May 29, 1923.

1,456,801

H. P. HOYLE

SCREENING APPARATUS

Filed July 26, 1922

6 Sheets-Sheet 1

Fig. 2.

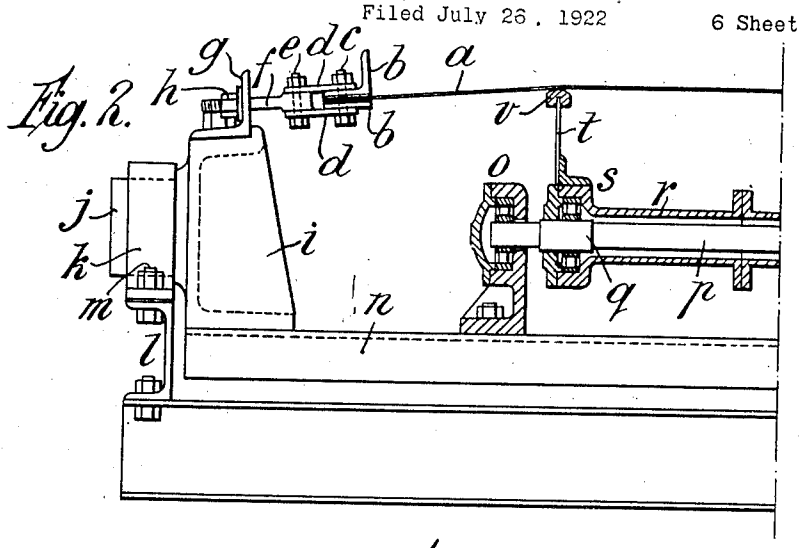
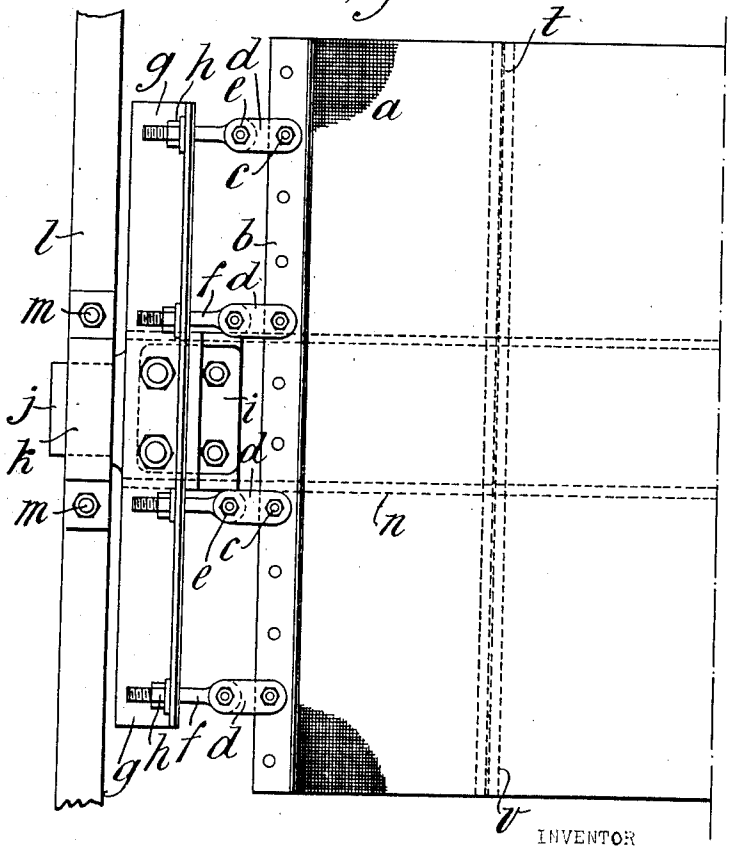


Fig. 1.



INVENTOR
HENRY PATRICK HOYLE
By his Attorneys
Baldwin & Wright

May 29, 1923.

