

March 31, 1959

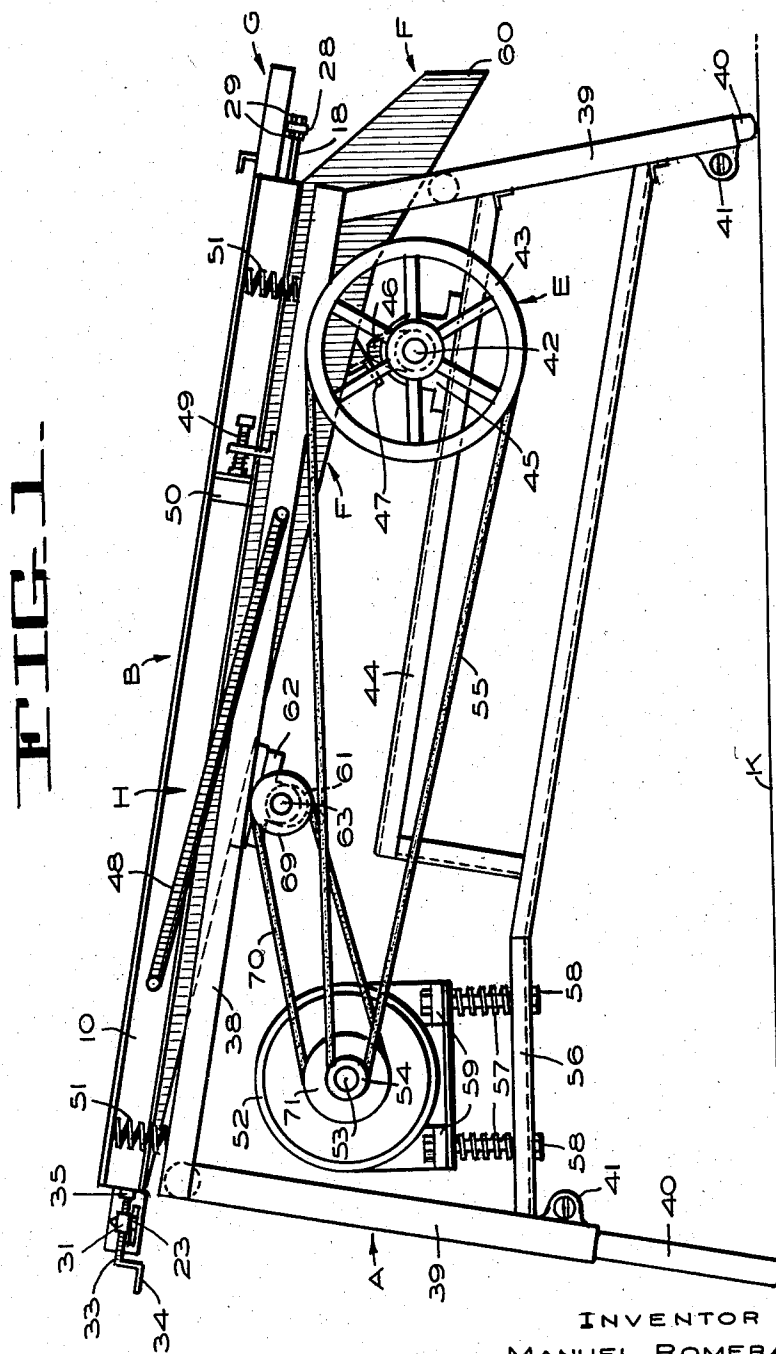
M. ROMERA

2,879,890

ORE-SCREENING AND GRADING MACHINE

Filed Dec. 31, 1956

4 Sheets-Sheet 1



March 31, 1959

