

No. 864,829.

PATENTED SEPT. 3, 1907.

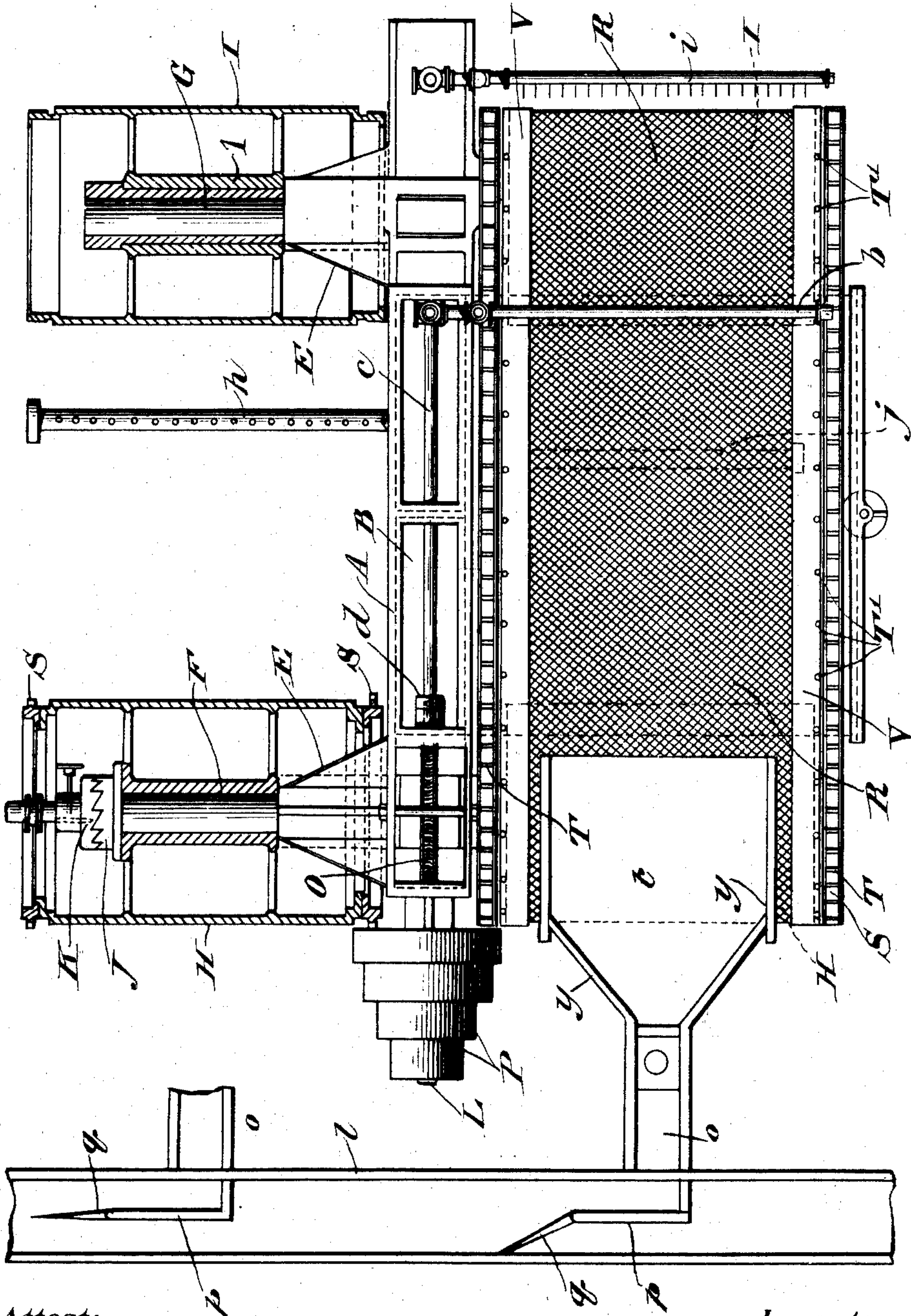
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SCREEN SIZING AND SEPARATING MACHINERY.

