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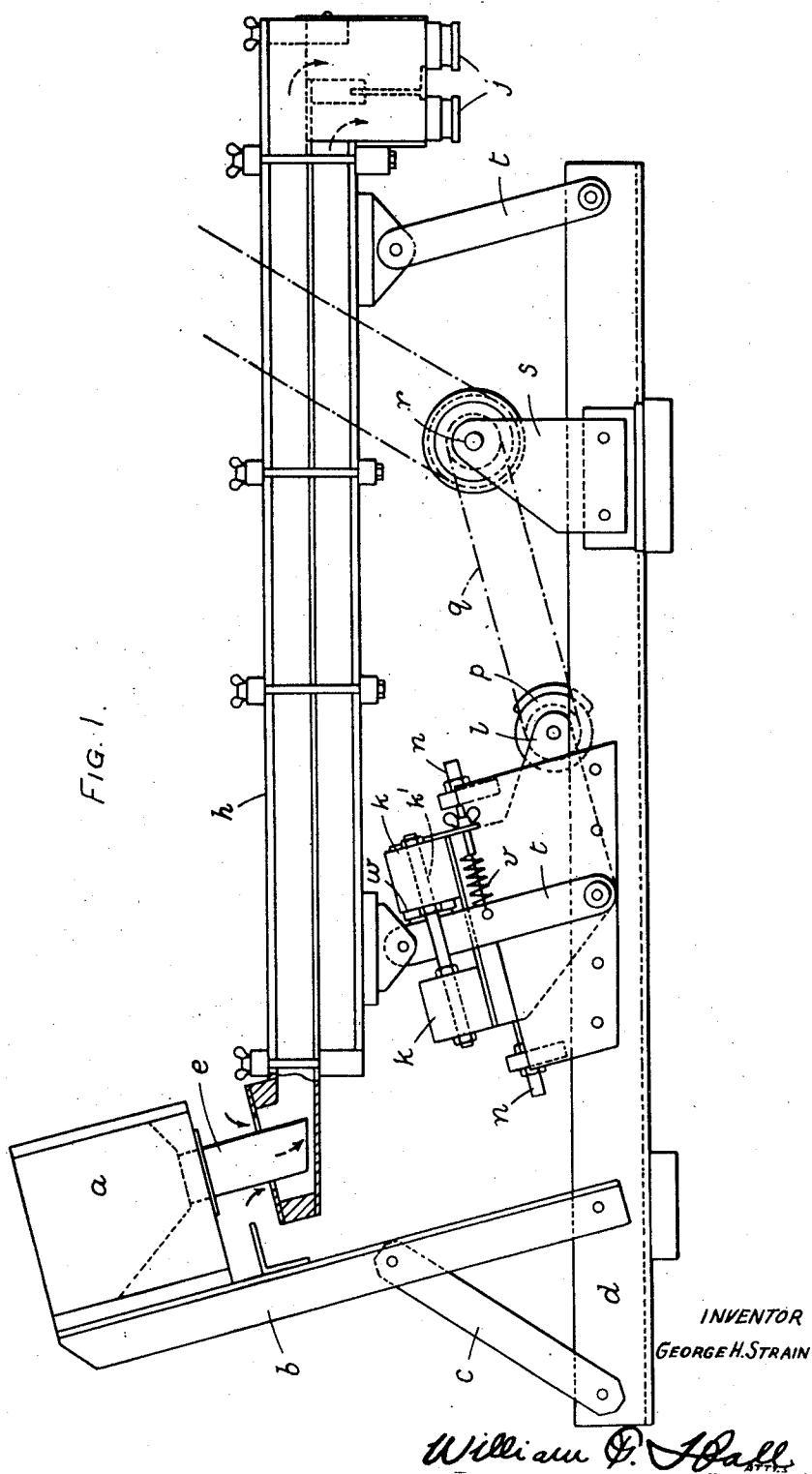
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APPARATUS FOR DISPLACING PULVERULENT OR BROKEN MATERIALS