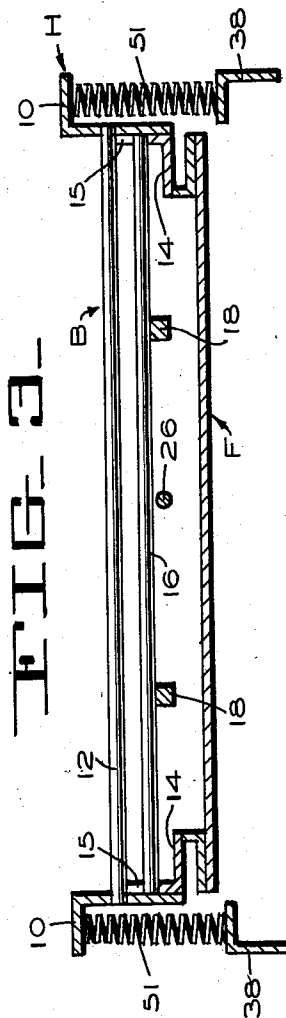
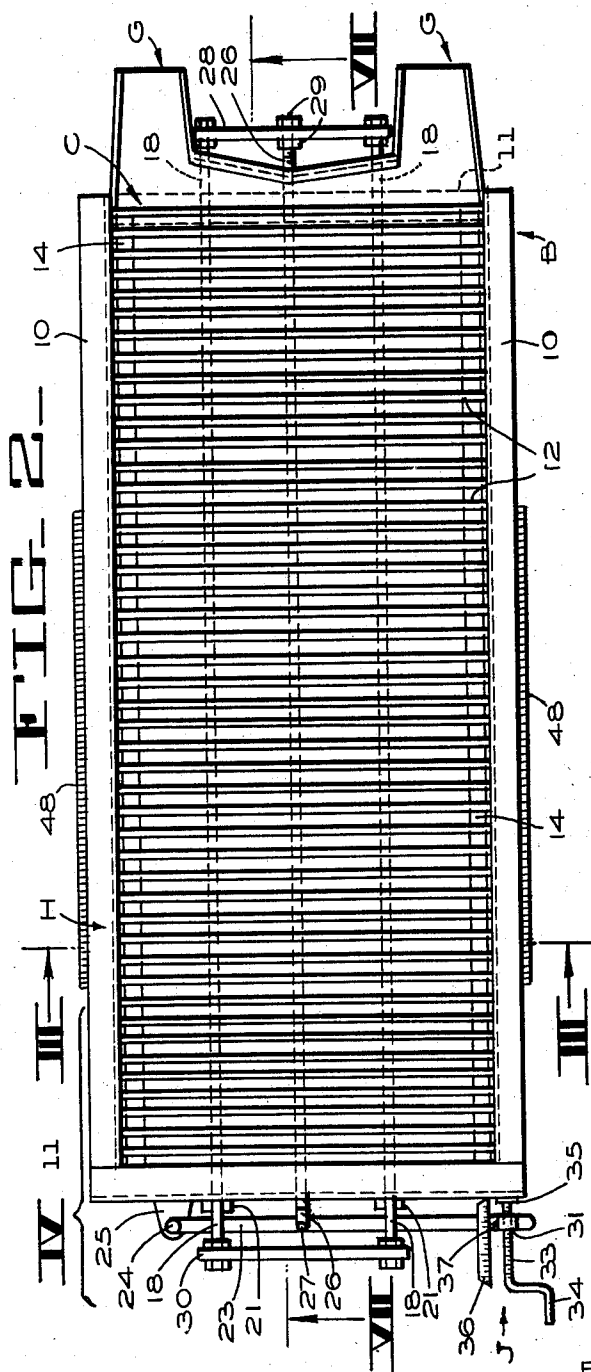
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ORE-SCREENING AND GRADING MACHINE