APPLICATION FILED NOV. 10, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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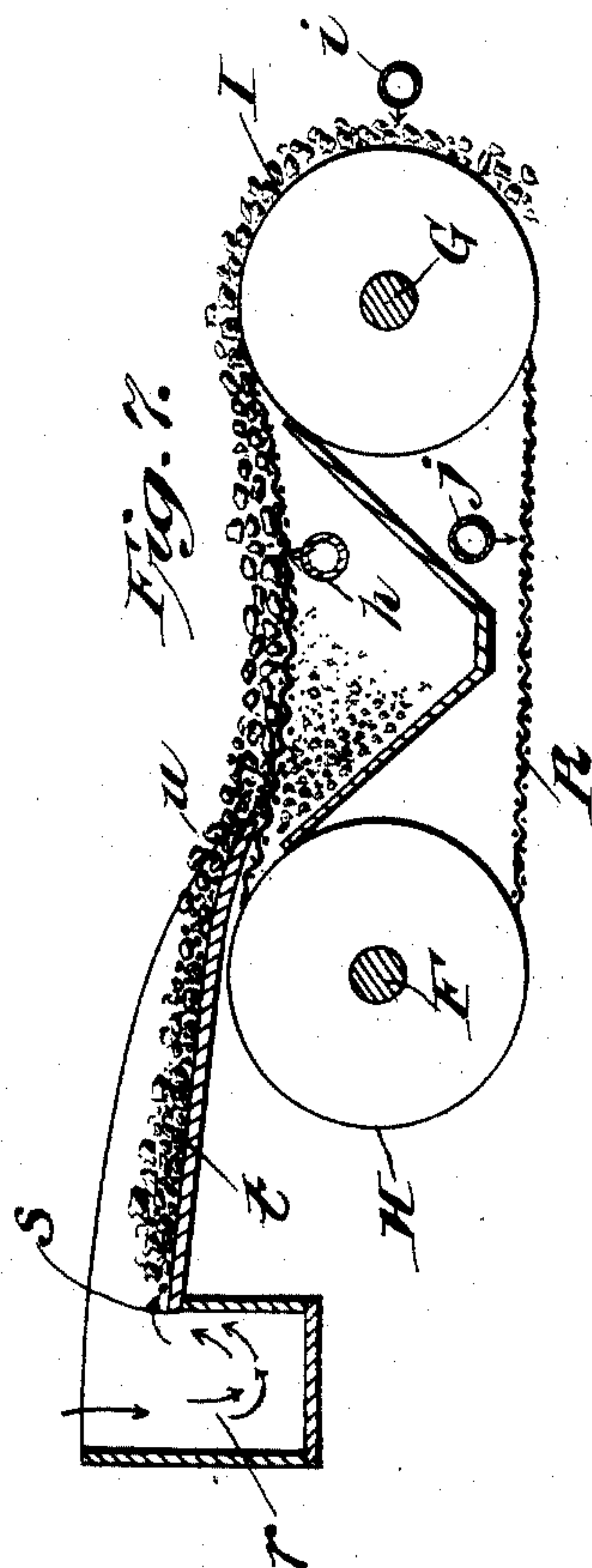
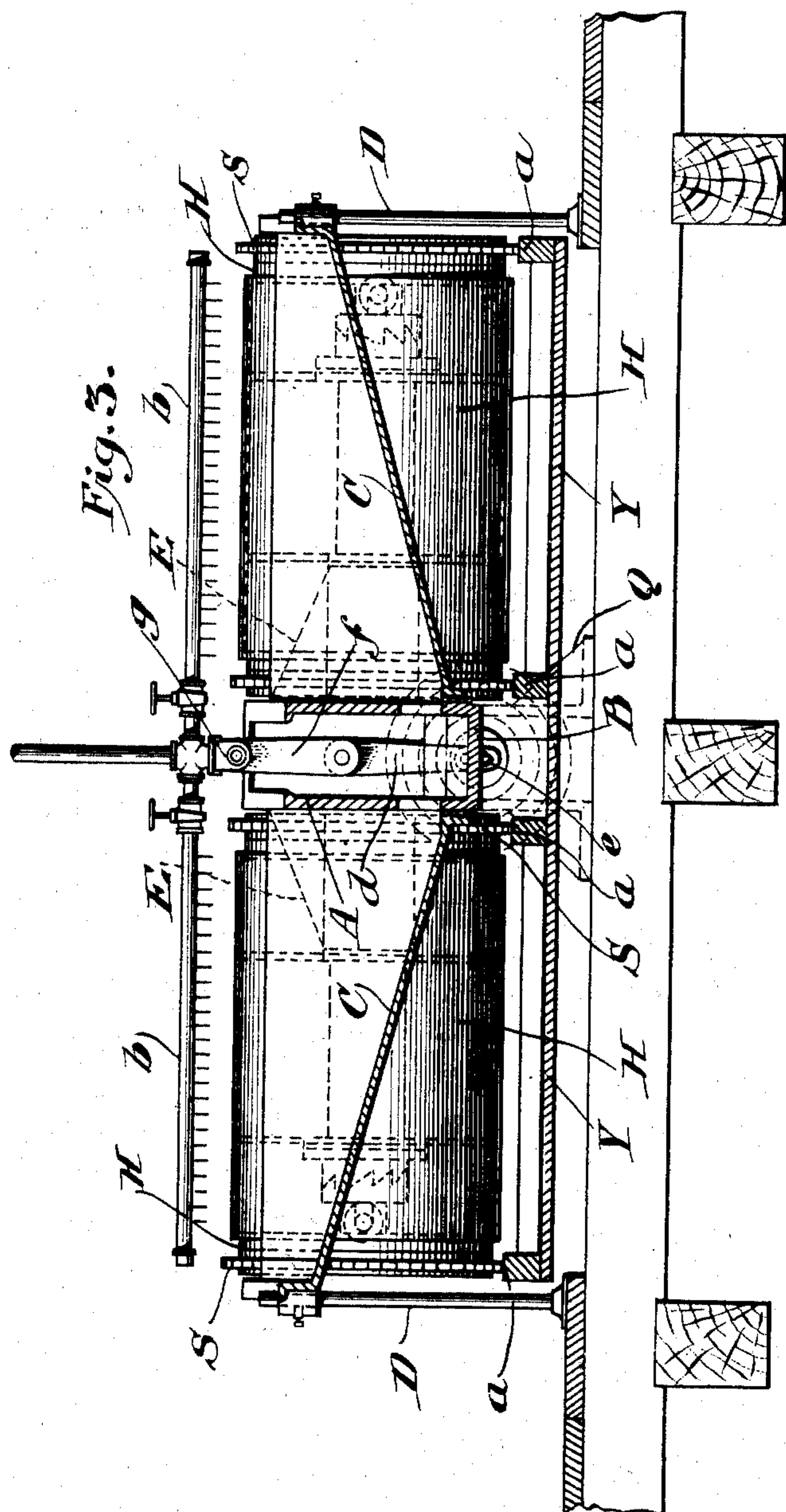
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

