

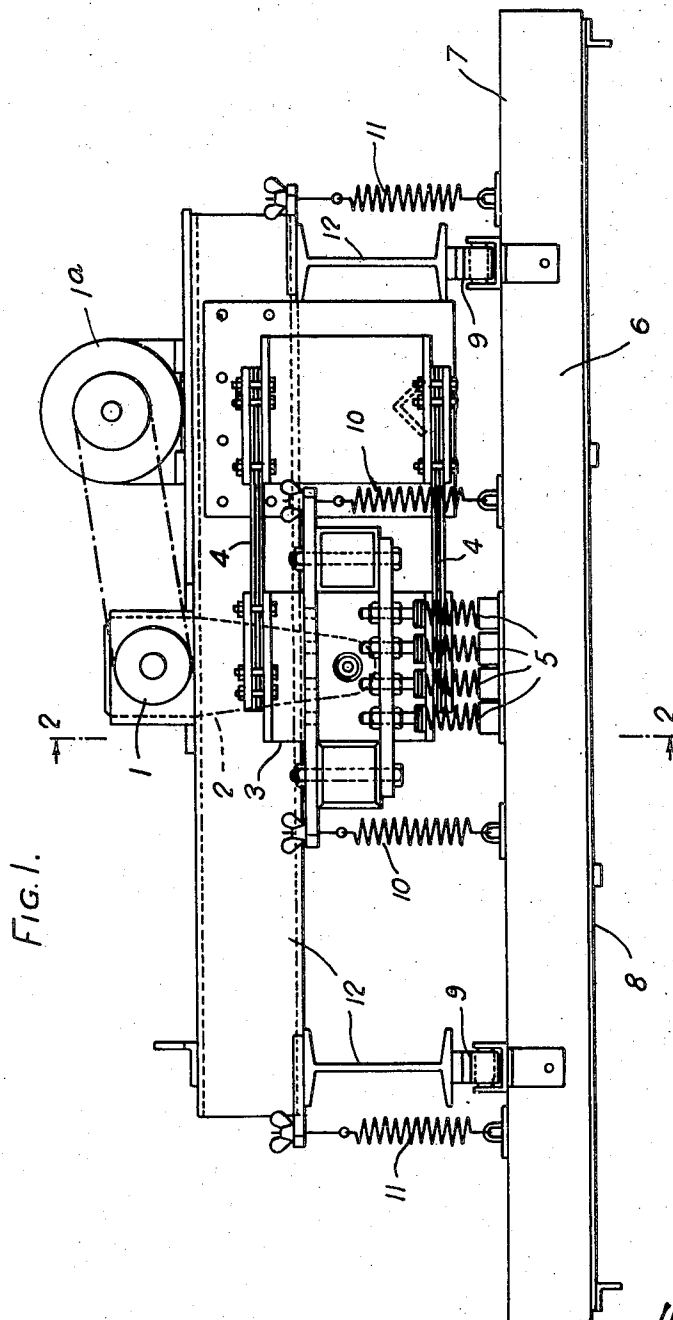
Nov. 13, 1951

G. H. STRAIN
SCREENING APPARATUS

2,575,143

Filed Aug. 11, 1947

5 Sheets-Sheet 1



INVENTOR
G. H. STRAIN
By *Wilkinson + MacKinney*
ATTYS.