1,456,801

H. P. HOYLE

SCREENING APPARATUS

Filed July 26, 1922

6 Sheets-Sheet 2

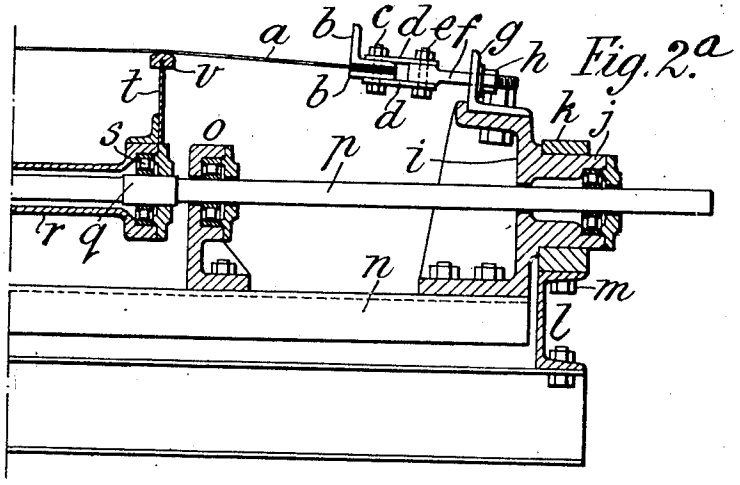
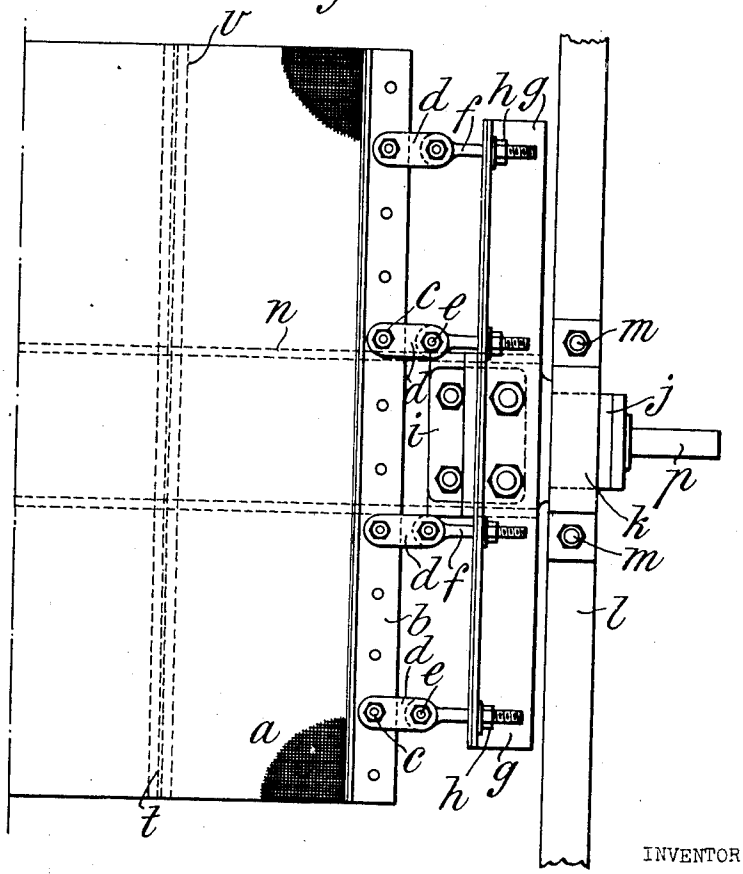


Fig. 2a.

Fig. 1a.