Filed Dec. 31, 1956

4 Sheets-Sheet 2



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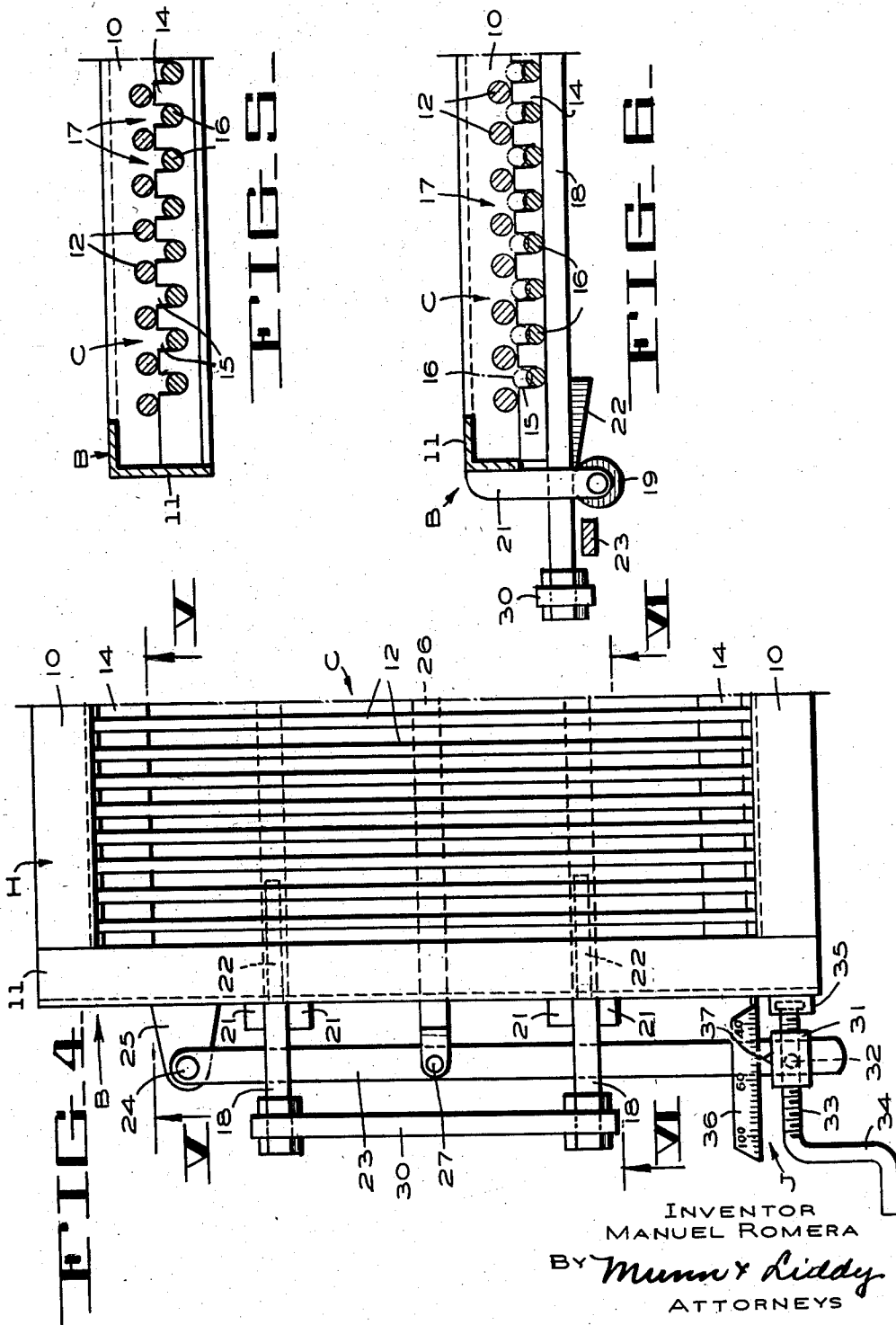
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ORE-SCREENING AND GRADING MACHINE

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4 Sheets-Sheet 3



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ORE-SCREENING AND GRADING MACHINE

