June 14, 1966 J. P. BURLS 3,255,885

VIBRATING SCREEN

Filed Feb. 27, 1963 2 Sheets-Sheet 1

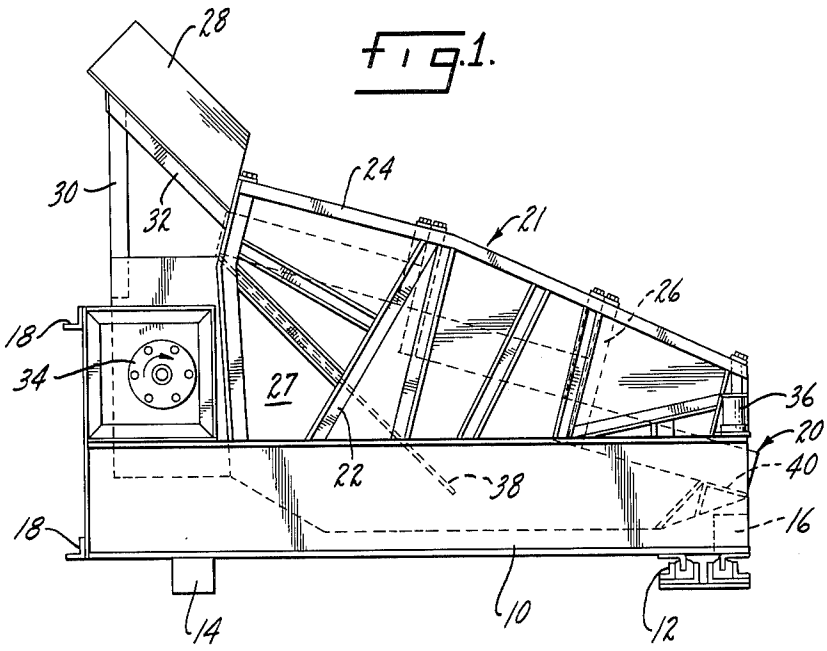

Fig. 1.

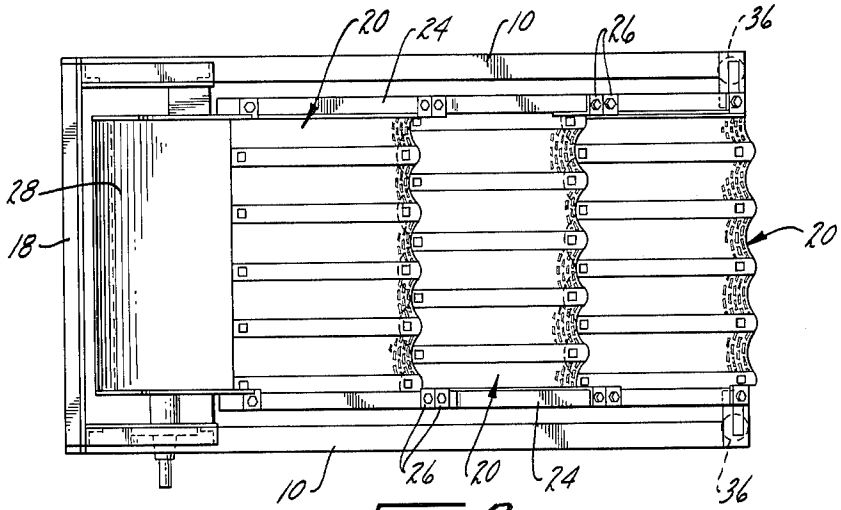

Fig. 2.