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May 29, 1923. 1,456,801

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SCREENING APPARATUS

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Fig. 3

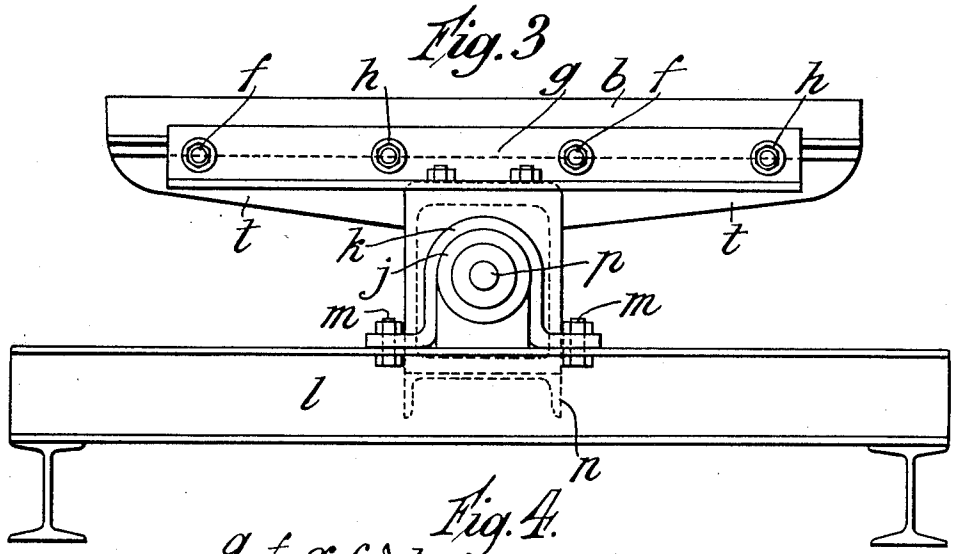
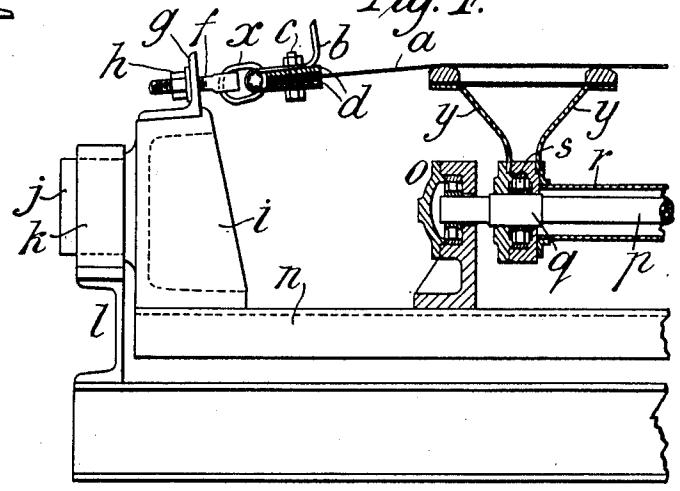


Fig. 4.



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May 29, 1923. 1,456,801

H. P. HOYLE

SCREENING APPARATUS

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Fig. 5.

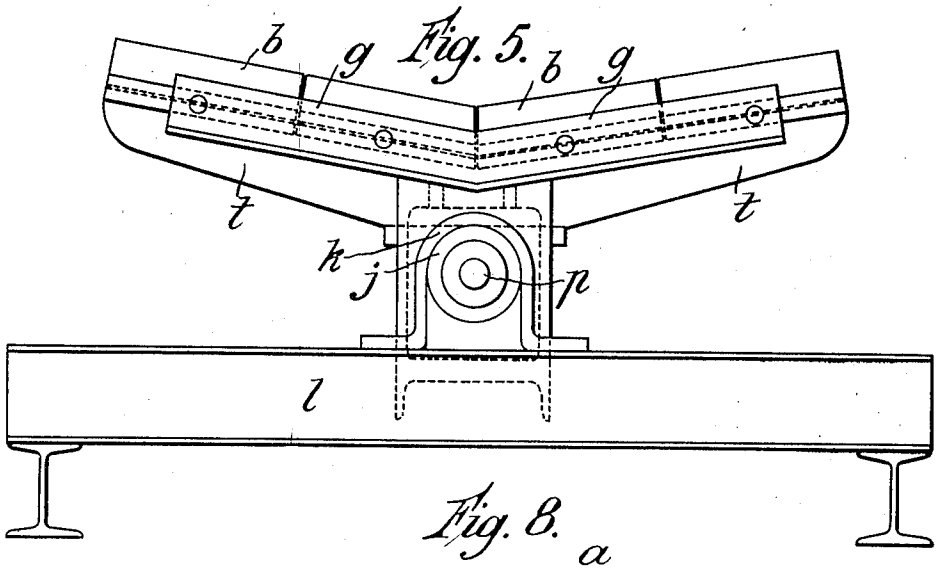


Fig. 8.

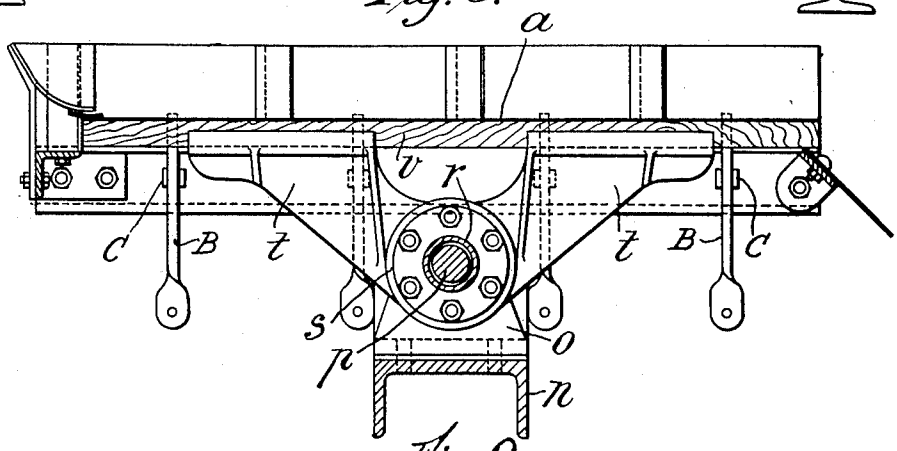
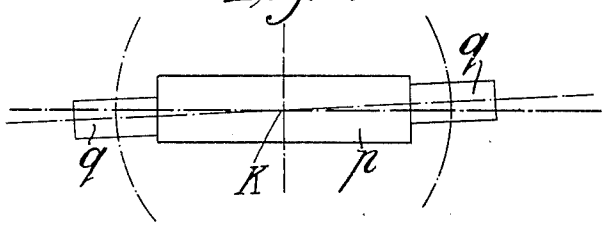


