G. E. Sellers.

Pulp Washer.

No. 66,258. Patented Jul. 2, 1867.

Fig. 1.

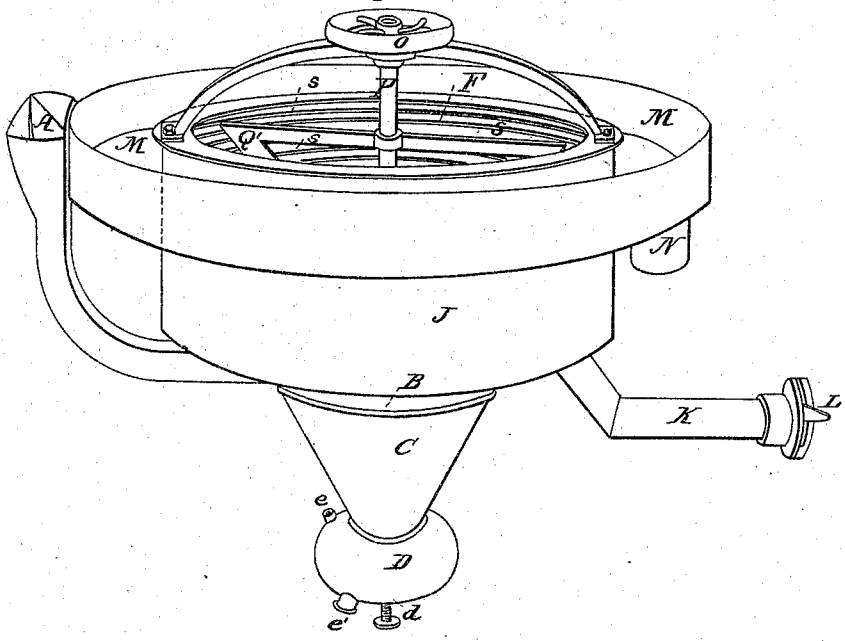
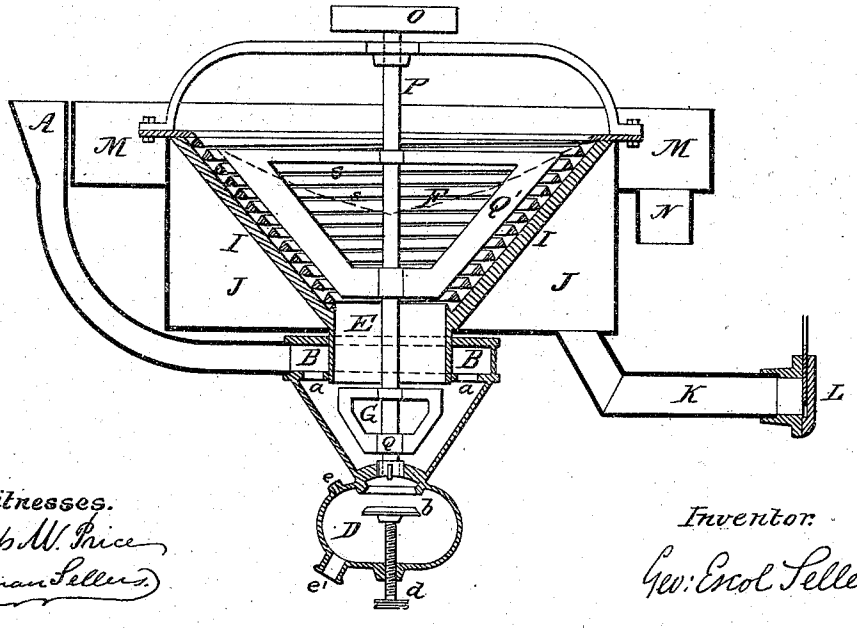


Fig. 2.



Witnesses.

Philip M. Price

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GEORGE E. SELLERS, OF SELLER'S LANDING, ILLINOIS.

Letters Patent No. 66,258, *dated July* 2, 1867.

MACHINE FOR DRESSING PAPER PULP.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, GEORGE ESCOL SELLERS, of Seller 's Landing, Hardin county, in the State of Illinois, have invented certain improvements in Pulp-Dressers for Dressing or Cleansing Paper Pulp or short vegetable fibre from knots, motes, and other imperfections and impurities.

The object of my invention is to remove the knots in a more thorough manner than has heretofore been done, and at the same time to cleanse the pulp or fibre of motes or specks that have a greater specific gravity than the pulp or fibre.

The nature of my invention consists in passing the diluted pulp or fibre into a pulp-screen in such a manner that the motes or specks, having a greater specific gravity than the pulp or fibre, are collected into a receiver, from which they can be removed at any time during the operation, and in producing such a motion of the pulp as to facilitate this object, and to present the pulp to the screen in a line with the openings or slits of the screen in such a manner that as the pulp passes through the slits the knots or other imperfections too large to pass through will travel on and be delivered from the screen while in operation.

