

T. L. & T. J. STURTEVANT.
VIBRATING SCREEN OR SEPARATOR.
APPLICATION FILED JULY 1, 1909.

961,467.

Patented June 14, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

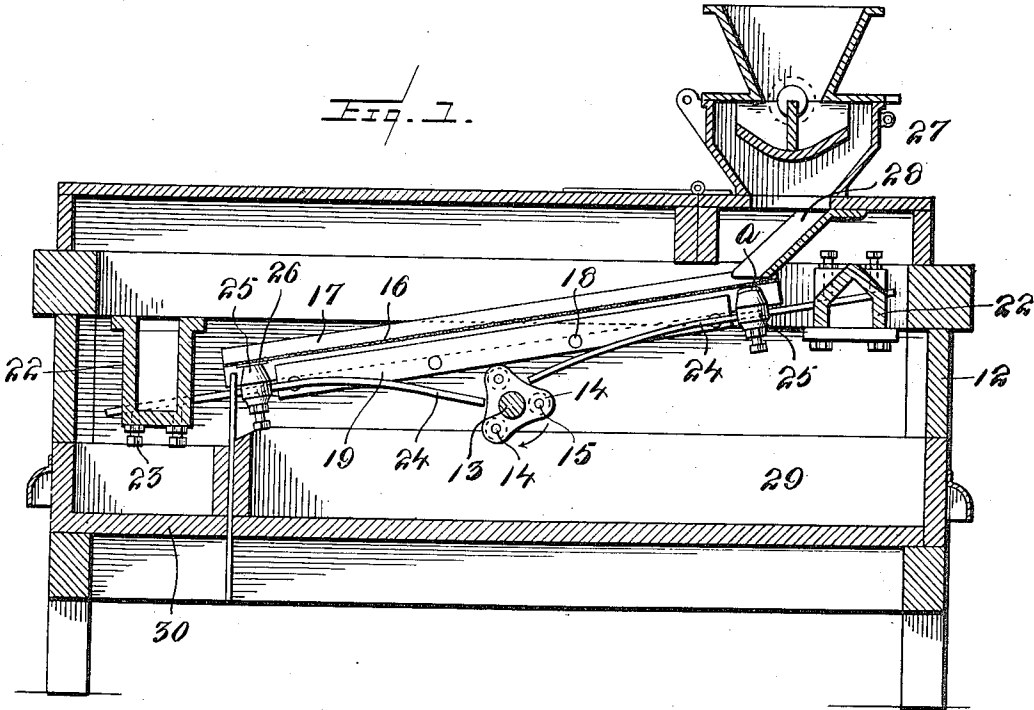
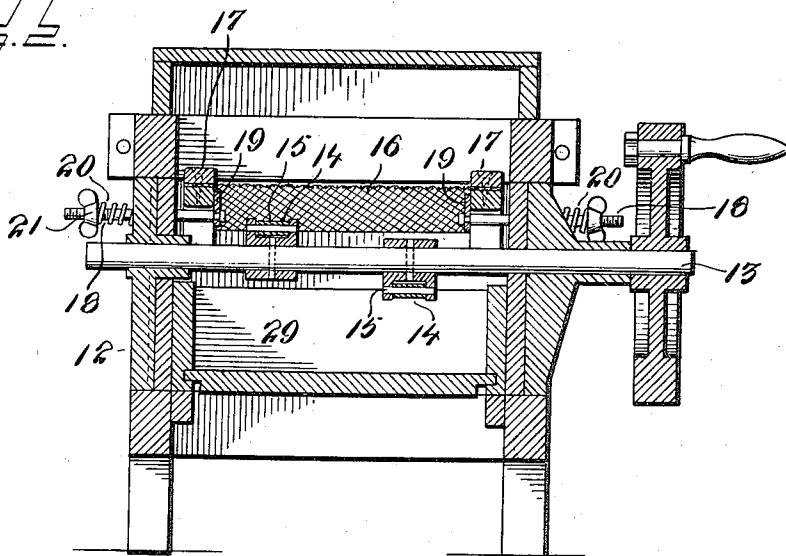


Fig. 2.