Fig. 9.



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SCREENING APPARATUS

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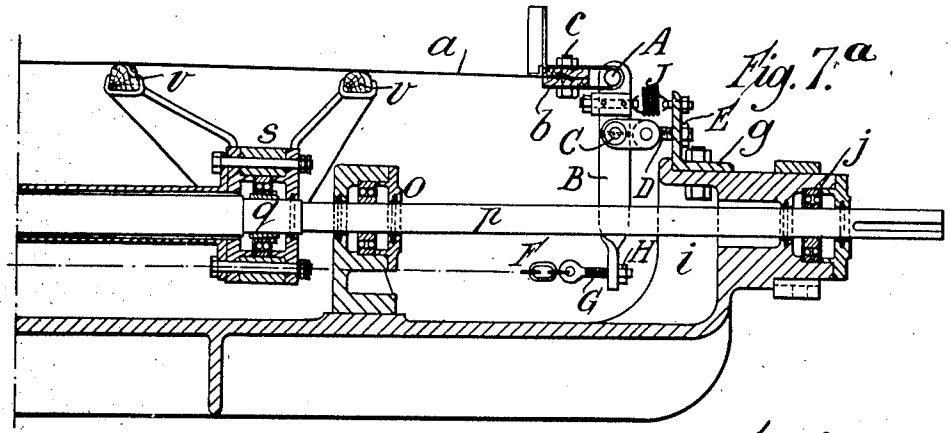
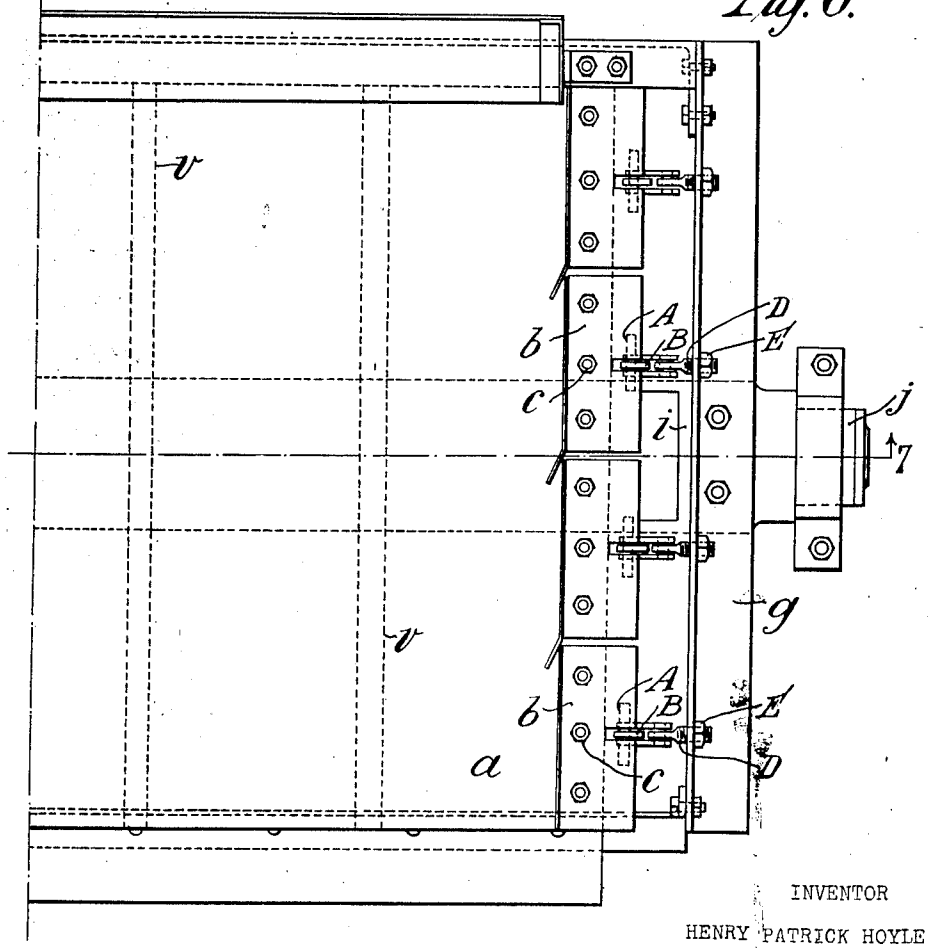