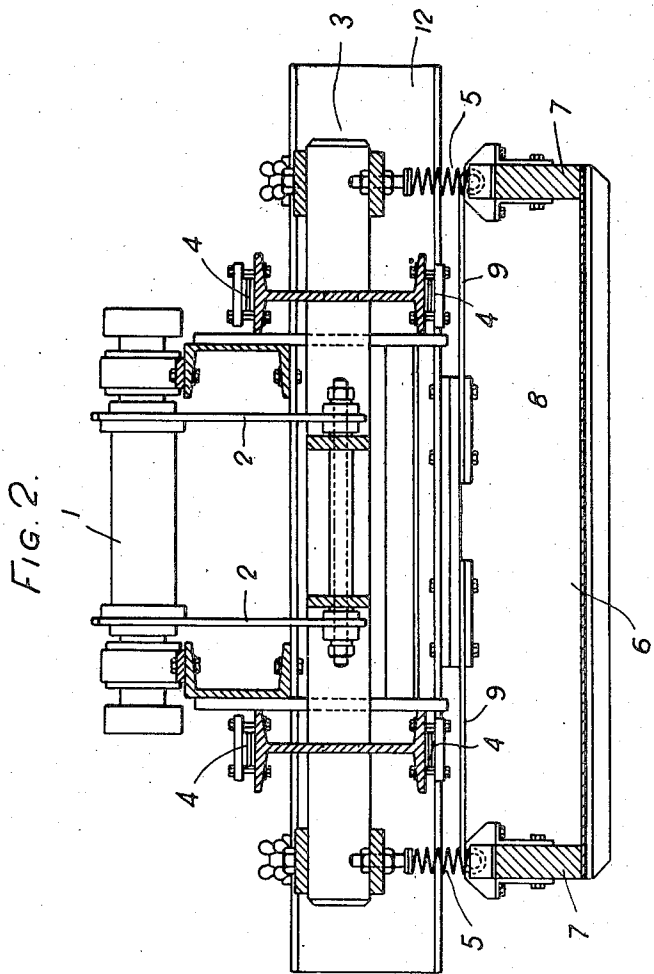
Nov. 13, 1951

G. H. STRAIN
SCREENING APPARATUS

2,575,143

Filed Aug. 11, 1947

5 Sheets-Sheet 2



INVENTOR
G. H. STRAIN
By
Wilkinson + Newkinney
ATTYS.

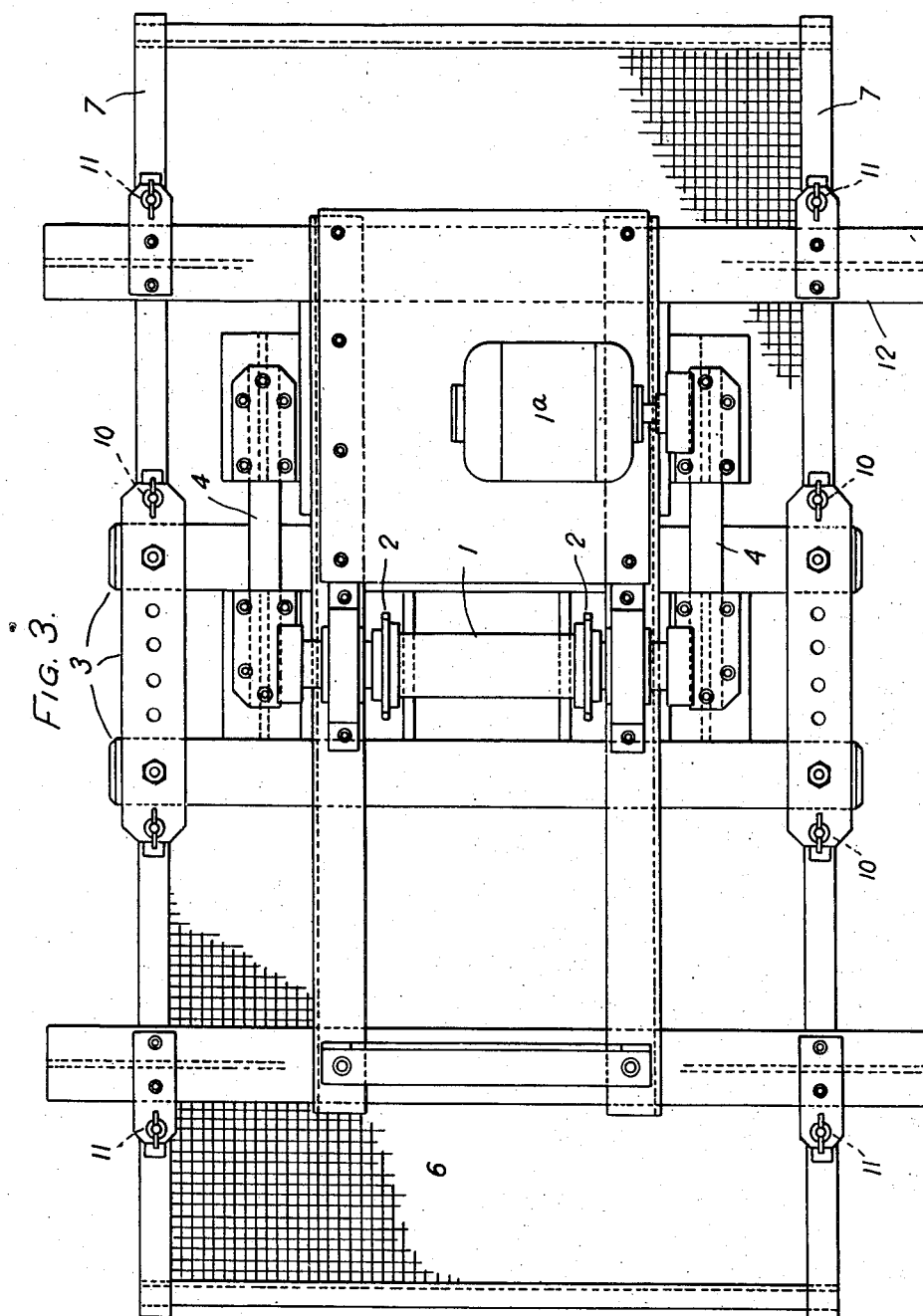
Nov. 13, 1951

G. H. STRAIN
SCREENING APPARATUS

2,575,143

Filed Aug. 11, 1947

5 Sheets-Sheet 3



INVENTOR

G. H. STRAIN

By G. H. STRAIN
Wilkinson + Mawhinney
ATTYS.