To enable others skilled in the art to construct and use my invention, I will describe the mode in which I employ it, referring to the annexed drawing, making part of this specification, in which—

Figure I is a drawing in perspective.

Figure II is a sectional elevation—

Similar letters having reference to similar parts.

A is a funnel-mouthed tube, through which the dilute pulp passes into the annular chamber B B, from which it is delivered through a series of openings, *a a*, into the conical chamber C, at the bottom of which chamber is the receiver D, provided with a valve, *b*, which is operated by the screw *d*. This valve is used to close the opening or passage between the chamber C and the receiver D, which receiver has an opening, *e*, through which it is filled; also a discharge pipe, *e'*, through which the accumulated motes, specks, or heavy particles separated from the pulp are discharged. These openings are either closed or opened when required by plugs or valves. E is a passage from the conical chamber C into the pulp-screen F. This screen is of an inverted conical form, open at the top, and is supported within and by the frame I I. The screen is a continuous slit, *s s s*, or opening from the inside to the outside, and from the bottom to the top of the cone; or it may be made of rings of metal that, when piled one on another, will form the hollow cone, the rings being kept apart the proper distance to leave the slit between them by partings or small pieces of sheet metal of the thickness the slits are required. The slit or slits *s s s* should be made wider on the outside than on the face of the screen to give free passage to the pulp, and to prevent clogging. J J is a chamber, surrounding the conical screen in which the dressed or screened pulp is received, and from which it flows through the tube K, regulated by the gate L. M M is an annular trough, around the top of the pulp-screen and chamber J J, to receive the knots as they are delivered over the top of the conical screen, and from which they are either removed by hand or run out through the spout N by keeping a stream of water running through the trough M. O is a driving-pulley on the shaft P, on which shaft are hung two sets of agitators or floats, Q Q'. Q is within the conical chamber, and Q' within the pulp-screen.

Having above described an apparatus such as I use, I will now proceed to describe the manner of operating with it.

After closing the discharge opening *e'*, I fill the receiver D through the opening *e* with water. When the receiver is filled and the openings closed, the valve *b* is opened, and the shaft P, with the floats Q Q', is made to revolve by means of the belt on the pulley O. Pulp from a stuff-chest, properly diluted, is then run into the funnel-mouthed tube A, being regulated in quantity by the stuff-chest valve or stuff-pump, as the case may be, and as the supply of pulp is regulated to pulp-dressers in common use. The diluted pulp passes through the tube A into the annular chamber B B, and from that down into the conical chamber C through the series of openings, *a a*. As the chamber C fills with pulp, and it ascends through the passage E into the conical screen F, it has acquired a rotary motion from the action of the floats Q, which is kept up by the floats Q' within the pulp-screen, and in this manner the dilute pulp is whirled round within the pulp-screen, travelling in the direction of the slits or openings. The fibres of the pulp are so presented to and slid along the slits that

they pass into the chamber J J through much finer openings than can be used in ordinary pulp-dressers. The amount of pressure against the screen is regulated by the velocity. The floats are made to revolve, and by the gate L, which regulates the flow from the chamber J J, and the level the dressed pulp shall be kept at within the chamber J J, to produce the proper amount of suction. As the dilute pulp is whirled around within the screen it assumes a dish-like form, as represented by the red dotted lines in the drawing. The knots or imperfections too large to pass through the screen travel round and round until they are finally crowded over the top rim of the screen into the trough M M.

The entire operation is very simple. The pulp, passing from the annular chamber B into the conical chamber C, has a downward current, impinging against the inside walls of the conical chamber C. The tendency of all heavy particles is to slide down the walls into the receiver D, displacing the water, and gradually filling the receiver. A knowledge of the quality of the stuff that is being dressed, or a very little experience, teaches how often and when it is necessary to clean out the receiver, which is done by closing the valve *b* and withdrawing the plugs *e e'*, and running a stream of water through the receiver. The passage E is of comparatively large area, and the ascending pulp through it has a gentle current, and without the rotary motion given by the floats within the chamber C a large portion of the heavy particles would sink, and be collected in the receiver; but there are many motes and specks in paper pulp, differing but little in specific gravity from the pulp, that will pass through the screen and make unsightly blemishes in the paper. The rotary motion increases the distance the pulp has to pass in its ascent into the screen, not only giving the heavier particles more time to sink, but giving a direction to the current more favorable than a direct upward current for that purpose. The rotary motion has also a tendency to draw the heavier particles to the centre or place of least motion. This is readily illustrated by partially filling a flat-bottomed vessel with dilute paper pulp, and mixing in it fine black sand, and then giving a rotary motion to the pulp sufficiently rapid to make it rise on the sides and sink in the centre until the bottom of the vessel becomes visible through the pulp, when the sand will be seen in a revolving cone in the centre. When it becomes necessary to clean the pulp-screen, first close the gate L to prevent the escape of the water from the chamber J, run a stream of clear water into the funnel-tube A, and rapidly revolve the floats or agitators. All the water admitted is then whirled around and dashed over the top of the screen into the trough M. After having thoroughly cleansed the inside of the knots that may have become attached to it, open the gate L and allow the water to be dashed through the screen.