Fig. 7a.

Fig. 6.



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May 29, 1923.

1,456,801

H. P. HOYLE

SCREENING APPARATUS

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Fig. 7a

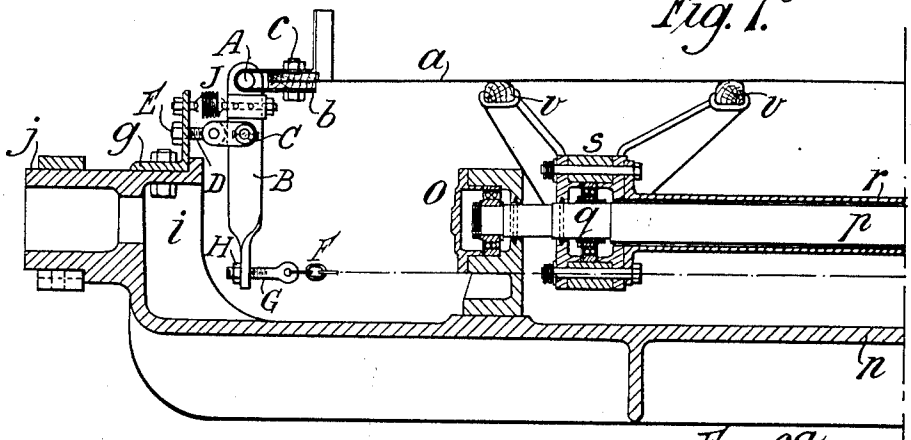
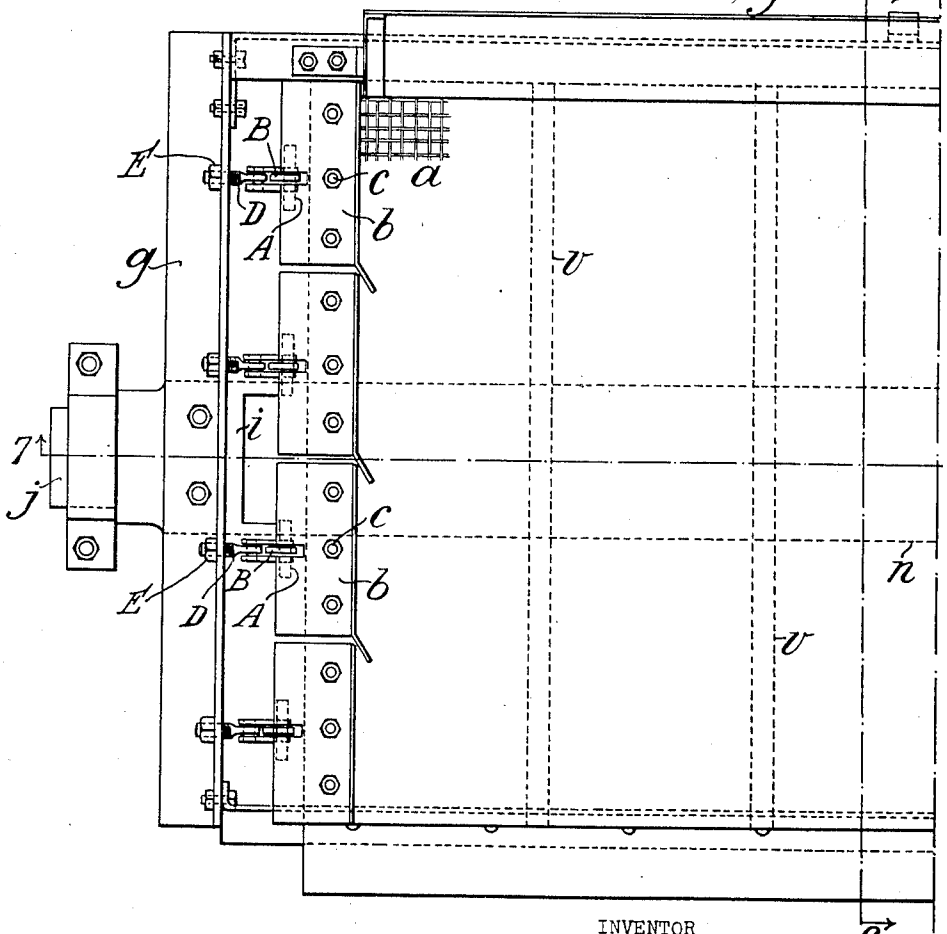