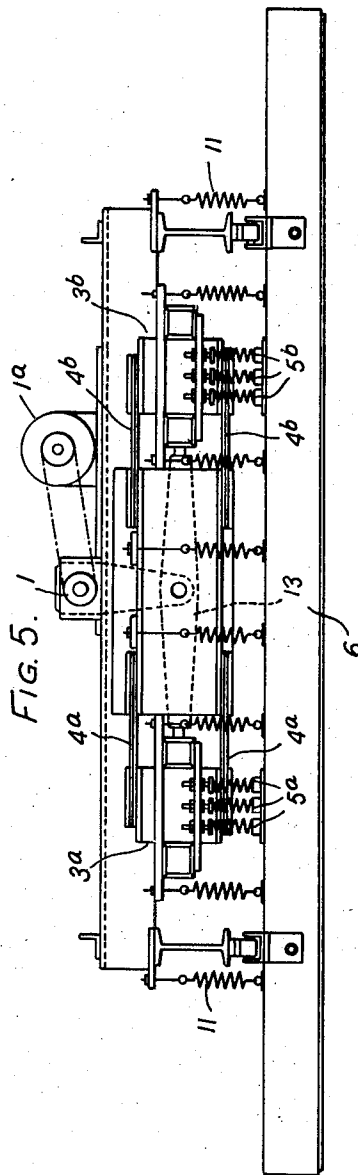
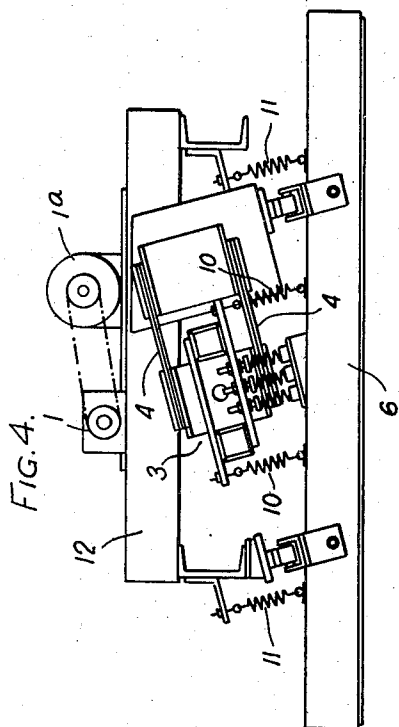
Nov. 13, 1951

G. H. STRAIN
SCREENING APPARATUS

2,575,143

Filed Aug. 11, 1947

5 Sheets-Sheet 4



INVENTOR
G. H. STRAIN
By *Wilkinson + Mawkinney*
ATTYS.