WITNESSES:

H. F. Roy & Co.
W. M. Sweeney.

INVENTORS:

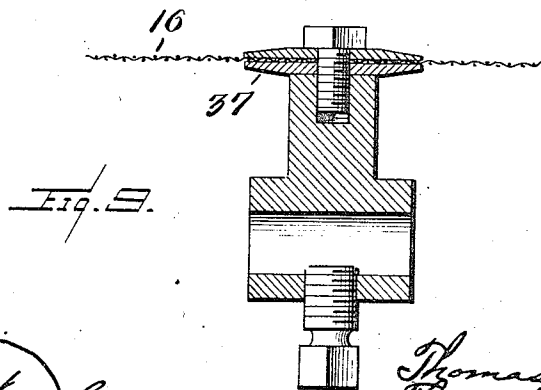
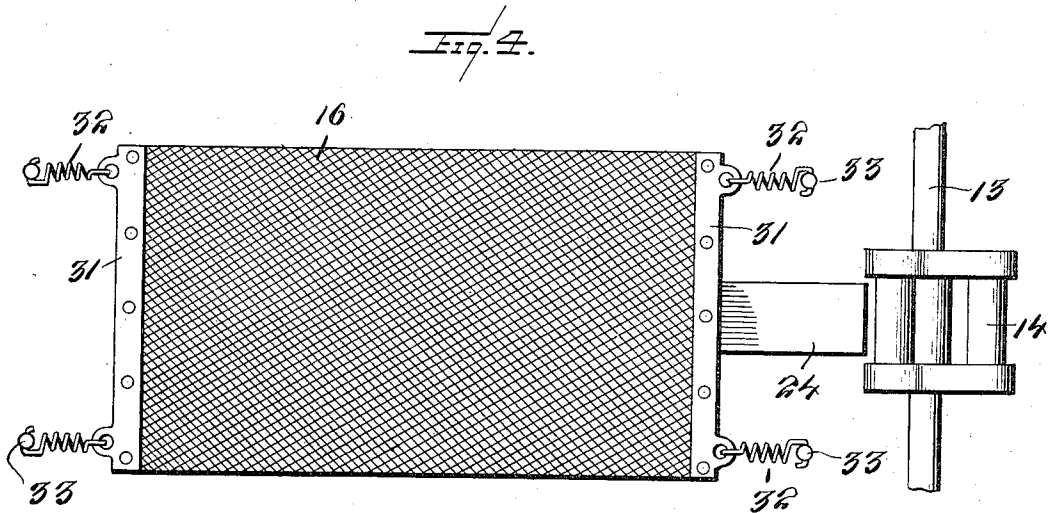
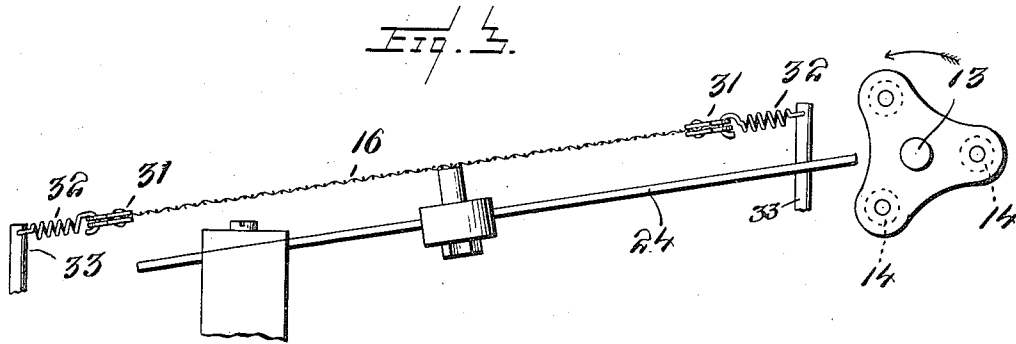
Thomas Leggett Sturtevant,
Thomas Joseph Sturtevant,
BY *Robert R. Ralston,*
Attorneys.

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3 SHEETS—SHEET 2.



WITNESSES:

H. F. Roy
C. H. Sweeney.

BY

INVENTORS:
Thomas Leggett Sturtevant
Thomas Joseph Sturtevant
Robert Ralston

Attorneys.

