 14 and nuts 15 and a bolt 16 is projected loosely through the upright wall of each clevis or loop and through an opening in a Z bar 17. Gaskets 18 of leather or

other suitable material are disposed upon the projecting outer ends of the bolts 16 and lock nuts 19 hold the bolts in adjusted position. At this particular place, however, I prefer to use the arrangement shown in Figure 21 in which a cone-shaped nut 64 fits into the correspondingly coned end of a sleeve 65, mounted in Z bar 17. This cone-shaped nut serves to hold the bolt 16 in central position. The upper Z bar 17 is secured to the top side of the spacer castings 21 disposed on the channel irons and secured thereto by the bolts 20 and 22 and nuts 2 and 23[a]. The lower Z bar 17[a] is inverted relatively to the upper Z bar 17 and is suitably bolted or riveted to the lower flange of the channel irons.

At the opposite end of each screening medium are two bars 24 and 25 similar to the bars 9 and 10 and similarly attached to the screening mediums respectively by the bolts 26 and nuts 27. At points in said bars 24 and 25 and in longitudinal alinement with the clevises or loops 13 are secured two loops or clevises 28 by the bolts 29 and nuts 30. A bar 31 is loosely extended through both clevises on the lower medium and is seated in the notches 32 formed in the ends of the channel irons. The outer edge of the bar 31 is rounded off at each clevis as shown at 31[a] (Fig. 8) and the adjacent inner wall of the clevis is curved correspondingly so that the clevises may rock more or less on the bar. The bar 31[b] for the upper medium is similar to the bar 31 and it is similarly disposed in the clevises on the upper medium. Its opposite ends are engaged in notches 34 formed in the castings 35 that are secured to the upper flanges of the channel irons. Set screws 31[c] with lock nuts 31[d] are mounted at suitable points in the bar 31 to prevent the bar from rattling in the notches 32. The bar 31[b] for the upper medium is similarly prevented from rattling by the set screws 33[a] and the lock nuts 33[b] mounted in the castings 35.

By adjusting the nuts 19, the desired tension is placed upon each screening medium. I have found that a moderate rather than a drum-head tension on each medium is more desirable and effective. The flexible supports formed by the clevises and the bars 31 and 31[b] avoid crystallization and fracture of the screening mediums at their lower ends.

In order to vibrate the screening mediums, I provide the following mechanism: Two chairs 37 are suitably secured to each channel iron, and to the two chairs on each channel iron I rigidly secure a spring or elastic member 38, preferably made of wood. This spring member, though rigidly secured at each end, is free to flex in the center. At a selected point in each spring member, I secure a suitable bearing 39, and support in the bearings a shaft 40. Two sets of unbalanced pulleys 41 and 42 are keyed to the shaft and suitable power may be applied to either pulley of either set. The key 43 prevents revoluble movement of the pulleys on the shaft and the set screws 44 in the pulleys prevent longitudinal movement thereon.

As shown in Figs. 18 and 19 the cut-out portions 41[a] of the pulley 41 and 42[a] of the pulley 42 are quite extensive so that the unbalanced condition of each pulley is of moment. Variations in the extent of unbalancing of the pulleys will be made as desirable. The pulley 42 is formed with a plurality of key-ways 42[b] into any one of which the key 43 may be inserted. The adjustment of this pulley is accomplished by releasing the set screw 44 therein, sliding the pulley from the key, rotating the pulley to cause the selected key-way 42[b] to register with the key and then sliding the pulley back again onto the key and tightening the set screw, thus changing the relation of the unbalanced portion of the pulley 41 to the unbalanced portion of the pulley 42. By this adjustment, a refined control of the vibrating movement of the shaft is possible.

A belt 45[a] is engaged on one of the pulleys and on a pulley attached to the shaft of the electric motor 45. The motor thereby revolves the shaft, the unbalanced pulleys causing a distinct and positive vibration of the shaft, the bearings supporting the shaft, and of the spring members.

In order to transmit this vibratory movement to the screening mediums, I secure the transmitter members 46 to the central point, preferably, of the spring members respectively, the transmitter members depending respectively from the spring members. A spring 47 is disposed between each transmitter member and the top of the channel below it to prevent sagging of the spring members, and to intensify the vibration of said members and of the screening medium. Thin, flat, flexible bars 48, preferably made of spring steel, are secured at one end to the channels and at the other end to the transmitter members respectively. They serve to keep the transmitter members in longitudinal alinement. An angle iron 48[a] is also secured to the transmitter members and serves to keep them in transverse alinement.

Each transmitter member is laterally recessed or pocketed at 50 and 51 to receive respectively the laterally projecting lugs 52 and 53, which are rigidly secured to the angle bars 54 and 55 that are secured to the screening members respectively and adjacent to the side edges thereof. Preferably these bars do not extend to the opposite ends of the screens as I have found in practice that the action of the screening mediums is better when the bars terminate at predetermined points, thereby causing the area of the screening member intermediate the termination of the longitudinal bars 54 and 55, and the two bars 9 and 10 and 24 and 25 to be more flexible than the remaining area of the screening member.