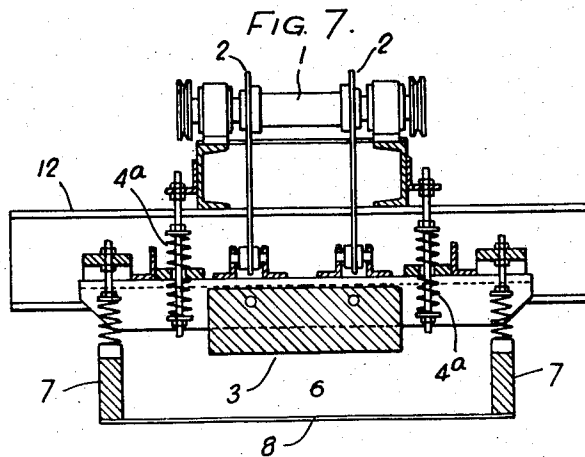
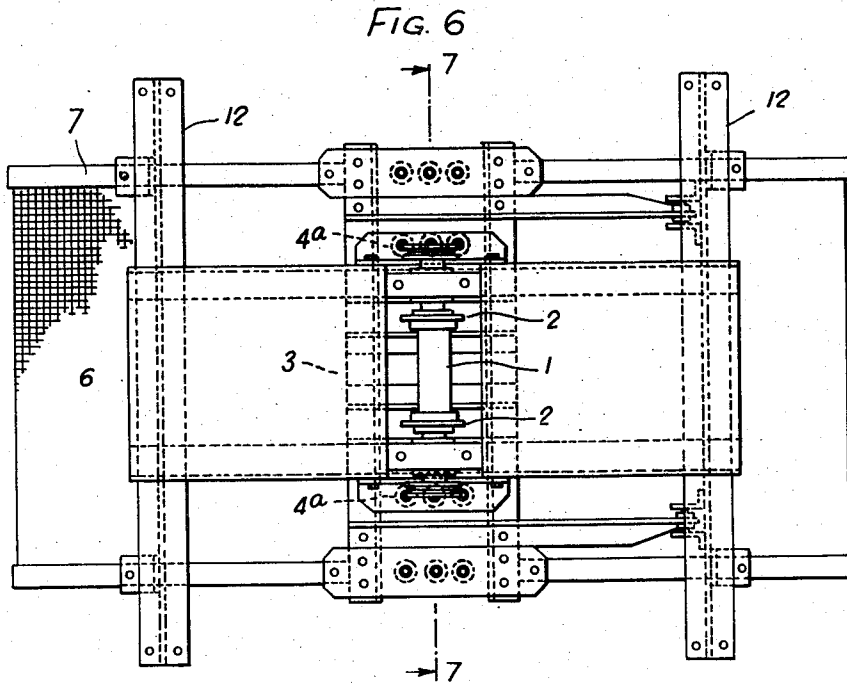
Nov. 13, 1951

G. H. STRAIN
SCREENING APPARATUS

2,575,143

Filed Aug. 11, 1947

5 Sheets-Sheet 5



INVENTOR

G. H. STRAIN

By *Wilkinson + Mawkinney*
ATTYS.

UNITED STATES PATENT OFFICE

2,575,143

SCREENING APPARATUS

George Harry Strain, Seaford, England

Application August 11, 1947, Serial No. 768,054
In Great Britain October 16, 1946

5 Claims. (Cl. 209—329)

1

In my prior U. S. Patent No. 2,192,668 I have described a screening device which comprises a rigid member or primary mass to which a reciprocating motion having a vertical component is imparted, and a screen or secondary mass mounted thereon in such manner that it is normally held in contact therewith by the force of a spring or the like, but is free to move against such force away from the position of contact. The upward movement of the screen was abruptly arrested and reversed by collision with an anvil or primary mass from which the screen derived its vibratory motion, the shock of impact being lessened by the interposition of rubber pads between the colliding masses, this produces concussive action.

It has been found in practice that these rubber pads are only partly satisfactory, and according to the present invention they are replaced by springs that determine the deceleration and acceleration of the secondary mass as it approaches and recedes from the primary mass, this producing non-concussive or simple-harmonic motion.

In a convenient arrangement the primary mass is divided into a plurality of separate and simultaneously operated units.

The buffer springs may be divided into groups so that they may become operative simultaneously or progressively.

The invention is illustrated in the annexed drawings, in which

Fig. 1 is a side elevation of a machine of which the screening impulses are perpendicular to the screening surface.

Fig. 2 is a sectional elevation on the line 2—2 of Fig. 1.

Fig. 3 is a plan.

Fig. 4 is a side elevation of a screening machine of which the impulses are inclined to the screening surface.

Fig. 5 is a side elevation of a machine in which the primary mass is divided into two parts.

Fig. 6 is a plan view of a slightly modified arrangement of that shown in Figs. 1—3, and

Fig. 7 is a sectional elevation on the line 7—7 of Fig. 6.

Referring first to Figs. 1—3, 1 is an eccentric driving shaft driven by a shaft 1a, and 3 is a primary mass driven through the medium of connecting rods 2, the mass 3 being mounted on parallel leaf springs 4. Further springs 5 are located near the centre of the length of side members 7 of a screening compartment 6, the springs 5 being adjustably secured to the mass 3 by screws,

2

which enable the springs to be moved into or out of contact with the compartment 6 which has a screening surface 8.

The screening compartment 6 is held in position, relatively to the primary mass 3 by transverse leaf springs 9 which contribute, together with the suspension and buffer springs, to determine the natural frequency of the compartment.