Filed Aug. 14, 1942

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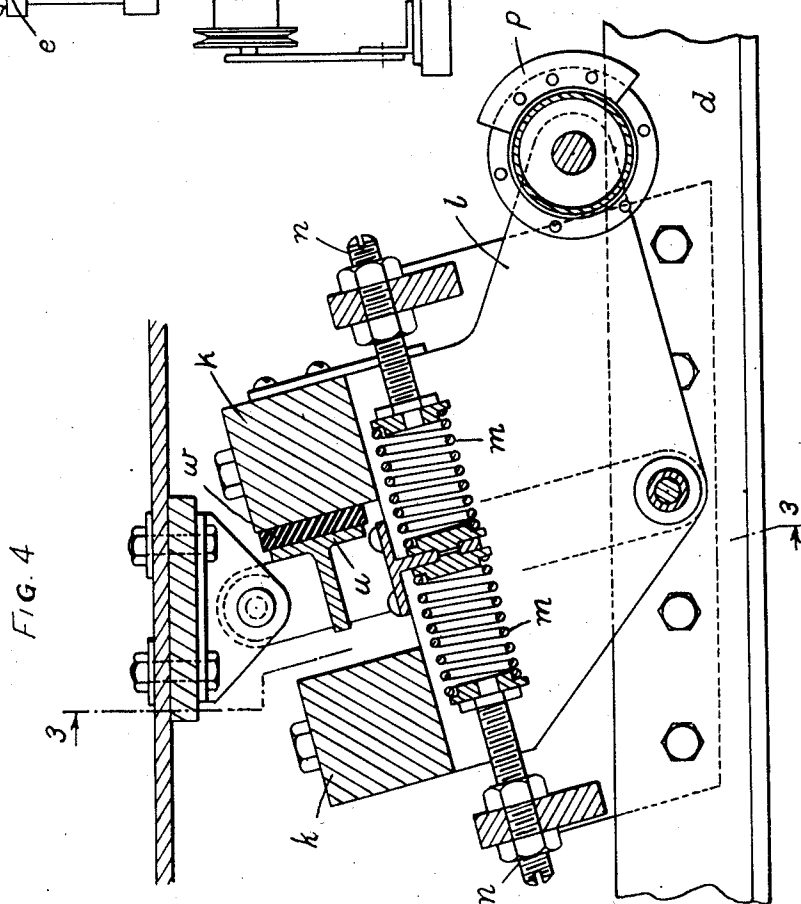
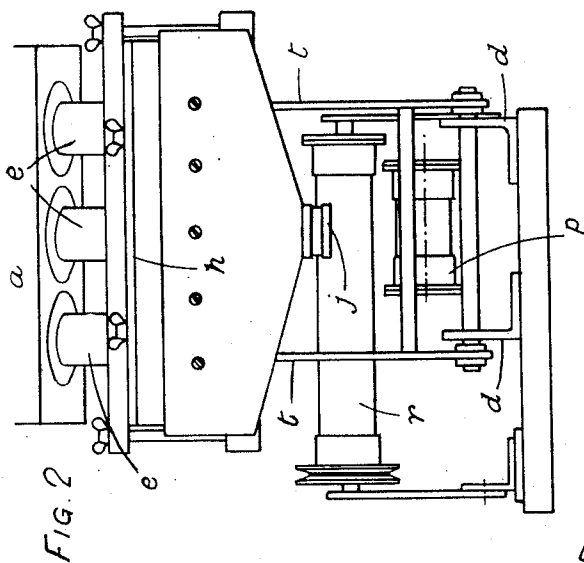
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5 Sheets-Sheet 2