JOHN M. CALLOW, OF SALT LAKE CITY, UTAH.

## SCREEN SIZING AND SEPARATING MACHINERY.

No. 864,829.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed November 10, 1905. Serial No. 286,738.

*To all whom it may concern:*

Be it known that I, JOHN M. CALLOW, a subject of the King of Great Britain, and a resident of Salt Lake City, Utah, have invented certain new and useful Improvements in Screen Sizing and Separating Machinery, of which the following is a specification accompanied by drawings.

This invention relates to improvements in screen sizing and separating machinery, but more particularly to that class of screening machines in which an endless traveling belt or band of screen cloth is used, upon which the separation of the coarse from the fines is effected.

The invention has special reference to the screening of finely divided and wet materials although it may be utilized with any kind of material to which it is found applicable.

In some respects this invention is an improvement upon the machinery disclosed in my co-pending applications, Serial Numbers 257,081 and 269,463.

The objects of the invention are to improve upon the construction of machines of the class described and simplify them and make them more efficient in operation.

To these ends the invention consists of apparatus for carrying out the above objects embodying the features of construction, combinations of elements and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which,—

Figure 1 is a top plan view of a machine embodying the invention partly in horizontal section; Fig. 2 is a side elevation of the machine; Fig. 3 is a transverse sectional elevation on the line *a—b* of Fig. 2 looking in the direction of the arrows; Fig. 4 is an enlarged detail top plan view of a part of the driving sprocket chains; Fig. 5 is an enlarged detail transverse sectional elevation of a part of the screen and driving chain; Fig. 6 is an enlarged detail top plan view of a part of the screen and the driving belt; Fig. 7 is a diagrammatic side elevation of the machine in operation.

Referring to the drawings A represents a central main frame or girder for supporting the principal parts of the machine. In this instance the girder A is hollow, which is the preferable construction, and a central gutter B is formed in the lower portion thereof for the discharge of under size and water. Under size hoppers C are suitably supported upon the main frame A and upon struts D.

The frame A is provided with suitable bearings E which carry the transverse head and tail shafts F and G extending entirely through the frame A and bearings E, and projecting sufficiently beyond the bearings for carrying the head rollers H and the tail rollers I. According to this construction it will be seen that the rollers are

all supported from the central frame A, and supports for the outer ends of the shafts F and G are not necessary.

Preferably the head and tail rollers are loose upon their shafts and suitable means are provided for connecting said rollers to rotate with the shafts, in this instance the head rollers being provided with the clutch members J, while the shaft F is provided with the clutch members K, which are carried upon the shafts to rotate therewith by any suitable means as for instance by means of feather keys, so that the members K may be slid along the shaft and connected and disconnected from the members J. Any suitable means may be provided for operating the clutch members K. The tail rollers I are preferably loose upon the shaft G.

Suitable means are provided for driving the shaft F, in this instance a central longitudinal driving shaft L being provided, supported in suitable bearings in the main frame A, and provided with a worm meshing with the worm wheel O connected to the shaft F. In this instance a stepped pulley P is provided upon the shaft L for varying the speed thereof.

According to the construction described the machine is duplex in form although it might be of simple form, because the central frame A is provided with feet Q, by means of which it may be firmly secured to the flooring.

Endless traveling belts or bands of screen cloth R are provided passing over the head and tail rollers. The head rollers, as shown, are provided with sprocket wheels or teeth S, which cooperate with the driving chains T connected to the sides of the belts. The tail rollers I are shown in this instance plain and without sprocket teeth, but they may also have them if desired. The sprocket chains are connected to the screens in any suitable manner, but preferably driving bands or strips of strong and flexible material, such as rubber or leather, are interposed between the edges of the screens and the chains. In this instance, the screens are suitably secured to these bands in any suitable manner, as by means of riveting, stapling, cementing, sewing, or other suitable methods. In order to connect the bands of flexible material to the sprocket chains, special means are provided. At frequent intervals in the chain are arranged special attachment links T', provided with knobs or buttons U, and on the flexible bands or edges V are arranged correspondingly spaced holes W, by means of which the screen is buttoned onto the carrying chains T. Preferably these holes W are re-inforced and strengthened by the knob eyelet attachments X, which are shown in the well known form of metal rings clenched in place on the flexible edges, and are utilized to prevent the buttonholes from tearing out if subjected to undue strains. Underneath the screen cloth is a sloping bottom Y for catching any drips from the



belt and conducting them into the over size spouts or hoppers Z. The edges of this bottom are raised to form suitable guides *a*, on which the return sides of the carrying chains travel and prevent any sagging of the chains between the rollers which might occur on account of their weight. Spray pipes *b* are provided for washing the over size products on the cloth and cleansing them as they pass from the head to the tail end of the machine. Means are provided for shaking the spray pipes *b* horizontally from side to side of the machine in order to spray every portion of the over size. In this instance a rock shaft *c* is provided extending longitudinally of the machine and at one end carries a slotted lever *d*, which engages a crank pin *e* on the end of the shaft L, so that rotation of said shaft rocks the rock shaft *c*. At the other end of the shaft *c* is an upright arm *f* pivoted to an ear *g* on the union between the pipes *b*. Said pipes *b* are suitably hung for movement and as the shaft *c* rocks it will be seen that the pipes *b* are shaken from side to side of the screen, thereby insuring that every portion of the over size is subjected to the washing action as it passes onward to the delivery end. If desired, the spray pipes *b* may be placed in the position indicated by the pipes *h* underneath the upper side of the screen and they may be rocked in this position. If desired, both the pipes *b* and *h* may be used to cooperate in conjunction as shown in the drawings.