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3 SHEETS—SHEET 3.

Fig. 6.

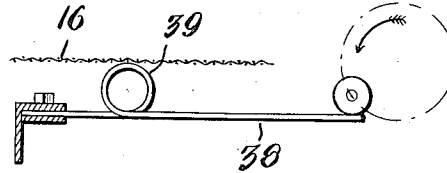


Fig. 7.

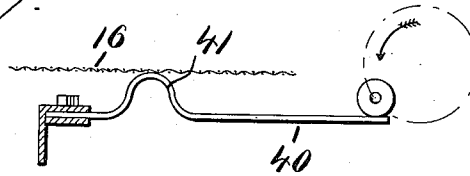


Fig. 8.

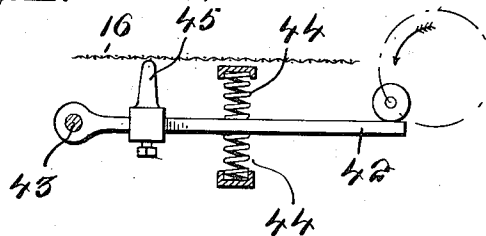
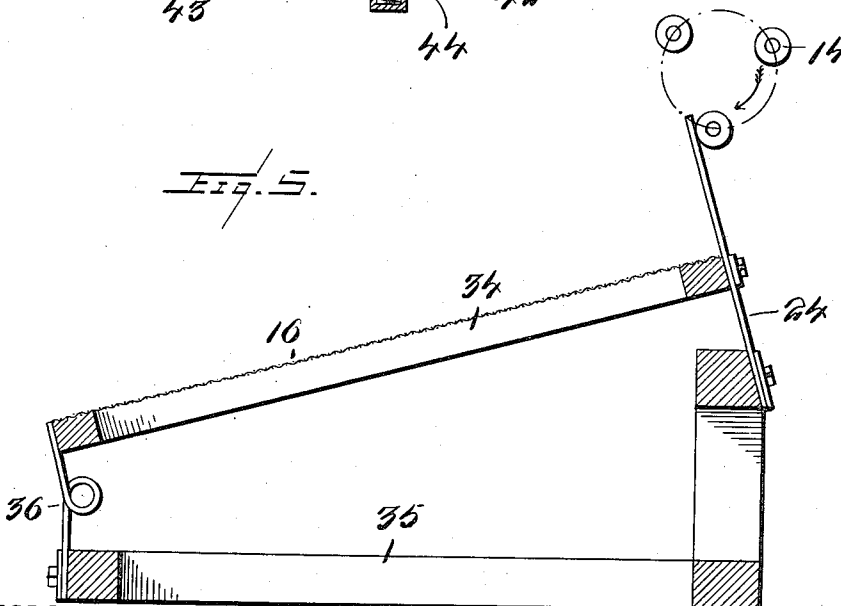


Fig. 5.



WITNESSES:

Wm. F. Roy
C. M. Sweeney

INVENTORS:

Thomas Leggett Sturtevant,
Thomas Joseph Sturtevant,
BY *Robert T. Galley*

Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS LEGGETT STURTEVANT, OF QUINCY, AND THOMAS JOSEPH STURTEVANT, OF WELLESLEY, MASSACHUSETTS, ASSIGNORS TO STURTEVANT MILL COMPANY, A CORPORATION OF MAINE.

VIBRATING SCREEN OR SEPARATOR.

961,467.

Specification of Letters Patent. Patented June 14, 1910.

Application filed July 1, 1909. Serial No. 505,409.

To all whom it may concern:

Be it known that we, THOMAS L. STURTEVANT and THOMAS J. STURTEVANT, citizens of the United States, residing, respectively, at Quincy and Wellesley, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Vibrating Screens or Separators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a screening or separating device by which the finer particles of comminuted material may be separated from the coarser particles thereof; and the invention has for its object to provide means whereby vibrations of great rapidity and intensity, but of small amplitude, may be imparted to the screen surface, thereby effectively performing the screening or separating operations but without causing the material to jump about on the screen surface in an objectionable manner.