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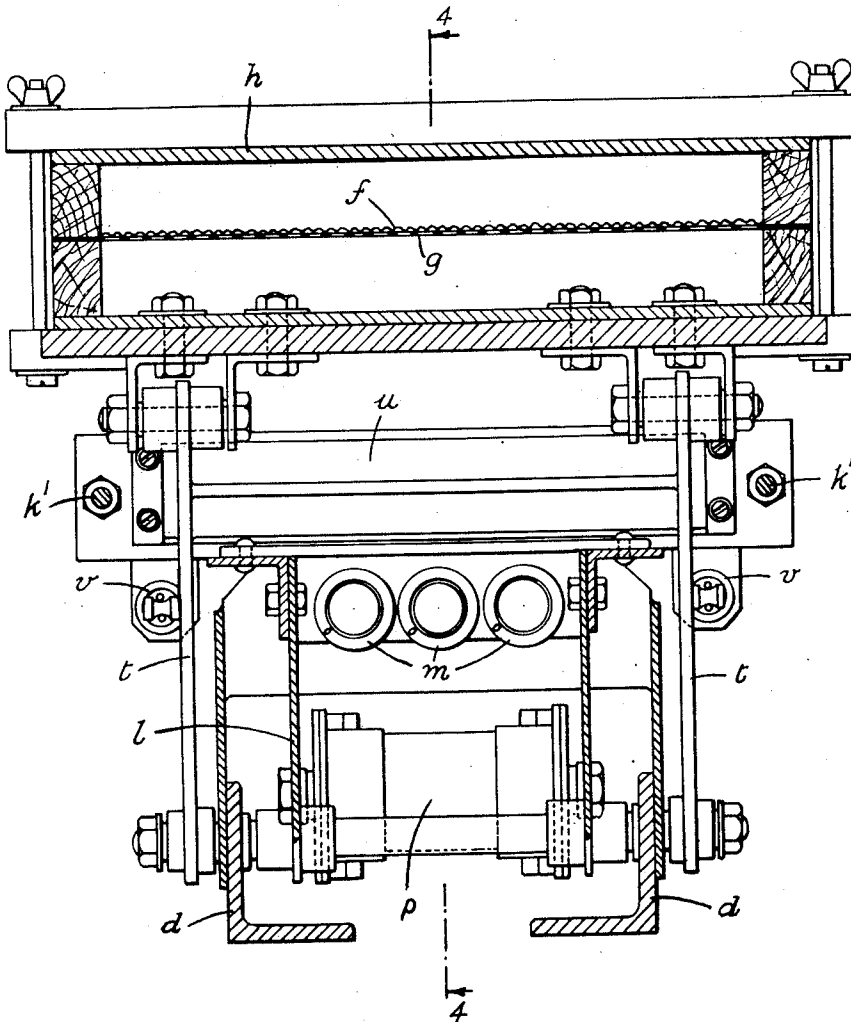
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5 Sheets-Sheet 3

FIG. 3.



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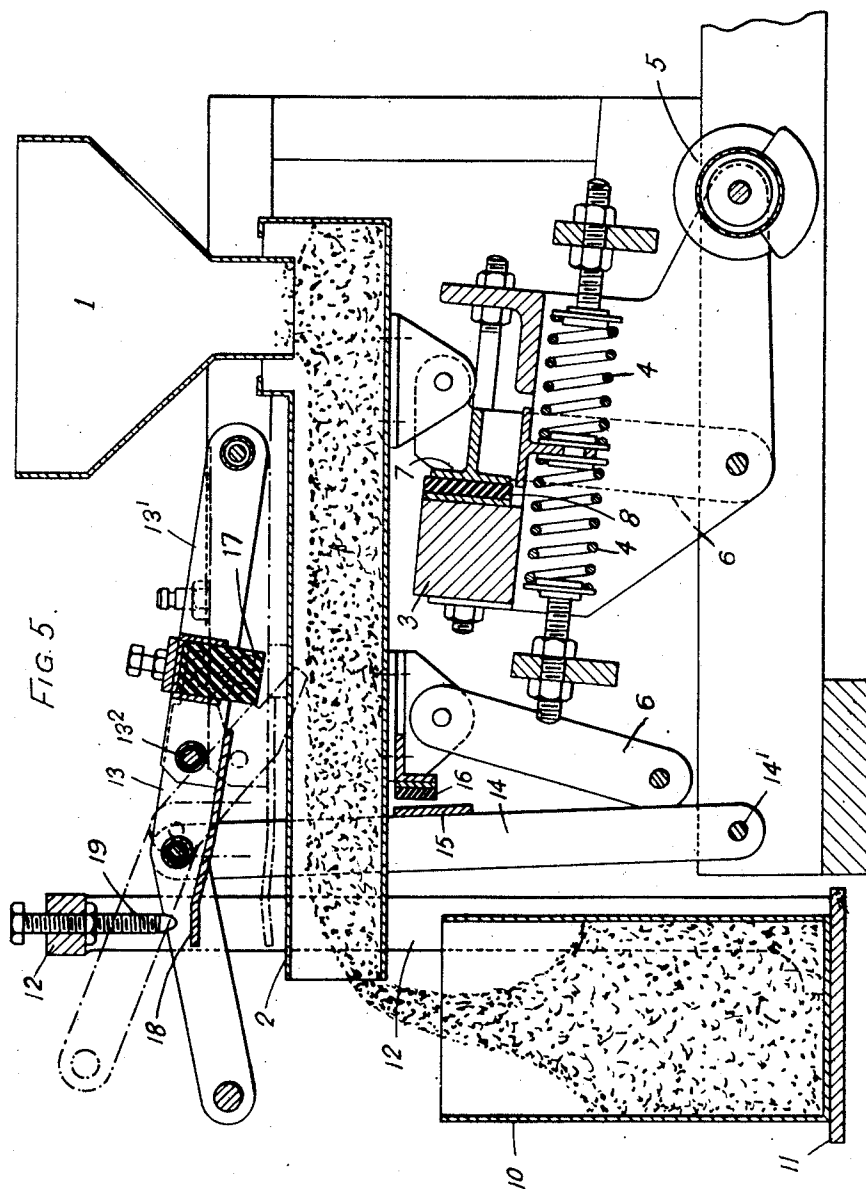
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APPARATUS FOR DISPLACING PULVERULENT OR BROKEN MATERIALS