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4 Sheets-Sheet 4

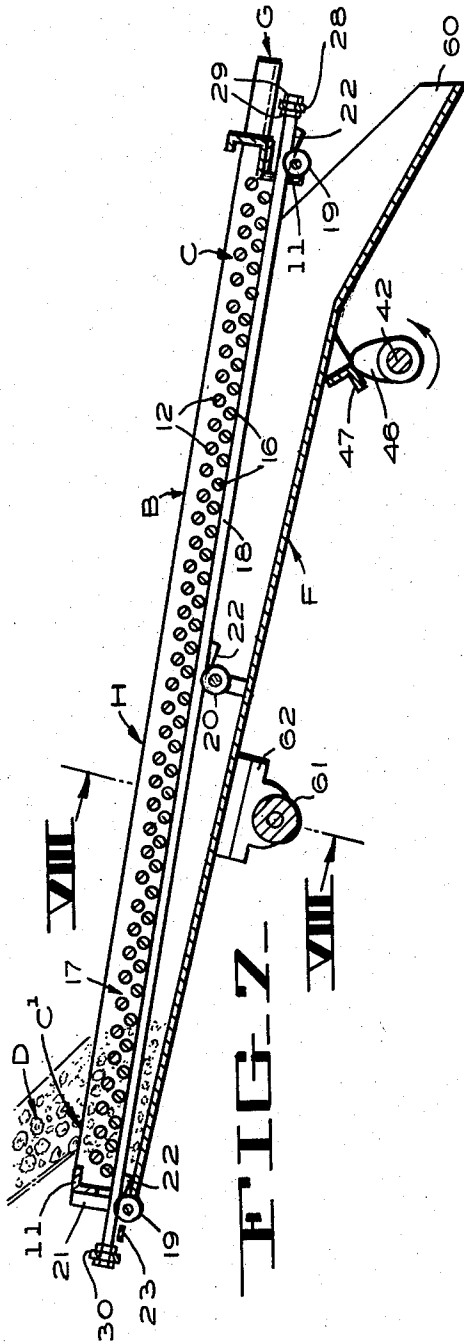
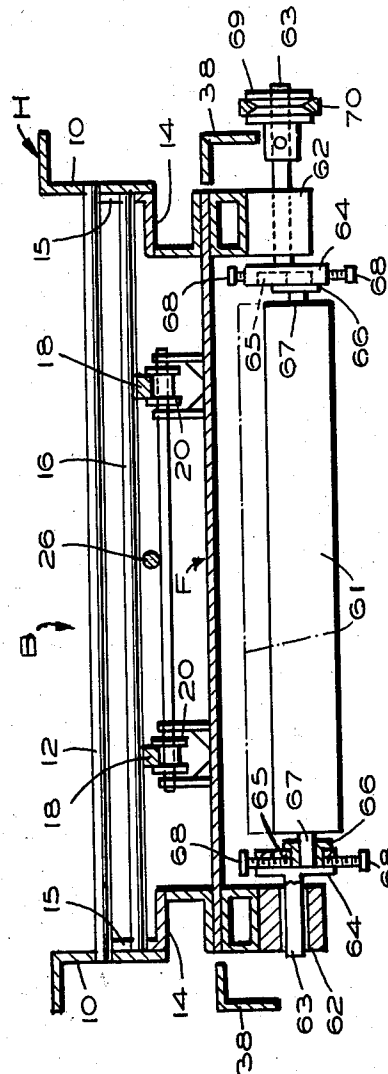


FIG. 7



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ORE-SCREENING AND GRADING MACHINE

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Application December 31, 1956, Serial No. 631,902

2 Claims. (Cl. 209—394)

The present invention relates to improvements in an ore-screening and grading machine. It consists of the combinations, constructions and arrangement of parts, as hereinafter described and claimed.

In the mining art of precious minerals, it is essential that the crushed ore be graded according to certain meshes prior to the reduction of the ore in a smelter. The proper mesh depends upon the particular type and grade of ore being mined.

Accordingly, and as the cardinal object of this invention, it is proposed to provide an ore-screening and grading machine in which the screen may be readily adjusted to thereby obtain the desired mesh of ore. Thus the operator may change the mesh of the screen, depending upon the type of ore being run, and obtain the proper screening out of the oversized tailings.

Moreover, it is proposed to provide a graduated scale on the machine so that the operator may easily adjust the screen to the desired mesh.

Other objects and advantages will appear as the specification continues. The novel features will be set forth in the claims hereunto appended.

Drawings

For a better understanding of the invention, reference should be had to the accompanying drawings, forming part of this specification, in which:

Figure 1 is a side elevational view of my ore-screening and grading machine;

Figure 2 is a top plan view thereof;

Figure 3 is an enlarged transverse sectional view taken along the line III—III of Figure 2;

Figure 4 is an enlarged view of the left-hand portion of Figure 2, as suggested by the bracket IV in the latter;

Figures 5 and 6 are longitudinal sectional views taken along the lines V—V and VI—VI, respectively, of Figure 4;

Figure 7 is a longitudinal sectional view taken along the line VII—VII of Figure 2; and

Figure 8 is a transverse sectional view taken along the line VIII—VIII of Figure 7.

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications, may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed description

In carrying my invention into practice, I provide a supporting frame A that has a shaker table B mounted thereon for back and forth movement. This table is provided with a screen designated generally at C, which is adapted to have ore D placed thereon for screening and grading operations (see Figure 7). The table is reciprocated by a drive mechanism E in the manner hereinafter described, with the fines of the ore below a predetermined mesh, passing through the screen into an inclined trough F (see Figures 1 and 7). At least one discharge chute G is provided to receive the tailings of the ore which will not pass through the screen.

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In its structural features, the shaker table B defines a rectangular-shaped frame H having longitudinally-extending side members 10 and transversely-extending end members 11. Moreover, an upper series of parallel and spaced-apart screening rods 12 are disposed horizontally to extend transversely of the table frame H, with these rods being fixed to the side members 10 (see Figures 3 and 8).