To this end the invention, in its simplest form, relates to a screen agitating or vibrating device intended to operate on the principle of a tuning fork by reason of the very short but very rapid vibrations which will be imparted thereto after each flexing or displacing operation. These vibrations, of great rapidity and intensity, but of small amplitude, may be imparted to the screen member to be agitated either by percussive impact against such screen member, or by a push-and-pull action by reason of a positive connection between the agitating member and the screen member to be agitated, or as will be hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a screening apparatus showing one embodiment of the present invention, and Fig. 2 is a cross section of the same. Figs. 3 and 4 are side and plan views, respectively, illustrating a somewhat different form of the invention from that shown in Figs. 1 and 2, Fig. 5 is a partly diagrammatic view illustrating still another form of the invention, and Figs. 6, 7 and 8 are partly diagrammatic views illustrating still other forms of the invention. Fig. 9 is a detail view showing one manner of connecting the impact or agitating block with the screen surface.

Referring to Figs. 1 and 2, 12 denotes a suitable frame in which is mounted for rotation a shaft 13 to which are attached rotary operating devices each comprising a series of spaced rollers 14 mounted on pins 15. The screen surface 16 preferably consists of a piece of woven wire cloth of suitable size clamped between sectional side bars 17 which are engaged by stretching devices comprising rods 18 secured to heads or bars 19 and acted on by coil springs 20. The said stretching devices will serve to keep the screen surface 16 under tension, and this tension may be regulated by means of adjustable thumb nuts 21 engaging threaded outer portions of the said rods 18.

Suitably supported on the frame 12 and rigidly attached thereto are brackets 22 in which are rigidly secured, by screws 23, the resilient agitating plates or vibrators 24 the free ends of which are arranged to be successively engaged by the rollers 14 carried by the shaft 13, so that the free ends of said agitating plates or vibrators may be successively engaged and released by said rollers which, after flexing or bending one of said agitating plates or vibrators, will suddenly release the same and permit it to vibrate by its own resilience until acted on by the next succeeding displacing roller. Thus each time an agitating plate or vibrator is flexed or bent and released by a roller 14 which engages and then suddenly releases the vibrator, the latter will, by its own resilience, perform a series of short rapid vibrating movements which will be conveyed to the screen through the contact block or impact part carried by said vibrator.

Adjustably secured to the agitating plates or vibrators, and preferably located near the fixed ends thereof, are the contact blocks 25 which may be cushioned, as at *a*, so as to act directly on the screen surface without injuring the same; or the said screen surface may be provided with projecting strips, as 26, to be engaged by the contact block or blocks. By adjusting a contact or impact block toward the free end of a vibrator the amplitude of movement of said block will be increased, as will be understood. Any desired number of agitating plates or vibrators may be provided, and they will preferably be so arranged as to be flexed alternately, so

that the vibration of the screen surface, resulting from the vibration of the said agitating plates or vibrators, will be constant.

The material to be screened may be fed to the screen surface in any suitable manner, as by a mechanically operated feeder, as 27, from which, through a feed spout 28, the material to be screened may be directed to the screen surface; and fine material passing through said screen surface may fall into a drawer, as 29, and the tailings be directed into a drawer, as 30, for the convenient removal of the fine screened material and tailings.

In the form of the invention shown in Figs. 3 and 4 the wire cloth screen 16 is shown as being attached at its ends to bars or plates 31 which are engaged by coil springs 32 connected to posts 33, the said springs thus holding the screen surface under tension. In this form of the invention the agitating plate or vibrator 24 is similar to those shown in Fig. 1, and is arranged to be operated in a similar manner by means of the rotating rollers 14 carried by the shaft 13.

In the form of the invention shown in Fig. 5, the screen 16 is mounted on a frame 34 yieldingly connected with the supporting frame 35 by means of spring supports 36, and the resilient agitating bar 24 is rigidly attached at one end to a portion of said frame 35, and between its fixed and free ends is clamped to a portion of the frame 34 so that when flexed by the rotating rollers 14 the said agitating bar 24 will serve to vibrate the screen frame 34 endwise by a series of very rapid movements of small amplitude, the movements of the said agitating plate or vibrator 24 being imparted to the screen frame by push-and-pull action.