Fig. 6a



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HENRY PATRICK HOYLE

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Patented May 29, 1923. 1,456,801

UNITED STATES PATENT OFFICE.

HENRY PATRICK HOYLE, OF DURHAM, ENGLAND.

SCREENING APPARATUS.

Application filed July 26, 1922. Serial No. 577,741.

To all whom it may concern:

Be it known that I, HENRY PATRICK HOYLE, a subject of the King of Great Britain, residing at 46 North Bailey, Durham, England, have invented new and useful Improvements in and Relating to Screening Apparatus, of which the following is a specification.

This invention relates to screening apparatus and has for its object to provide means for imparting a vibratory motion to the screening surface.

According to his invention the screening surface has imparted to it a vibratory movement by arms engaging the screening surface and actuated by eccentrics on a shaft. Preferably the eccentric portions of the shaft are formed with their axes in line, which line passes through the centre point of the axis of the portion of the shaft between the eccentric portions. The arms are mounted perpendicularly to the common axis of the eccentric portions and at each revolution of the shaft the screening surface receives an up and down movement combined with a crosswise movement. The eccentrics are preferably set at an angle of 180° to each other.

In one embodiment of the invention the shaft is mounted in bearings below the screening surface and on the eccentric portions of the shaft are other bearings mounted upon which is a hollow sleeve carrying the arms.

The screening surface is secured to side clamping bars which are secured to side arms bolted to supports having trunnions held in clamps secured to the fixed frame by bolts. The supports may be connected together by a bar upon which the bearings of the shaft are mounted. Preferably the side bars to which the screening surface is secured are connected to the ends of levers pivoted upon adjustable pivots to the side arms, whilst the other ends of the levers on each side of the screening surface are connected together in pairs, which arrangement permits of a crosswise movement of the screening surface, such movement being limited by springs attached to the levers.

The accompanying drawings show screening apparatus made in accordance with this invention.

Figure 1 is a plan view of part of the apparatus.

Figure 1ª is a plan view of the other part thereof.

Figure 2 is a transverse section of part of the apparatus, and

Figure 2ª is a transverse section of the other part thereof.

Figure 3 is an end elevation.

Figures 4 and 5 correspond to Figures 2 and 3 and show modifications.

Figure 6 is a plan view of a part of another form of apparatus.

Figure 6ª is a plan view of the other part thereof.

Figure 7 is a longitudinal section on the line 7 of Figure 6.

Figure 7ª is a longitudinal section on the line 7 of Figure 6ª.

Figure 8 is a transverse section on the line 8—8 of Fig. 6.

Figure 9 shows diagrammatically the eccentrics at the ends of the shaft.

In Figures 1 to 3, the screening surface *a* is secured to side clamping bars *b* by bolts *c* and the side bars *b* are secured by link plates *d d* and bolts *e* to eye-bolts *f* secured to arms *g* by nuts *h*. The arms *g* are bolted to supports *i* having trunnions *j* held in clamps *k* secured to the fixed frame *l* by bolts *m*, whereby the arms *g* and screening surface *a* can be held in any desired position. The supports *i* are connected together by a bar *n*. On the bar *n* are bearings *o* supporting a shaft *p* which extends through and has a bearing in the trunnion *j* on the right hand side of the screen. This shaft may be turned by a belt and pulley or other convenient means. On the shaft *p* are eccentric portions *q q* set at an angle of 180° to each other. A hollow sleeve *r* is carried by bearings *s* mounted on the eccentric portions *q* and to the ends of the sleeve *r* are attached arms *t* at the ends of which are strips of wood *v* which extend along and are in contact with the underside of the screening surface *a*. When the shaft *p* is turned the eccentric portions *q q* cause the arms *t* to be raised and lowered thus imparting a vibratory motion to the screen *a*.