Spray pipes *i* are provided for spraying water upon the over size roller to wash off the deposit of over size clinging to the belt as it passes over the tail roller. As a further means when necessary for cleansing the cloth additional pipes *j* are provided on the underneath side of the cloth after it has passed over the tail roller. Since the screens are driven from the head rollers there is a sagging of the top side of the screens which is purposely provided for since this has been found to have a most important influence in preventing "blinding". On the part of the belt which sags the meshes of the cloth are smaller at the top than at the bottom thus:  $\wedge$  but as the screen advances over the tail roller a reversal takes place and the meshes open up thus:  $\vee$ . The first described condition prevents the wedging in of pieces on to the meshes and the second condition enables any pieces which might have become entangled to drop out.

Means are provided for varying the amount of sag on the upper side of the belt, in this instance the tail shaft G is provided with eccentric sleeves 1, upon which the tail rollers are carried, these sleeves serving as bearings for rollers upon which they turn. Means are provided for changing the position of these sleeves as by means of the handles 2, so that the head and tail rollers can be brought closer together or spaced further apart, and in this way the sag of the belt is regulated on its top side by tightening or loosening the same.

An important feature of the invention resides in the means for supplying the feed to the machine, and in this instance *l* represents a transverse trough provided with passage ways *o*, partitions *p* and gates *q*, by means of which the material is directed to one or the other or both of the outlet passages *o* leading to the screens. Beneath the outlet passage ways *o* are provided dash pots or pockets *r*, each having an edge or weir *s*, over

which the material passes to the board or sole plate *t* having a lip *u*, over which the material is fed to the screens. The board or sole plate *t* is supported in such manner that its slope may be adjusted, and the position of the lip *u* relatively to the screen is also thereby adjusted. In this instance the board *t* is carried upon a suitable support *v* having a turn buckle *w* for raising and lowering the screen. The connection between the upper end of the support *v* and the board is such that the angle of the board may be varied by means of the wedge *x*. As shown in plan view the sides *y* of the sole plate or board extend outwardly at an angle from the weir *s* and then continue substantially parallel to the sides of the screen and the board extends substantially across the whole width of the screen. The material plunges into the dash pots or pockets *r* where all irregularities of flow are broken up and an even stream spreads over and courses down the sloping board over the lip *u* to the screen. This board or sole plate and the lip play an important part in the operation of the machine, for here a preliminary sorting or sizing is done. As the particles which are of all sorts and sizes fall from the lip *u*, the coarsest and largest pieces having the greatest trajectory strike the screen at a point considerably ahead of the smaller pieces and are there deposited leaving the space on the screen behind them free and unencumbered. The pores of the cloth in the rear being therefore still uncovered and open, permit the free passage of the fines and water. Simultaneously with this action the cloth is being moved forward and a deposit of over size is continuously removed from the separating or screening zone. The machine continues to perform its function as long as the cloth is kept moving and as long as the feed is supplied.

After leaving the screening zone the deposit of over size is carried forward and passes under the shaking spray pipes *b* where any traces of slimes or of fine adhering particles are washed and passed through the water from the spray into the under size hopper. Continuing on, the over size which is still clinging to the screen cloth passes in front of the impinging spray from the pipe *i*, which may be conveniently situated at about the mid-diameter of the tail roller, and these particles are then washed off into the over size hopper Z.

In the operation of the machine, the slope of the board or sole plate *t* should be so adjusted, and the relation of the lip *u* to the surface of the screen should be such that the coarser particles in the feed will attain sufficient velocity to separate them from the fines in the act of falling so that they will fall on the screen at a point in advance of the fines, leaving the screen cloth in the rear unencumbered by over size and in a condition for the free passage of the fines and water.