It will be noted from the drawings that angle-shaped guide racks 14 are secured to confronting faces of the side members 10 below the upper series of screening rods 12 (see Figures 2-6 and 8). These guide racks are fashioned with vertically-extending recesses 15 therein. Also, a lower series of parallel and spaced-apart horizontal screening rods 16 are arranged transversely of the frame H, and have their ends guided in the recesses 15 for up and down movement. It will be apparent from Figures 5 to 7, inclusive, that each of the lower rods 16 is interposed between a pair of the upper rods 12, but disposed therebelow.

Referring to Figure 7, it will be observed that the table frame H and its screen C are inclined downwardly in a longitudinal direction. The ore D to be screened is deposited on the upper series of rods 12 at the higher end of C¹ of the screen. The two series of rods 12 and 16 coact to define passageways 17 through which the ore may be screened according to size (see Figures 5, 6 and 7). That portion of the ore, which passes through these passageways, drops into the inclined trough F, while the oversized tailings work their way downwardly over the upper rods 12 for discharge into the chutes G.

For the purpose of varying the effective mesh of the passageways 17 between the two series of screening rods, a pair of bars 18 have been arranged underneath the rods 16 of the lower series to extend longitudinally of the shaker table frame H, with these rods resting on the bars 18. The latter are supported for movement longitudinally of the frame H by flanged end rollers 19 and flanged intermediate rollers 20. The rollers 19 are mounted adjacent to the transverse end members 11, while the rollers 20 are supported by the inclined trough F.

Moreover, the transverse member 11 at the higher end C¹ of the screen has a plurality of depending brackets 21 secured thereto, with a pair of these brackets straddling each bar 18 (see Figures 2, 4, 6 and 7). The purpose of these brackets is to guide the bars 18 for up and down movement.

In order to elevate the bars 18 when they are moved longitudinally toward the higher end C¹ of the screen, that is, to the left in Figures 4 and 7, each bar is provided with three inclined cams 22 on its underneath surface. The outermost cams on each bar are disposed adjacent to the end rollers 19, while the intermediate cam on each bar is presented adjacent to one of the rollers 20.

When the bars 18 are moved toward the left, the cams 22 coact with the rollers to elevate these bars, thereby raising all of the rods 16 in the lower series simultaneously toward the rods 12 in the upper series. This will decrease the mesh of the passageways 17 (see dot-dashed raised rods 16 in Figure 6). Conversely, when the bars 18 are returned to their normal positions, (as shown in Figures 6 and 7), the rods 16 will be lowered again so as to increase the mesh of the passageways.

For the purpose of adjusting the bars 18 longitudinally to thereby vary the effective mesh of the passageways between the two series of rods 12 and 16, I provide a bar-adjusting mechanism J (see Figures 2 and 4). This mechanism includes a swingable lever 23, which is pivotally secured at one end thereof by a pin 24 to a bracket

25. The latter is fastened to the transverse end member 11 at the higher end C' of the screen.

Moreover, the mechanism J includes a connecting rod 26, which is interposed between the bars 18 so as to extend longitudinally of the table frame H. This rod has one end thereof pivotally secured to the lever 23 by a journal pin 27, while its opposite end is adjustably secured to a cross-head 28. For this purpose, nuts 29 are threaded on the connecting rod 26 on opposite sides of the cross-head 28. The latter extends transversely relative to the table frame H and is fixed to the right-hand ends of the bars 18 (see Figure 2). A similar cross-head 30 is provided for interconnecting the left-hand ends of these bars.

Thus it will be apparent that when the rod 26 is pulled to the left in Figures 2, 4, 6 and 7, the bars 18 will be moved in the same direction. This movement will cause the cams 22 to raise the bars 18 and thus elevate the lower series of rods 16 so as to reduce mesh of the passageways 17. Likewise, when the bars 18 are moved to the right again, the rods 16 will be lowered, thus increasing the mesh of the passageways 17. Accordingly, the mesh of the screen C may be readily changed by merely swinging the lever 23 in the proper direction.