Since the longitudinal bars 54 and 55 are connected to the transmitter members and said members are connected to the spring members, the vibrating movement of the spring members is imparted to the screening mediums.

To uniformly distribute the vibrations over the screening mediums caused by the vibrating bars 54 and 55, I secure the angle irons 56 to the lower side of each said medium at points where needed.

I have found in practice that a small portion of the vibrations generated by the unbalanced pulleys is unavoidably carried into the main frame. In order that said vibrations shall not be imparted to the electric motor, I mount the motor upon a board or bar of suitable material 57 and secure its opposite ends respectively to Z-shaped sheets 58 of rubber, leather, belting or other suitable material. The sheets are secured to the standards 59 respectively, that are secured to the channel irons or are integral with the castings 35. The flexible Z-shaped connections between the motor support and the standards absorb any vibration in the standards occasioned by the vibrating parts, and the motor is thereby protected against injury by such vibrations.

Instead of using only the lock nuts 19 on each bolt 16 at the upper end of the screening mediums, I may insert a sleeve 60 (Fig. 20) in each aperture 61 in the Z bar 17 and provide a recess therein for the reception of one end of the spring 62, the spring being coiled about the bolt which now extends through the sleeve. The opposite end of the spring is received by a cup 63 mounted on the bolt, the lock nuts 19 then holding the cup 63 in adjusted position. This construction, which I prefer to use when the screening member is of very fine mesh, furnishes a resilient tension on the screening mediums.

I prefer to revolve the unbalanced pulleys at a speed ranging from 2000 to 2100 revolutions per minute, and to so construct the unbalanced pulleys that the amplitude of vibration of the spring members and screening mediums will be approximately $\frac{1}{16}$ of an inch. As previously set out, the amplitude of vibration can be controlled by a suitable adjustment of the pulleys 41 and 42.

Numerous modifications in the application of the vibrating movement generated in the spring members by the rotating unbalanced pulleys to the screening mediums are possible. I have illustrated but one such application.

What I claim is:

1. A vibrating screen comprising a main frame, a screening medium supported in tension on the frame, spring members mounted on the frame at opposite sides thereof, a transmitter member connected to each spring member and having engagement with the screening medium, a shaft revolubly supported in bearings rigidly secured to both spring members and means on the shaft to cause the spring members to vibrate as the shaft is rotated.

2. A vibrating screen comprising a main frame, a screening medium supported in tension on the frame, spring members mounted on opposite sides of the frame respectively, a transmitter member connected to the middle portion of each spring member and engaged to the adjacent side edge of the screening medium, a shaft revolubly mounted at its opposite ends directly on the spring members, an unbalanced member secured to the shaft for causing the spring members to vibrate and means to drive the shaft.

3. A vibrating screen comprising a main frame, a screening medium supported in tension on the frame, spring boards mounted on opposite sides of the frame respectively, transmitter members connected to the spring boards respectively, bars secured to the screening medium and extending along the opposite side edges of the same respectively, the transmitter members being connected to the said bars respectively, a shaft revolubly mounted on both spring boards and means on the shaft to cause the spring boards to vibrate when the shaft is rotated.

4. A vibrating screen consisting of a main frame, a screening medium mounted in tension on the frame, spring boards mounted at their opposite ends upon the main frame at opposite sides of the screening medium respectively, bars extending along the opposite sides of the said medium respectively and secured thereto and being parallel to the spring boards, transmitter members secured to the spring boards respectively and secured to the said bars respectively, a shaft revolubly mounted on both spring boards and an unbalanced pulley secured to the shaft for causing the spring boards to vibrate when the shaft is rotated.

5. A vibrating screen consisting of a main frame, a screening medium mounted in tension on the frame, elastic members mounted on the frame and connected to the screening medium independenly of the main frame, a shaft revolubly mounted at its opposite ends in bearings fixed to the elastic members, means on the shaft to cause the latter members to vibrate when the shaft is rotated, means to drive the shaft and a support for the driving means flexibly mounted on the main frame.

6. A vibrating screen comprising a main frame, a screening medium supported in tension on the frame, spring boards mounted on the frame, transmitter means engaging the screening medium and having connection with the spring boards, a shaft revolubly supported on the spring boards and means on the shaft to cause the spring boards to vibrate as the shaft is rotated.

7. A vibrating screen consisting of a main frame, a screening medium supported in ten-

sion on the main frame, two spring boards mounted on the sides of the main frame respectively and extending longitudinally therewith, two bearings secured to the spring boards respectively, a shaft mounted in both bearings, means on the shaft to cause the spring boards to vibrate when the shaft is rotated, and transmitter members secured to the spring boards and adapted to operatively engage the screening medium whereby the vibrations of the spring boards are transmitted to the medium.

In witness whereof I have hereunto signed my name this 20th day of May, 1926.

EMIL DEISTER.