The object of the construction and arrangement shown and described is to attain greater efficiency in the operation of the machine under particular conditions. By carrying the rollers over hung from a central support, their outer ends are free and unobstructed and thereby greatly facilitate the putting on and removal of the screen belts. These belts are made endless and complete with their flexible edges attached, and then the rollers are brought sufficiently close together by means of the adjustment of the eccentric sleeves to enable the endless screen belts to be slipped on over



the ends of the rollers. The screens are then very easily attached to the side sprocket chains by buttoning the eyelet holes on their corresponding projections.

The sprocket chains greatly improve the machine and its operation for they remain of substantially the same length as the cloth and serve to guide the screen laterally. There is no danger of the length of the chains stretching or shrinking, and therefore adverse strains and stresses in the screen cloth are avoided, thereby prolonging its life and usefulness.

I do not herein claim anything disclosed and claimed in my co-pending application, Serial No. 269,463, filed July 13, 1905.

What I claim and desire to obtain by Letters Patent is the following:

1. In a screen sizing and separating machine, the combination with the endless traveling belt screen and rollers, of a feeding device arranged above and to the rear of the head roller, said device comprising a pocket for the reception of the feed, an edge or weir over which the feed flows, an inclined board or sole plate extending from the weir over the head roller, a lip from which the feed falls to the screen and means for adjusting the slope of the sole plate and the relation of the lip to the surface of the screen.

2. In a screen sizing and separating machine the combination with the endless traveling belt screen and rollers, of a feeding device arranged above and to the rear of the head roller, said device comprising a pocket for the reception of the feed, an edge or weir over which the feed flows, an inclined board or sole plate extending from the weir over the head roller and having sides extending first outwardly at an angle from the weir and then extending substantially parallel to the edges of the screen, a lip from which the feed falls to the screen and means for adjusting the slope of the sole plate and the relation of the lip to the surface of the screen.

3. In a screen sizing and separating machine, the combination with the rollers, of an endless traveling belt screen passing over the rollers, sprocket chains at each side of the screen having links with knobs thereon, supplementary edges of pliable material attached to the screen and having holes cooperating with said knobs and teeth on the rollers cooperating with the chains.

4. In a screen sizing and separating machine for screening wet materials, the combination with the head and tail

rollers, of a single layer endless traveling belt of fine meshed or perforated screen cloth unsupported throughout the length of its upper side and adapted to sag in the middle, means for driving the upper length of the screen from the head roller towards the tail roller, whereby the upper side of the screen sags in the middle, and means for varying the amount of such sagging.

5. In a screen sizing and separating machine, the combination of a main central frame or girder, shafts rotatably supported on said frame, rollers carried by the overhanging ends of said shafts, endless belt screens traveling over said rollers, and means for driving said rollers.

6. In a screen sizing and separating machine, the combination of a main central hollow frame or girder, forming a central gutter for the discharge of under size and water, under size hoppers attached thereto, shafts carried by said frame, rollers carried by the shafts, a belt screen and means for driving the same.

7. In a screen sizing and separating machine, the combination of a main central hollow frame or girder, shafts carried by said frame, rollers loose on said shafts, means for connecting the head rollers to the shaft, a belt screen and means for driving said shafts.

8. In a screen sizing and separating machine, the combination of a main central frame or girder, shafts carried thereby, rollers loosely carried by said shafts, means for connecting and disconnecting the head rollers from the head shaft, endless traveling belt screens passing over said rollers, means for driving the head rollers from a common source, and means for spraying water on the over size roller.

9. In a screen sizing and separating apparatus the combination of head and tail rollers and an endless belt screen passing over said rollers, means for spraying water on the over size roller for removing the over size from the screen, means for spraying water on the return side of the screen for further washing and cleansing the same, means for spraying water on the over size as it passes from the feed to the discharge end of the machine, and means for spraying water beneath the screen to wash the oversize as it passes from the feed to the discharge end of the machine.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN M. CALLOW.

Witnesses:

FRANK E. JOHNSON,  
G. H. NICHOLS.