In the modification shown in Figure 4, the side bars *b* are shown bent back upon each other so forming a space in which the screen-

ing surface *a* is inserted and secured by bolts *c*. The side bars *b* are connected to the eye-bolts *f* by links *x*. In place of one arm *t* on the sleeve *r*, twin arms *y y* are provided.

Figure 5 shows a screen similar to that shown in Figure 3 except that the screening surface is sloped towards its centre line as shown.

In Figures 6 to 8, the screening surface *a* is secured to side bars *b* by bolts *c* and the side bare *b* pass around studs A on levers B mounted on pivots C adjustably secured by screws D and nuts E to the arms *g* which are bolted to supports *i* having trunnions *j* as before.

The levers B are connected together in pairs on opposite sides of the screening surface *a* by chains F, the tension of which can be adjusted by bolts G and nuts H.

This arrangement permits of crosswise movement of the screening surface, such movement being limited by springs J, see Figure 7.

The supports *i* are connected together by a bar *n* and on the bar *n* are bearings *o* supporting a shaft *p* which extends through and has a bearing in the trunnion *j* on the right hand side of the screen. This shaft may be turned by a belt and pulley or other convenient means. On the shaft *p* are eccentric portions *q q* set at an angle of 180° to each other. The axes of the eccentric portions *q q* are in a line with each other and pass through the centre point K of the axis of the portion of the shaft *p* between the portions *q q* as shown in Figure 9. A hollow sleeve *r* is carried by bearings *s* mounted perpendicularly to the common axis of the eccentric portions *q* and to the ends of the sleeve *r* are attached arms *t* at the ends of which are strips of wood *v* which extend along and are in contact with the underside of the screening surface *a*. When the shaft *p* is turned the eccentric portions *q q* cause the arms *t* to impart to the screen *a* an up and down movement combined with a crosswise movement. This twofold movement produces more effective screening than a single movement only, the material being continually separated by the upward throw and compelled to take a longer or zig-zag path on its passage down screen, owing to the crosswise movement.

What I claim is:—

1. The combination of a screening surface with arms, bars on the arms extending across and engaging the screening surface and positive means for moving the arms an appreciable distance away from and towards the screening surface.

2. The combination of a screening surface with arms engaging the screening surface and positive means for moving the arms an appreciable distance away from and towards and also crosswise of the screening surface.

3. The combination of a screening surface with arms engaging the screening surface, a shaft, and eccentrics on the shaft, which eccentrics move the arms away from and towards the screening surface.

4. The combination of a screening surface with arms engaging the screening surface, a shaft, and eccentrics on the shaft, which eccentrics move the arms away from, towards and also crosswise of the screening surface.

5. The combination of a screening surface with arms engaging the screening surface, a shaft, and eccentrics spaced apart on the shaft and formed with their axes in a line which passes through the centre point of the axis of the portion of the shaft between the eccentrics.

6. The combination of a screening surface with arms engaging the screening surface, a shaft, eccentrics on the shaft, bearings on the eccentrics and a sleeve mounted on the bearings and carrying the arms.

7. The combination of a screening surface with arms engaging the screening surface, a shaft, eccentrics spaced apart on the shaft and formed with their axes in a line which passes through the centre point of the axis of the portion of the shaft between the eccentrics, bearings on the eccentrics and a sleeve mounted on the bearings and carrying the arms.

8. A screen attached to side arms connected together by a bar, bearings mounted upon the bar, a shaft turning in the bearings, eccentric portions on the shaft, other bearings on the eccentric portions, a hollow sleeve mounted upon the latter bearings and arms on the hollow sleeve engaging with the screening surface of the screen.

9. The combination of a screen frame, side arms fixed to the frame, side bars secured to the side arms, a screening surface secured to the side bars, other arms, bars on the latter arms extending across and engaging the screening surface and positive means for moving the arms an appreciable distance away from and towards the screening surface.

10. The combination of a screen frame, side arms fixed to the frame, side bars secured to the side arms, a screening surface secured to the side bars, arms engaging the screening surface and positive means for moving the arms an appreciable distance away from, towards and also crosswise of the screening surface.

11. The combination of a screen frame, side arms fixed to the frame, side bars secured to the side arms, a screening surface secured to the side bars, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft and arms on the eccentrics adapted to engage the screening surface.

12. The combination of a screen frame, side arms fixed to the frame, side bars secured to the side arms, a screening surface secured to the side bars, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft, bearings on the eccentrics, and a sleeve mounted in the bearings and carrying arms adapted to engage the screening surface.