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5 Sheets-Sheet 4



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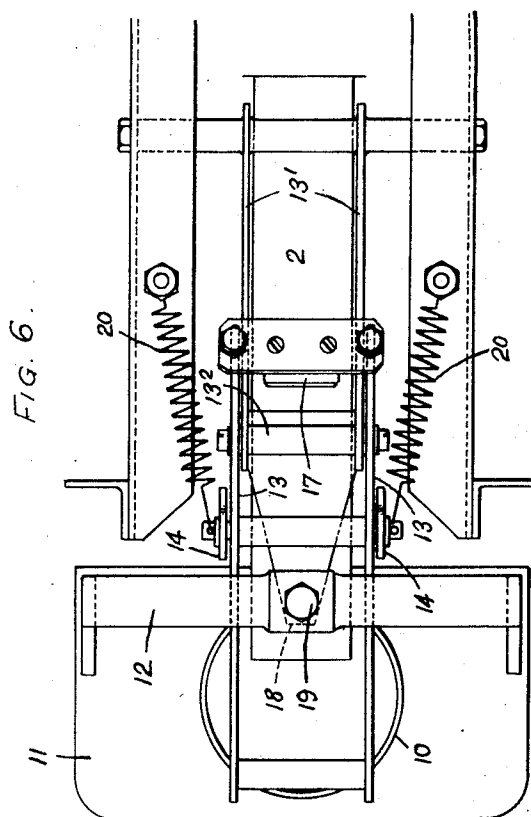
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APPARATUS FOR DISPLACING PULVERULENT OR BROKEN MATERIALS

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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APPARATUS FOR DISPLACING PULVERULENT OR BROKEN MATERIAL

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Application August 14, 1942, Serial No. 454,846
In Great Britain December 23, 1941

6 Claims. (Cl. 198—220)

The present invention relates to apparatus for displacing pulverulent material and more specifically pertains to improvements in such apparatus wherein an anvil is reciprocated and imparts oscillating movement to a screen or conveyor along which the granular material is caused to proceed.

According to one feature of the present invention movement is imparted to a striker which engages the screen or conveyor, by means of an anvil, and this anvil is caused to vibrate with the desired frequency by means of opposed springs, preferably compression springs, the degree of compression or tension of the springs being adjustable. With this arrangement only a small amount of rotating force is necessary to excite the anvil in the region of its natural frequency, and the magnitude of this force is too small to disturb the mass of the stationary framework of the machine. The opposing momenta of the oscillating masses, that is the anvil and the screen are designed to be equal at the moment of impact so that energy that would otherwise vibrate the machine as a whole is cancelled, and vibrations are confined to the anvil and screen.