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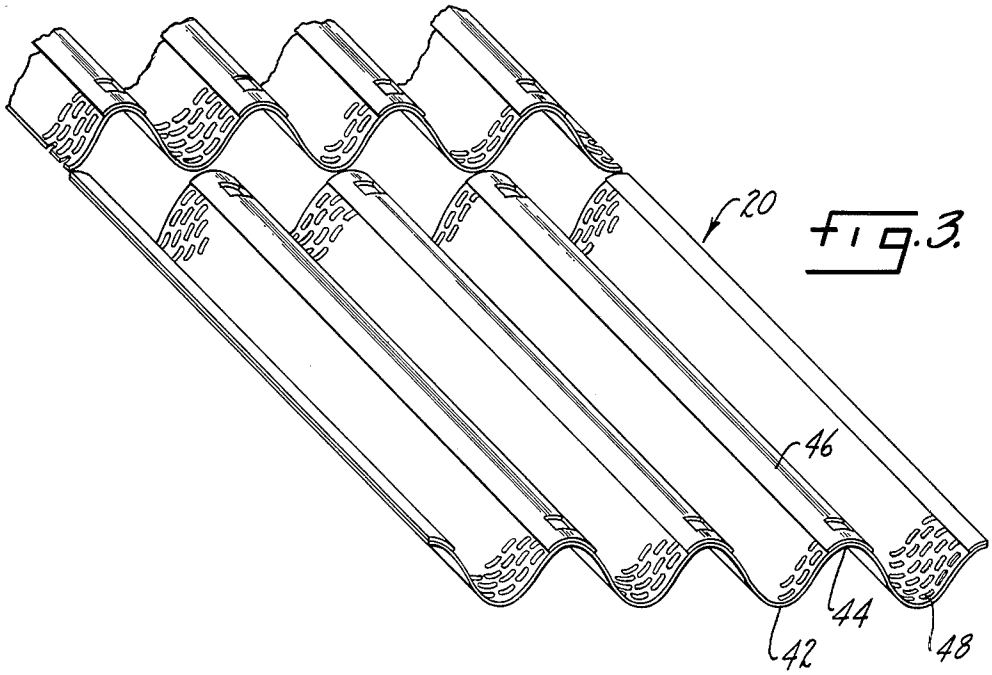

Fig. 3.

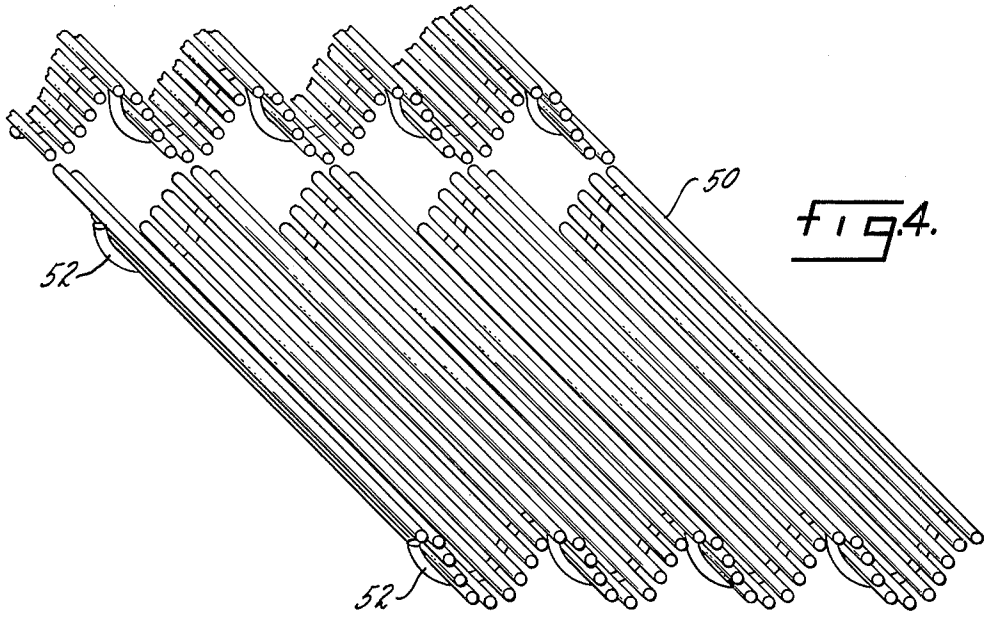

Fig. 4.

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VIBRATING SCREEN

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This invention relates to an improved horizontally disposed vibrating screen.