If it be desired to vibrate the screen by a push-and-pull action through the medium of the device shown in Figs. 1, 2, 3 and 4, the impact or agitating blocks 25 may be provided with washers 37 between which the wire cloth screen may be clamped, as shown in Fig. 9.

In the diagrammatic form of the invention shown in Fig. 6 the vibrator may consist simply of a piece of spring wire 38 provided with a coil portion 39 for impact against the screen 15. In the form of the invention shown in Fig. 7 a plate spring 40 may be provided with a bent portion 41 for contact with the screen. In the form of the invention shown in Fig. 8 the vibrator consists of a rigid bar 42 mounted on a pivot 43 and held between coiled springs 44 which, when the said bar is displaced by the rotating rollers, will serve to impart a series of short, rapid vibrations thereto and thus cause the impact block 45 carried thereby to rapidly engage the screen 16.

In all the forms of the invention herein-

before described, except that shown in Fig. 8, each of the vibrators is rigidly secured or held at one end to the fixed bracket or support to which it is attached, and in the form of the invention shown in Fig. 8 the rod or pin 43 serves as a rigid support for one end of the spring-controlled vibrator 42.

In the operation of the invention the spaced rollers 14 will be rotated somewhat slowly to afford suitable intervals for the vibrators to act on the screens after having been suddenly released by the rollers.

From the foregoing it will be understood that the invention is not to be limited to the details herein shown in that the construction and arrangement of the agitating plates or vibrators, each fixed at one end and arranged to have their free ends successively flexed or displaced, and which are provided between their fixed and free ends with means for agitating or vibrating the screens, or are otherwise adapted to agitate screen members, as also the means for flexing or displacing the free ends of said plates or vibrators, may be widely varied without departing from the spirit of the invention.

In all forms of the invention herein shown and described the vibrators or agitating members, having fixed and free ends, are normally in a state of equilibrium, or in a balanced condition, either by their own resiliency or by reason of the balancing action of opposing springs; so that when flexed or displaced from their normal positions such vibrating or agitating members perform extremely rapid vibrations, due to spring action, in the manner in which the tine of a tuning fork vibrates when displaced or flexed from its normal state of equilibrium when subjected to the percussive blow of a contact or impact device, as hereinbefore stated.

In the form of the invention shown in Figs. 1 and 2 the metallic woven wire screen 16, instead of being held in a frame, as is usual, is stretched or held under elastic tension by means of the side bars 17 yieldingly pulled apart by the action of the springs 20; while in the form of the invention shown in Figs. 3 and 4 the metallic woven wire screen 16 is attached to end plates 31 acted on by the coil springs 32 which hold the said screen 16 taut and under elastic tension, as hereinbefore stated. In both of these forms of the invention the screen is what may properly be termed a frameless one, in that it is entirely free at two opposite sides or ends, or at two opposite edges, and being held taut and under elastic tension is left very much freer to be evenly stretched and to vibrate under the percussive action of the agitating device or devices than would be the case if it were attached to a frame at three or more parts of its margin, as is the case with screens of prior constructions.

Having thus described our invention we claim and desire to secure by Letters Patent:—

1. In a screening or separating device, the combination with a screening or separating member, of a spring-controlled vibrator for said member consisting of a member normally in a state of equilibrium and one end of which is secured to a fixed support and adapted to act at its free end on said screening or separating member, and rotating means, acting directly on said vibrator, for displacing or flexing and suddenly releasing the same, so that, when suddenly released, after its free end has been flexed or displaced, it will perform a series of short, rapid vibrations due to spring action.

2. In a screening or separating device, the combination with a screening or separating member, and springs for holding the same under elastic tension, of a vibrator for said screening or separating member consisting of a spring-controlled member normally in a state of equilibrium and one end of which is secured to a fixed support and which is adapted to act at its free part on said screening or separating member, and rotating means, acting directly on said vibrator, for displacing or flexing and suddenly releasing the same, so that, when suddenly released after it has been flexed or displaced, it will perform a series of short rapid vibrations due to spring action.