The striker is provided with springs which conserve energy when the anvil and striker move apart from one another, and this stored energy is used in the following impact stroke. With this arrangement only a small amount of energy, which is provided by an unbalanced rotating weight, is required to produce vibrations of great, but controllable, intensity.

In a slightly modified form of construction means are provided whereby the movements of the conveyor are automatically arrested when a predetermined weight of material has been discharged into a receiver.

Two forms of construction of the invention, as applied to screening apparatus having one screening compartment, is illustrated in the annexed drawings, in which—

Fig. 1 is a side elevation.

Fig. 2 is a front elevation.

Fig. 3 is a section on the line 3—3 of Fig. 4, and also showing the screening compartment.

Fig. 4 is a section on the line 4—4 of Fig. 3, the screening compartment not being shown.

Fig. 5 is a longitudinal section of a modified form of construction. Fig. 6 is a plan view of the toggle device shown in Fig. 5, other parts being omitted for clarity.

In Figs. 1-4, *a* is a hopper for the material to be screened, and is mounted on a support *b* connected to hinged struts *c* mounted on frame

members *d* of the apparatus. The material flows from this hopper through inlets *e* on to a screen, which consists of a layer of gauze *f* secured to a perforated plate *g*. The screening compartment is provided with a removable cover *h*. The material flows through the compartment from left to right, and is finally discharged through outlets *j* into receptacles (not shown). Travel of the material through the compartment is assisted by a current of air which enters the compartment through annular spaces around the inlets *e* as shown by the arrows in Fig. 1, and travels along and under the screen. The flow of air is promoted by the concussive action of an anvil to be described later.

The anvil consists of two iron blocks *k*, connected by bolts *k'*, mounted on pivoted brackets *l*, and subjected to the action of compression springs *m*, which impart the correct frequency of vibration to the anvil. The springs *m*, *m* are mounted in stationary brackets attached to the frame of the apparatus. The degree of compression of the springs can be regulated by screws *n*. Vibration is imparted to the anvil by means of a rotating unbalanced weight *p* driven by a belt *q* from a countershaft *r* driven by a small motor. The countershaft is mounted in inclinable brackets *s* to permit of adjustment of the belt tension.

The screening compartment is pivotally connected to oscillating arms *t* one pair of which carries a striker plate *u* which is coupled to the anvil by means of springs *v* which form an elastic medium of determined frequency. The movements of the anvil are transmitted to the striker which alternately makes contact with and moves apart from the anvil, thus providing a concussive action of considerable intensity. A rubber buffer plate *w* is interposed between the anvil and the striker.

In the arrangement shown in Figs. 5 and 6 the material is fed into a hopper 1 from which it passes to a pipe 2 which is caused to vibrate by means of an anvil 3 subjected to the action of compression springs 4, which determine the correct natural frequency of vibration of the anvil. Vibration is imparted to the anvil by means of a rotating unbalanced weight 5, operated by a motor (not shown). The pipe 2 is pivotally connected to oscillating arms 6, one pair of which carries a striker plate 7, which is adjacent the anvil. The movements of the latter are transmitted to the striker, which alternately makes contact with, and moves apart from, the anvil, thus providing a concussive action of consider-

able intensity. A rubber buffer plate 8 is interposed between the anvil and the striker. The material flows from right to left into a receiver 10.

According to the present invention, the receiver 10 is mounted on a movable platform 11, forming part of a weighing machine (not shown), provided with a yoke 12 of which the upper part is connected to a trip mechanism for automatically arresting with great rapidity the movements of the pipe 2. This mechanism comprises a toggle device having toggle arms 13 and 13' pivoted at 13², movable links 14 pivoted at 14' and carrying a pressure plate 15 adapted to make contact with a rubber pad 16 secured to the forward end of the vibrating pipe, and a rubber pad 17 carried by the toggle arm 13', and a trigger device 18 adapted to be tripped by a screw 19 mounted on the yoke 12.