13. The combination of a screen frame, side arms fixed to the frame, side bars secured to the side arms, a screening surface secured to the side bars, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft and formed with their axes in a line which passes through the centre point of the axis of the portion of the shaft between the eccentrics, and arms on the eccentrics adapted to engage the screening surface.

14. The combination of a screen frame, side arms fixed to the frame, side bars secured to the side arms, a screening surface secured to the side bars, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft and formed with their axes in a line which passes through the centre point of the axis of the portion of the shaft between the eccentrics, bearings on the eccentrics, and a sleeve mounted in the bearings and carrying arms adapted to engage the screening surface.

15. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, and connections joining the other ends of the levers on opposite sides of the screen in pairs, arms engaging the screening surface and means for moving the arms away from and towards the screening surface.

16. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, and connections joining the other ends of the levers on opposite sides of the screen in pairs, arms engaging the screening surface and means for moving the arms away from, towards and crosswise of the screening surface.

17. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft, and arms on the eccentrics adapted to engage the screening surface.

18. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft, bearings on the eccentrics, a sleeve mounted in the bearings and carrying arms adapted to engage the screening surface.

19. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft and formed with their axes in a line which passes through the centre point of the axis of the portion of the shaft between the eccentrics, and arms on the eccentrics adapted to engage the screening surface.

20. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft and formed with their axes in a line which passes through the centre point of the axis of the portion of the shaft between the eccentrics, bearings on the eccentrics, a sleeve mounted in the bearings and carrying arms adapted to engage the screening surface.

21. The combination of a screening surface with arms, bars on the arms extending across and engaging the screening surface, and positive means for moving the arms an appreciable distance away from and towards and also crosswise of the screening surface.

22. The combination of a screening surface with arms, bars on the arms extending across and engaging the screening surface, a shaft, and eccentrics on the shaft, which eccentrics move the arms away from and towards the screening surface.

23. The combination of a screening surface with arms, bars on the arms extending across and engaging the screening surface, a shaft, and eccentrics on the shaft, which eccentrics move the arms away from, towards and also crosswise of the screening surface.

24. The combination of a screening surface with arms, bars on the arms extending across and engaging the screening surface, a shaft and eccentrics on the shaft and set at an angle of 180° to each other, which eccentrics move the arms away from, towards and also crosswise of the screening surface.

25. The combination of a screening surface with arms, bars on the arms extending across and engaging the screening surface, a shaft, and eccentrics on the shaft and set at an angle of 180° to each other, which eccentrics move the arms away from and towards the screening surface.

26. The combination of a screening surface with arms engaging the screening surface, a shaft, and eccentrics on the shaft and set at an angle of 180° to each other, which eccentrics move the arms away from and towards the screening surface.

27. The combination of a screening surface with arms engaging the screening surface, a shaft, and eccentrics on the shaft and set at an angle of 180° to each other, which eccentrics move the arms away from, towards and also crosswise of the screening surface.

28. The combination of a screening surface with arms engaging the screening surface, a shaft and eccentrics set at an angle of 180° to each other, spaced apart on the shaft, and formed with their axes in a line which passes through the center point of the axis of the portion of the shaft between the eccentrics.

29. The combination of a screening surface with arms engaging the screening surface, a shaft, eccentrics on the shaft and set at an angle of 180° to each other, bearings on the eccentrics and a sleeve mounted on the bearings and carrying the arms.

30. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, springs adapted to limit the movement of the pivoted levers, arms engaging the screening surface and means for moving the arms away from and towards the screening surface.

31. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, springs adapted to limit the movement of the pivoted levers, arms engaging the screening surface and means for moving the arms away from, towards and crosswise of the screening surface.

32. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, springs adapted to limit the movement of the pivoted levers, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft, and arms on the eccentrics adapted to engage the screening surface.

33. The combination of a screen frame, side arms fixed to the frame, levers pivoted to the side arms, side bars connected to the ends of the levers, a screening surface secured to the side bars, connections joining the other ends of the levers on opposite sides of the screen in pairs, springs adapted to limit the movement of the pivoted levers, a bar connecting together the supports, bearings on the bar, a shaft turning in the bearings, eccentrics spaced apart on the shaft, bearings on the eccentrics, and a sleeve mounted in the bearings and carrying arms adapted to engage the screening surface.

In testimony that I claim the foregoing as my invention I have signed my name this 7th day of July, 1922.

HENRY PATRICK HOYLE.