3. In a screening or separating device, the combination with a screen member, of a vibrator for said screen member consisting of a resilient body one end of which is rigidly attached to a fixed support and which body is adapted to act at its free part on said screen member, and rotating means, acting directly on said vibrator, for flexing and suddenly releasing the same to cause it to perform a series of rapid vibrations of small amplitude to agitate said screen member.

4. In a screening or separating device, the combination with a screen member, of a vibrator for said member consisting of a resilient body having fixed and free ends, and which body is provided with an independent contact or impact part to act on said screen member, and rotating means, acting directly on said vibrator, for flexing and suddenly releasing the free end thereof to cause said vibrator to perform a series of rapid vibrations of small amplitude.

5. In a screening or separating device, the combination with a screen member, of a vibrator for said member consisting of a resilient body having fixed and free ends, and which body is provided with an independent contact or impact part to act on said screen member, and rotating means, acting directly on said vibrator, for flexing and suddenly releasing the free end of the same to cause it to perform a series of rapid vi-

brations of small amplitude, said rotating means comprising a series of spaced rollers acting successively on said resilient body.

6. In a screening or separating device, the combination with a screen member, of a vibrator for said member consisting of a spring-controlled member having fixed and free ends and having adjustable means, between its ends, whereby it is adapted to act on said screen member, and rotating means, acting directly on said vibrator, for displacing or flexing the free end thereof, so that when suddenly released, after its free end has been flexed or displaced, it will perform a series of short rapid vibrations due to spring action.

7. In a screening or separating device, the combination with a metallic screen surface and springs for holding the same under elastic tension, of a vibrator for said screen consisting of a normally balanced resilient member having fixed and free ends and having adjustable means, between its ends, whereby it is adapted to act on said metallic screen, and means for displacing or flexing the free end of said vibrator, so that, when suddenly released, after its free end has been flexed or displaced, it will perform a series of short rapid vibrations due to spring action.

8. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a resilient body having fixed and free ends, and which body is provided between its ends with an adjustable contact or impact part to act on said screen, and means for flexing and suddenly releasing the free end of said resilient body to cause the latter to perform a series of rapid vibrations of small amplitude.

9. In a screening or separating device, the combination with a metallic screen and springs for holding the same under tension, of a vibrator for said screen consisting of a resilient body having fixed and free ends, and which body is provided between its ends with an adjustable contact or impact part to act on said screen, and means for flexing and suddenly releasing the free end of said resilient body to cause the latter to perform a series of rapid vibrations of small amplitude.

10. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a resilient body having fixed and free ends, and which body is provided between its ends with an adjustable contact or impact part to act on said screen, and rotating means for flexing and suddenly releasing the free end of said resilient body to cause the latter to perform a series of rapid vibrations of small amplitude.

11. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a

resilient body having fixed and free ends, and which body is provided between its ends with an adjustable contact or impact part to act on said screen, and rotating means for flexing and suddenly releasing the free end of said resilient body to cause the latter to perform a series of rapid vibrations of small amplitude, said rotating means comprising a series of spaced rollers acting successively on the free end of said resilient body.

12. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a normally balanced, spring-controlled member having fixed and free ends and provided with adjustable means whereby it is adapted to act on said metallic screen, and rotating means, acting directly on said vibrator, for displacing or flexing the free end thereof, so that when suddenly released, after its free end has been flexed or displaced, it will perform a series of short rapid vibrations due to spring action.

13. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a normally balanced, resilient member having fixed and free ends and provided with means whereby it is adapted to act on said metallic screen, and rotating means, acting directly on said vibrator, for displacing or flexing the free end thereof, so that when suddenly released, after its free end has been flexed or displaced, it will perform a series of short rapid vibrations due to spring action.

14. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a normally balanced, resilient member having fixed and free ends and provided with an independent contact device to act on said metallic screen, and rotating means, acting directly on said vibrator, for displacing or flexing the free end thereof, so that when suddenly released, after its free end has been flexed or displaced, it will perform a series of short rapid vibrations due to spring action, said rotating means comprising a series of spaced operating devices arranged to act successively and at intervals on said vibrator.

15. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a normally balanced, resilient member having fixed and free ends and provided with means whereby it is adapted to act on said metallic screen, and rotating means for displacing or flexing the free end of said vibrator, so that when suddenly released, after its free end has been flexed or displaced, it will perform a series of short rapid vibrations due to spring action, said rotating means com-

prising a series of spaced rollers arranged to act successively and at intervals on said vibrator.

16. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a normally balanced, resilient body having fixed and free ends and provided between its ends with an adjustable contact or impact part to act on said screen, and means for flexing and suddenly releasing the free end of said resilient body to cause the said body to perform a series of rapid vibrations to agitate said screen percussively.

17. In a screening or separating device, the combination with a metallic screen, of a vibrator for said screen consisting of a resilient body having fixed and free ends and provided between its ends with an adjustable contact or impact part to act on said screen, and means for flexing and suddenly releasing the free end of said resilient body to cause the said body to perform a series of rapid vibrations to agitate said screen percussively, said flexing or displacing means comprising spaced rotating members arranged to act successively and at intervals on said resilient body.

18. In a screening or separating device, the combination with a frameless, metallic wire mesh screening member having two opposite free edges, of springs for holding the said screen member under elastic tension, resilient vibrators, mounted on fixed supports and normally in a state of equilibrium, and means, acting directly on said resilient devices, for flexing or displacing the same to cause them to act percussively on said screen member, to jar or vibrate the same.

19. In a screening or separating device, the combination with a frameless wire mesh screen member having, at least, two opposite free edges, of springs for holding the said screen member under elastic tension, resilient devices mounted on fixed supports and normally in a state of equilibrium and each rigidly attached at one end to a fixed support, and rotating means, acting directly on said resilient devices, for flexing or displacing the same, so that they will be caused to act percussively on said screen member to jar or vibrate the same.

20. In a screening or separating device, the combination with a frameless wire mesh screen member having, at least, two opposite free edges, of springs for holding the said screen member under elastic tension, and means, acting percussively, for jarring or vibrating said screen member, said jarring or vibrating means comprising one or more resilient bodies having fixed and free ends and provided with contact or impact parts to act on said screen member, and means,

acting directly on said resilient body or bodies, for flexing and suddenly releasing the free end or ends thereof.

21. In a screening or separating device, the combination with a frameless wire mesh screen member having, at least, two opposite free edges, of springs for holding the said screen member under elastic tension, and means, acting percussively, for jarring or vibrating said screen member, said jarring or vibrating means comprising one or more resilient bodies having fixed and free ends and provided with contact or impact parts to act on said screen member, and rotating means, acting directly on said resilient body or bodies, for flexing and suddenly releasing the free end or ends thereof.

22. In a screening or separating device, the combination with a frameless wire-cloth screen having two opposite free edges, of springs for holding the said screen under elastic tension, and means, acting percussively, for jarring or vibrating said screen, said jarring or vibrating means comprising one or more resilient bodies having fixed and free ends and provided between their ends with contact or impact parts to act on said screen, and rotating means, acting on the free end or ends of said body or bodies, for flexing and suddenly releasing the same, said rotating means comprising a series of spaced rollers.

23. In a screening or separating device,

the combination with a wire-cloth screen having two opposite free edges, of springs, acting in the direction of said edges, for holding said screen under elastic tension, and one or more resilient bodies having fixed and free ends and each provided between said ends with a contact part for acting percussively on said screen, and rotating spaced rollers arranged to roll on and off the free end or ends of said resilient body or bodies successively for the purpose of flexing the same.

24. In a screening or separating device, the combination with a wire-cloth screen having two opposite free edges, of springs, acting in the direction of said edges, for holding said screen under elastic tension, and one or more resilient bodies having fixed and free ends and each provided, between said ends, with an adjustable contact part for acting percussively on said screen, and rotating spaced rollers arranged to roll on and off the free end or ends of said resilient body or bodies successively for the purpose of flexing the same.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS LEGGETT STURTEVANT.
THOMAS JOSEPH STURTEVANT.

Witnesses:

FRED A. KLINGE,
J. D. KLINGE.