Every practical paper-maker is aware that the pulp-dressers in common use are simply screens, separating by size alone, and that he has to depend on sorting stock by hand, dusters, sand-screens, and other devices to free his stock from impurities that the pulp-dresser will not remove, and, with the greatest care, much escapes that causes blemishes in the finished paper. The pulp-dresser in most general use is a large screen of metal plates cut through in fine parallel slits. The plates are fixed in a frame extending above and below the plates; the portion above to receive the dilute pulp, that below extending into the vat that receives the screened pulp. By a rapid up-and-down motion of the screen alternate suction and dashing are produced. The particles of pulp that happen to be over the slits are drawn through at every upward motion, and at every downward motion the slits are freed from the knots that may have got over them. It must be evident to any one that with such a screen the heaviest particles must be the first to pass through. The knots are left dancing about on the face of the screen, and have to be scraped together and removed by hand. In scraping across the screen, knots are frequently pressed into the slits of the screen, so as to project through to the under side and form nuclei to collect other fibres, which, by the rapid dancing motion of the screen on the pulp, are spun into threads, that in time become detached and pass with the pulp on to the wire cloth of the paper machine, and produce serious defects in the paper. The frame of the pulp-screen and supporting bars of the plates also collect these strings. By my mode this serious difficulty is entirely avoided. There have been other devices to avoid this defect, but which have produced still greater. Pulp-screens have been made so as to have a horizontal oscillating motion on the surface of the pulp which passed upward through the slits of the screen; but this arrangement has the objection of holding back knots and impurities in the pulp being screened until all in the vat becomes so thick with knots as to impede the passage of the pulp through the screen, thus making paper of irregular thickness, and obliging frequent stops to clean out the vat.

When straw, cane, or other vegetable substances that yield short fibre fit for paper stock are used, the separation of impurities by the difference in the specific gravity is probably more important than for common rag stock. I find when using cane (*Arundinaria macrosperma*) that the hollows below the lower joints after the cane is cut are liable to collect sand and dirt; also that sand is sometimes found in the cavities between the joints, carried up by the rapid growth of the plant; also that the joints themselves in a manner partake of the fibrous and non-fibrous parts of the plant, so united as to produce minute stick-like particles without the felting property of the pure cellulin, and that have a greater specific gravity than the fibres of the plant, and are readily separated from the fibre by my mode. I also find that by subjecting the cane fibre to a cleansing by my mode, removing knots and other imperfections previous to bleaching, there is a large saving in time and of chlorine, and a consequent saving in the expense of bleaching.

From the above description of a machine capable of performing the uses to which I apply it, it is evident that the theory of its operation is the production of such motions or currents of the dilute paper pulp as to facilitate the settling and gathering together into a receiver of all particles having a greater specific gravity than the fibres composing the pulp, and in presenting the pulp to be dressed to the screen in such a manner and with such force as to make it travel in a line, or nearly so, with the slits or openings of the screen, and to constantly deliver the knots, or such imperfections as cannot pass through the screen, from the screen during the operation. It is also evident that the machinery to accomplish this may be made in various ways. For instance, the conical chamber C may be a cylinder, or of any other shape, and by giving it sufficient depth it may itself be the receiver to gather the heavier particles; or the receiver may be separated from the pulp-

screen, and be used at any point between the stuff-chest and the screen; or the screen may be made cylindrical and not conical; or the centre shaft with its floats may be made stationary, and the screen made to revolve.

I therefore do not wish to limit myself to the precise arrangement of machinery described, while I obtain the same results by means substantially the same. But what I do claim, and desire to secure by Letters Patent, are—

1. I claim the annular chamber B B, through which the pulp is delivered into the chamber C, the chamber C and agitator Q to collect the heavy particles into the centre over the receiver D, substantially as described and for the purposes specified.

2. I also claim the pulp-screen F, with the slit or slits *s s s*, the agitator or float Q to give direction to the pulp in the line of the slits, the pulp-receiver J J and regulating valve L, and the knot-receiver M M, all substantially as described and for the purposes specified.

GEO. ESCOL SELLERS.

Witnesses:

PHILIP M. PRICE,

COLEMAN SELLERS.