A primary purpose of the invention is a vibrating screen which is so formed that the material being screened tends to tumble as it moves along the screen deck to thereby offer different faces of each particle to the screen.

Another purpose is a vibrating screen made up of a plurality of inclined deck sections, with the discharge end of each section being positioned above the feed end of the next lower section.

Another purpose is a vibrating screen formed of a plurality of inclined deck sections in which each section undulates in a direction perpendicular to the axis of vibration.

Another purpose is a screen of the type described in which the screen deck sections are formed by alternate troughs and crests, with the troughs of one deck section being aligned with the crests of the adjacent deck section.

Other purposes will appear in the ensuing specification, drawings and claims.

The invention is illustrated diagrammatically in the following drawings wherein:

FIGURE 1 is a side view of a vibrating screen of the type described,

FIGURE 2 is a top plan view of the screen shown in FIGURE 1,

FIGURE 3 is an enlarged partial perspective of a vibrating screen of the type described showing one formation of the screen deck sections, and

FIGURE 4 is an enlarged perspective, similar to FIGURE 3, showing another formation of the screen deck sections.

Considering FIGURE 1, the base of the screen may include a pair of side frame members or channels **10** mounted on front supports **12** and a laterally extending rear support **14**. A laterally extending cross member **16** may hold the front end of the channels together and a pair of spaced cross members **18** may hold the rear end of the channels together.

The deck for screening material, whether it be ore or otherwise, may be formed of a plurality of screen deck sections indicated generally at **20** and shown particularly in FIGURES 2, 3 and 4. Each of the sections will be described in detail hereinafter. The sections are each mounted within a framework **21** consisting of generally vertically extending supports **22** tied together at their upper ends by generally downwardly sloping members **24**. Each of the deck sections **20** is supported in the framework **21** by straps or the like, indicated at **26**, with the upper end of the straps being fastened to the members **24**. The front end of the lower deck section may be supported by a cross member **40**, as shown in FIGURE 2. The frame, which may also include side plates **27**, will be mounted on the base by rubber mounting members **36**, at the front, and by suitable springs, not shown, at the rear. The rubber mounting members are solid and may be formed of a dual hardness rubber.

Positioned above the first of the deck sections **20**, or the highest deck section, is a feed chute **28**, the rear end of which is supported by upwardly extending supports **30**. The underside of the feed chute is supported by frame members **32**. Beneath the feed chute **28** is a drive mechanism the shaft of which is indicated at **34**. Although the

particular location of the drive mechanism is not essential to the invention, it has been found to be advantageous to place the drive unit at the rear of the structure. The drive may be conventional and will provide rapid vibrations in a generally longitudinal direction to move the material being screened from the feed chute toward the discharge or front end.

Beneath the deck sections is a discharge chute **38** which receives material passing through the deck sections and discharges it down to a suitable hopper or the like, not shown.

FIGURE 3 illustrates one formation of the screen deck sections **20**. Each section may undulate in a direction perpendicular to or transverse to the direction of vibration, which is longitudinal, with each section being formed by a plurality of spaced upwardly open troughs **42** separated by crests **44**. The crests **44** may be capped, by metal plates or the like **46**. The plates **46** are important as they protect the underlying plates from the impact of heavier and larger pieces of material.

As shown in FIGURE 3, each of the screen deck sections is formed of a perforated or expanded metal, a woven wire mesh, or a foraminous material having openings **48** for the passage of the material being screened. The size of the openings **48** is substantially less than the width of the troughs. The particular design for each of the deck sections will depend upon the type and size of material being screened. Expanded or perforated metal sections may be used for smaller size material.

As illustrated particularly in FIGURE 3, the troughs **42** of each screen deck section are aligned with the crests **44** of the adjacent section. In this way, material sliding down the trough of one section will tumble when it reaches the end of that section in that it must go either to the right or to the left in order to reach the trough of he next lower section. Also note that the trough of one section is substantially below the trough of the section next above it. The crest of one deck section and the trough of the preceding section may be generally the same height, although again this is not necessary and the crest of one section may be below the preceding trough. In any event, what is important is to provide an alignment such that material being screened will tumble and roll as it passes along the screen, thereby presenting different sides of each particle to the screen structure. It is in this way that the fines which may stick to the larger material will be removed during the screening process.