The empty receiver 10 is placed on the platform 11; the flow of material is started by pulling down the lever device into the "on" position shown in full lines in Fig. 5. When a predetermined weight of material has entered the receiver, and the latter has made a corresponding downward movement, the screw 19 descends with the yoke 12 and trips the trigger 18, connected to the toggle member 13', and the toggle device, when the joints are forced beyond the dead centre, springs into the "off" position shown in dot-dash lines in Fig. 5, the links 14 move, and the pressure plate 15 is forced into contact with the pad 16, forcing the striker 7 away from the anvil 3 against the action of the striker springs. The result is that the striker ceases to vibrate, although the anvil continues to do so. At the same time the rubber pad 17 is forced into contact with and exerts a braking force on the pipe 2, the movements of the pipe being arrested almost instantaneously. As soon as the mechanism is returned to the "on" position the material flows again at full speed.

The weight of material to be admitted to the receiver can be regulated by adjusting the position of the screw 19 relatively to the trigger 18.

The springs 20 shown in Fig. 6 serve as toggle actuating springs.

I claim:

1. Apparatus for displacing granular material comprising, a frame, a reciprocal structure for conveying the granular material laterally from a loading station, arms swingably supporting said structure on said frame, an anvil mounted for vibrating movement on said frame, an unbalanced rotating mass for vibrating said anvil, resilient means controlling the natural period of vibration of the anvil, and means carried by one of said arms adapted to be engaged by the vibrating anvil to reciprocate said structure.

2. Apparatus for displacing granular material comprising, a frame, a reciprocal structure for conveying the granular material laterally from a loading station, arms swingably supporting said structure on said frame, an anvil mounted for vibrating movement on said frame, an unbalanced

rotating mass for vibrating said anvil, springs controlling the natural period of vibration of the anvil, means carried by one of said arms adapted to be engaged by the vibrating anvil to reciprocate said structure, and means for adjusting the resiliency of said springs.

3. Apparatus for displacing granular material comprising, a frame, a reciprocal structure for conveying the granular material laterally from a loading station, arms swingably supporting said structure on said frame, brackets pivoted to said frame, an anvil mounted on said brackets, an unbalanced rotating mass mounted on said brackets for vibrating said anvil, compression springs interposed between the frame and the anvil controlling the natural period of vibration of the anvil, and means carried by one of said arms adapted to be engaged by the vibrating anvil to reciprocate said structure.

4. Apparatus for displacing granular material comprising, a frame, a reciprocal structure for conveying the granular material laterally from a loading station, two pairs of arms swingably supporting said structure on said frame, an anvil mounted for vibrating movement adjacent one pair of said arms, an unbalanced rotating mass for vibrating said anvil, opposed resilient means controlling the natural period of vibration of the anvil, a striker plate carried by one pair of said arms adapted to be engaged by the vibrating anvil to reciprocate said structure, and spring means between the striker and anvil.

5. Apparatus for displacing granular material comprising, a frame, a reciprocal structure for displacing the granular material laterally from a loading station, two pairs of substantially vertical arms pivoted to the frame and pivoted to the structure, a striker plate carried by one pair of arms, an anvil including two blocks arranged on opposite sides of said striker plate, brackets pivoted on said frame supporting said blocks, a rotating mass mounted on said brackets for vibrating said anvil and moving one of the blocks into engagement with the striker plate, and compression springs interposed between the frame and the anvil for controlling the frequency of vibration of the anvil.

6. Apparatus for displacing granular material comprising, a frame, a reciprocal structure for conveying the granular material laterally from a loading station, two pairs of arms swingably supporting said structure on said frame, an anvil mounted for vibrating movement adjacent one pair of said arms, an unbalanced rotating mass for vibrating said anvil, resilient means controlling the natural period of vibration of the anvil, a striker plate carried by one pair of said arms adapted to be engaged by the vibrating anvil to reciprocate said structure, brake means mounted adjacent said structure, and means for moving the brake means into engagement with said structure to maintain the striker plate in a position to prevent engagement of the anvil therewith.

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