In order to swing the lever 23, the latter has a sleeve 31 pivotally secured thereto by a vertically-extending journal pin 32 (see Figure 4). This sleeve has the shank 33 of a crank 34 threaded therethrough, with the shank being rotatably anchored in a bearing 35, the latter being attached to the left-hand end member 11. This end member has a graduated scale 36 fixed thereto so as to project therefrom in parallel relation with the shank 33 (see Figure 4). The sleeve 31 carries a pointer 37, which is positioned to ride along the scale 36 when the crank 34 is rotated. The graduations on this scale indicate the mesh to which the screen C is adjusted. Obviously, the nuts 29 on the connecting rod 26 may be adjusted so that the scale 36 and the pointer 37 will indicate the mesh of the screen with accuracy.

Returning now to the structural features of the supporting frame A, it defines longitudinally-extending side members 38, which are disposed below the side members 10 of the table frame H. The members 38 are supported by legs 39. Each leg is provided with an adjustable section 40, the lower end of which is adapted to rest on the ground or floor K (see Figure 1). Clamps 41 hold the sections 40 in adjusted position. Thus the legs 39 may be adjusted so as to incline the shaker table H to the desired extent so that the tailings of the ore D will gravitate along the upper series of rods 12 to the discharge chutes G, when the table and its screen are reciprocated.

It will be noted that the drive mechanism E defines a shaft 42, which may be rotated by a driven pulley 43. As illustrated in Figure 1, a sub-frame 44 is secured to the supporting frame A, and carries bearings 45 in which the shaft 42 is mounted. A cam 46 is fixed to this shaft, and it is adapted to bear against an abutment bar 47 when the cam is turned in a counterclockwise direction in Figures 1 and 7. This abutment bar is fixed to the underneath side of the inclined trough F.

Accordingly, during each revolution of the shaft 42, the cam 46 will move the shaker table B to the left in Figure 1. However, as soon as the cam clears the abutment bar 47, a pair of springs 48 will return the shaker table to the right. These springs have their opposite ends anchored to the side members 10 and 38, respectively (see Figure 1). In order to arrest movement of the shaker table B, when it is returned to a normal position, at least one adjustable stop 49 has been provided on a side member 38, and it is disposed to abut a bracket 50 secured to a side member 10. It will be apparent that the stops 49 and brackets 50 may be duplicated on opposite sides of the machine, if desired.

For the purpose of supporting the shaker table B for back and forth movement in a longitudinal direction relative to the supporting frame A, coil springs 51 have been

interposed between the side members 10 and 38 (see Figures 1 and 3).

Power for driving the pulley 43 may be derived from any suitable source, such as an electric motor 52. As shown in Figure 1, the shaft 53 of this motor has a drive pulley 54 fixed thereto, which is connected by a belt 55 to the driven pulley 43. The motor has been shown as being resiliently supported on a platform 56 by coil springs 57. The latter encircle bolts 58 that project through feet 59 of the motor, and further extend through the platform 56.

It has been found desirable to vibrate the shaker table B and the inclined trough F during operation of the machine. This is necessary in order to cause the fines of the ore D to gravitate through the screen C, and further to move the tailings along the upper series of screening rods 12 until they reach the discharge chutes G. Likewise, vibration of the trough F will result in moving the fines contained therein toward the lower discharge end 60 of the trough.

This vibratory motion is accomplished by providing an eccentrically-mounted elongated weight 61, which is supported in bearings 62, the latter being secured to the underneath side of the inclined trough F (see Figures 1, 7 and 8). It will be observed from Figure 8 that a pair of stub shafts 63 are rotatably carried by these bearings and each is provided with a cage 64 at its inner end.

As shown, each of these cages is fashioned with a diametrically-extending slot 65 for slidably receiving a journal block 66. Trunnions 67 project from opposite ends of the weight 61 and are projected into the blocks 66. The latter are adjustably-supported in the slots 65 by threaded studs 68. Obviously, the studs 68 may be adjusted so as to regulate the amount of offset of the trunnions 67 relative to the stub shafts 63. Thus, the amount of vibration imparted to the shaker table frame H and the inclined trough F may be controlled.

In order to swing the weight 61 around the stub shafts 63, one of these shafts has a driven pulley 69 fixed thereto. This pulley is connected by a belt 70 to a second drive pulley 71, which is anchored to the motor shaft 53 (see Figure 1). As the shaker table B and the inclined trough F are reciprocated, the springs 57 will yield to allow the motor 52 to shift, and thus the belts 55 and 70 will be maintained substantially tight.