FIGURE 4 illustrates another formation of the deck sections. In this case spaced parallel rods **50**, supported at opposite ends by formed bars or rods **52**, are arranged in a configuration substantially like that shown in FIGURE 3. Each deck section undulates or is sinuous in a direction transverse to the axis of vibration with the crests in one section being aligned with the troughs in the adjacent sections. The invention should not be limited to any particular formation of the deck sections as what is important is to provide openings for the screening of material, with the formation itself being in the general shape of a series of waves, with the troughs of one section being aligned with the crests of the adjacent sections.

The use, operation and function of the invention are as follows:

One of the disadvantages of previous screens in which the deck was substantially flat, was that larger pieces of material being screened tended to maintain a fixed orientation as they moved through the screening zone. The same surfaces of each particle contacted the screen. Accordingly, any undersized particles adhering to the larger particles often were carried along with them and the screening process was not efficient. To overcome this difficulty it is proposed to tumble and roll the parti-

cles so that substantially all of the surfaces of each of the particles will contact the screen at some point thereby removing a substantial portion of the adhering undersized particles.

By dividing the screen deck into a plurality of sections, each inclined, and by making it mandatory that each particle drop and laterally move as it falls from one section to another, it is possible to provide a tumbling or rolling motion for the mass of particles as they pass through the screening zone. The screen deck sections are formed into troughs which open upwardly, with crests separating each of the troughs. The crests of one deck section are aligned with the troughs of the adjacent deck sections thereby insuring tumbling movement of the mass of material as it passes through the screening zone. This promotes the removal of the undersized particles that adhere to the larger particles. An additional advantage from the undulating deck section is the added area available for screening.

The particular formation of each of the deck sections is not important and a plurality of steel rods, suitably spaced, may be used as well as perforated or expanded metal or woven wire mesh. Spaced bars are also satisfactory. What is important is the overall configuration of each of the deck sections and not the type of opening.

The size of the openings may vary considerably, depending on the material being screened. For example, 1½-inch openings may be satisfactory for one type of operation and openings as small as ¼ inch or ⅛ inch may be satisfactory for other operations.

The present invention is used in a machine in which vibration is provided in a generally longitudinal direction, or parallel to the crests and troughs. Such a direction of vibration is conventional in screens of this general type and any suitable means may be used to provide the vibration.

Although the troughs are shown as all being the same size or width, in some applications, the width of the troughs vary so that the larger pieces of material will be carried as far as possible on the protecting caps or plates.

In some applications a second series of deck sections may be placed beneath the first series of deck sections to further screen the material or to screen out an intermediate size. Also, water may be directed upwardly at the deck sections to increase the separation efficiency.

Whereas the preferred form of the invention has been shown and described herein, it should be realized that there are many modifications, substitutions and alterations thereto within the scope of the following claims.

I claim:

1. In a vibrating screen, a base, a deck supported on said base and means on the base for vibrating said deck along an axis extending generally longitudinally of said deck, said deck including a plurality of sections arranged end to end and inclined downwardly toward the discharge end of the deck, each such section having a plurality of parallel, upwardly open troughs extending along the axis of vibration of the screen, and separated by crests, the walls of the troughs being formed with apertures of substantially smaller diameter than the width of the troughs through which undersize material may escape, a reinforcing plate capping each crest, the feed end of each lower section being offset downwardly in relation to the discharge end of each upper section, with the troughs in adjacent sections being staggered, whereby material delivered from the discharge end of the troughs of a given section is directed downwardly toward crests of the next section.

2. The structure of claim **1** further characterized in that the troughs are formed of foraminous material.

3. The structure of claim **1** further characterized in that the troughs are formed of a plurality of parallel rods.

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