These leaf springs 9 couple the screening compartment to a stationary framework 12, so that the position of the compartment is securely maintained. The compartment is coupled to the primary mass 3 by tension springs 10 through which energy from the primary mass is directly transmitted to the compartment 6. The compartment is also coupled to the stationary framework 12 by tension springs 11 for the purpose of raising or lowering the compartment relatively to the stationary framework. Apart from the leaf springs all the springs are adjustable, and by their arrangement and adjustment, the primary mass leaf springs 4 and the compartment leaf springs 9 may be relieved of load when the machine is at rest. In this condition, the leaf springs are subjected to the least amount of bending stress when the machine is working and their endurance is enhanced.

When all the buffer springs are at all times of working in contact with the compartment the motion of the latter is simple harmonic in character, and its amplitude is influenced by its natural frequency, which is determined by all the springs in contact with the compartment.

Assuming the primary mass to have a constant amplitude and frequency, the amplitude of the compartment is greater as its natural frequency approximates to that of the primary mass. By reducing or increasing its natural frequency, by using weaker or stronger springs, the compartment amplitude may be reduced to little more than that of the primary mass, and with the proper selection of springs the movement of the compartment may be increased to $\frac{1}{2}$ " when vibrating at 1400 per minute. At this speed and movement the compartment has an acceleration much greater than that of gravity so that material being screened is projected clear of the screening surface 8 without the need of impact. By these means, the acceleration of the compartment may be determined to suit the needs of material being screened. If, however, impact characteristics are desired, the springs 5 may be set to part company with the compartment on its down stroke and to meet again on the up-

3

stroke, the distance or period of deceleration being determined by the stiffness of the springs.

If the springs 5 are set a little in advance of each other, the process of parting company with the compartment will be progressive and so will be the rejoining, so that deceleration, or impact characteristic, may be usefully varied over a considerable range.

As the performance of the machine depends upon the ratio of the natural frequency of the secondary mass to the frequency of the primary mass, variation of performance may be achieved by varying the speed of the eccentric driving shaft, the spring setting of the secondary mass remaining constant.

In the arrangement described where the screening impulses are perpendicular to the screening surface it is necessary for the machine to be tilted to cause the material to travel along the surface.

In the slightly modified arrangement shown in Fig. 4 the screening impulses are inclined to the screening surface, the compartment being adapted to function in an horizontal position.

Fig. 5 illustrates an arrangement in which the primary mass is divided into two halves 3a and 3b with two sets of leaf springs 4a and 4b and two sets of springs 5a and 5b. The two halves of the mass 3 are driven from a single shaft 1 and compensating links 13.

In the arrangement shown in Figs. 6 and 7 the leaf springs 4, on which the primary mass 3 is mounted, are replaced by coil springs 4a and the mass 3 oscillates in the manner described in Figs. 1-3.

I claim:

1. Screening apparatus comprising a rigid primary mass mounted on springs and subjected to substantially rectilinear vibrations, a secondary mass comprising a screening compartment adapted to vibrate in accordance with the movements of said primary mass, buffer springs interposed between the two vibrating masses and serving to determine the deceleration and acceleration of said secondary mass as it approaches or recedes from said primary mass, tension springs for coupling the secondary mass to and forcing the same towards the primary mass, additional tension springs for coupling said screening compartment to a stationary framework, and transverse springs for holding said

4

screen compartment in position relatively to the primary mass.

2. A non-concussive screening apparatus comprising a rigid primary mass, means for subjecting said primary mass to substantially rectilinear vibrations, a screening compartment constituting a secondary mass adapted to vibrate in accordance with the movements of the primary mass, compression springs mounted upon the primary mass and engaging the secondary mass for urging the secondary mass away from the primary mass, tension springs connected to the primary mass and the secondary mass for urging the secondary mass towards the primary mass, a stationary framework, and tension springs connected to said stationary framework and to said secondary mass for urging the secondary mass towards the primary mass.

3. A non-concussive screening apparatus as claimed in claim 2 characterized by the fact that transverse springs are connected to the stationary framework and the secondary mass for holding the secondary mass in position relatively to the primary mass.

4. A non-concussive screening apparatus as claimed in claim 3 characterized by the fact that brackets are mounted on the secondary mass at an angle thereto, and that the primary mass is mounted upon said brackets at an inclination to said secondary mass and that the longitudinal axes of said interposed and tension springs are disposed at an angle to said secondary mass.

5. A non-concussive screening apparatus as claimed in claim 4 characterized by the fact that said primary mass comprises at least two separate and simultaneously operated units.

GEORGE HARRY STRAIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 19,817	Wurzbach et al.	Jan. 7, 1936
2,192,668	Strain	Mar. 5, 1940
2,353,492	O'Connor	July 11, 1944

FOREIGN PATENTS

Number	Country	Date
375,934	Great Britain	July 7, 1932
479,366	Great Britain	Feb. 7, 1938