Summary of operation

The operation of my ore-screening and grading machine is summarized briefly as follows:

Initially, the crank 34 should be turned until the pointer 37 registers with the graduation on the scale 36 which will correspond with the mesh desired for the fines of the ore to be separated by the screen C. The turning of this crank will swing the lever 23, resulting in moving the connecting rod 26 endwise, and imparting a corresponding movement to the bars 18. The cams 22 on the latter will move the lower series of rods 16 relative to the upper series of rods 12, thereby regulating the passageways 17 to give the desired mesh for the screen.

Subsequently, the electric motor 52 should be started. This will result in causing the drive mechanism E to turn the shaft 42 and its cam 46. During each rotation of this shaft, the cam will engage with the abutment bar 47, pushing the shaker table B and the inclined trough F to the left in Figure 1. As soon as the cam clears the abutment bar, the springs 48 will return the shaker table and trough to the right, until the bracket 50 contacts with the adjustable stop 49.

As the shaker table continues to reciprocate, the ore D should be fed onto the screen at the higher end C' of the latter. Of course, the eccentrically-disposed weight 61 will be turning at this time, imparting a vibratory movement to the shaker table B and the inclined trough F. The fines of the ore will pass downwardly through the passageways 17, and will be carried to the lower end 60 of

the trough for discharge. The oversized tailings, which fail to pass through the mesh of the screen, will be jogged downwardly over the upper series of rods 12 until they enter the chutes G, where they will be discharged.

I claim:

1. In an ore-screening and grading machine; a shaker table providing a substantially rectangular-shaped frame, the latter including longitudinally-extending side members; an upper series of parallel and spaced-apart horizontal screening rods disposed transversely of the frame and being secured to said side members; guide racks fixed to confronting faces of the side members of the shaker table frame below the upper series of screening rods; the guide racks being fashioned with vertically-extending recesses; a lower series of parallel and spaced-apart horizontal screening rods arranged transversely of the frame, and having their ends guided in said recesses for up and down movement; the two series of rods coacting to define passageways through which ore may be screened; at least a pair of bars arranged underneath the rods of the lower series and extending longitudinally of the frame, with the rods of the lower series resting on said bars; these bars being supported for movement longitudinally of the shaker table frame; means operable for elevating the bars when the latter are moved longitudinally in one direction, thereby raising all of the rods in the lower series simultaneously toward the rods in the upper series to decrease the mesh of said passageways, and for lowering the rods in the lower series to increase the mesh of said passageways when the bars are moved in the opposite direction; and means for adjusting the bars longitudinally of the frame to thereby vary the effective mesh of the passageways between the two series of rods.

2. In an ore-screening and grading machine: a shaker table providing a substantially rectangular-shaped frame, the latter including longitudinally-extending side members; an upper series of parallel and spaced-apart horizontal screening rods disposed transversely of the frame and being secured to said side members; guide racks fixed to confronting faces of the side members of the shaker table frame below the upper series of screening rods; the guide racks being fashioned with vertically-extending recesses; a lower series of parallel and spaced-apart horizontal screening rods arranged transversely of the frame, and having their ends guided in said recesses for up and

down movement; the two series of rods coacting to define passageways through which ore may be screened; at least a pair of bars arranged underneath the rods of the lower series and extending longitudinally of the frame, with the rods of the lower series resting on said bars; these bars being supported for movement longitudinally of the shaker table frame; means operable for elevating the bars when the latter are moved longitudinally in one direction, thereby raising all of the rods in the lower series simultaneously toward the rods in the upper series to decrease the mesh of said passageways, and for lowering the rods in the lower series to increase the mesh of said passageways when the bars are moved in the opposite direction; a crosshead secured to the bars adjacent to one end of the frame; a lever having one end thereof swingably secured to the opposite end of the frame; a connecting rod extending lengthwise of the frame, and having one of its ends adjustably connected to the cross-head and its other end pivotally attached to the lever intermediate the ends of the latter; a scale secured to the frame and being graduated in terms of mesh; the scale extending across the lever; a sleeve secured to the lever by a journal pin and having a pointer positioned to move along the scale, when the lever is swung in one direction or the other; a crank having a shank threaded through the sleeve, with the shank being rotatably anchored to the frame, whereby rotation of the crank will swing the lever and thereby actuate the connecting rod to move the bars lengthwise of the frame and thereby vary the effective mesh of the passageways between the two series of rods.

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