

(No Model.)

H. J. ROGERS.
MACHINE FOR STRAINING PAPER PULP.

No. 464,725.

Patented Dec. 8, 1891.

Fig. 1.

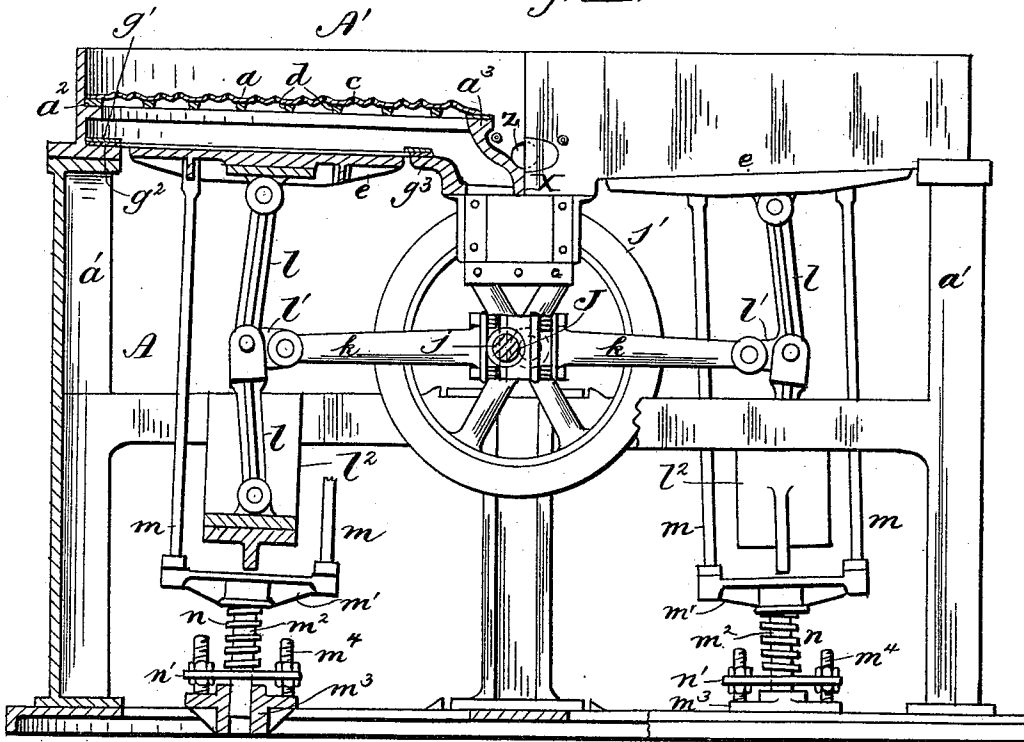


Fig. 3.

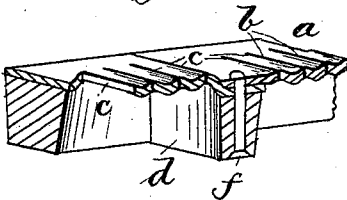
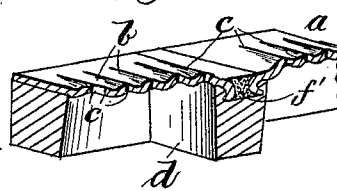


Fig. 2.



Witnesses:

H. B. Kingsbury.
C. Morthurf.

Inventor:

Henry J. Rogers,
by William E. Boulter,
attorney

UNITED STATES PATENT OFFICE.

HENRY JOHN ROGERS, OF WATFORD, ENGLAND.

MACHINE FOR STRAINING PAPER-PULP.

SPECIFICATION forming part of Letters Patent No. 464,725, dated December 8, 1891.

Application filed December 20, 1888. Serial No. 294,345. (No model.) Patented in England March 18, 1887, No. 4,073; in Belgium May 16, 1887, No. 77,477, and in France May 17, 1887, No. 183,626.

To all whom it may concern.

Be it known that I, HENRY JOHN ROGERS, a citizen of Great Britain, residing at Watford, in England, have invented certain new and useful Improvements in Machines for Straining Paper-Pulp, (for which Letters Patent have been obtained in Great Britain, No. 4,073, dated March 18, 1887; in France, No. 183,626, dated May 17, 1887, and in Belgium, No. 77,477, dated May 16, 1887;) and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to machines or apparatus for straining various materials for use in the arts and more especially for straining paper-pulp in the manufacture of paper, and it relates more particularly to the means for imparting a pulsating motion to the pulp to cause the same to be thoroughly strained, and to the construction of the strainer-plates.

My invention has for its primary objects to provide a machine of this class which is simple in its construction and which is adapted to effectively strain the paper-pulp or other material and prevent the impurities strained from the same from again becoming mixed therewith and also to dispense with the use of a cleaning device for removing the impurities from the strainer-plates.

Another important object of my invention is to so construct the strainer-plates that the same can be very readily reclosed when necessary without requiring very much pressure to effect this, as is ordinarily the case.

With the above-recited objects in view my invention consists in the construction, arrangement, and combination of parts, as hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the appended claims.

In the drawings, Figure 1 represents a side elevation, partly in section, of my improved machine. Figs. 2 and 3 are perspective detail views showing different means for attaching the strainer-plate to the supporting-frame.

Heretofore in machines of this class it has sometimes been the custom to employ strainer-plates which are perfectly flat upon their upper or wearing surface and to arrange said plates horizontally in the machine. This, however, entails numerous disadvantages,

principally among which is the tendency of the foreign matter strained from the material to be retained upon the upper surface of the plate and gradually become disintegrated and find its way through the slits of the strainer-plates into the strained pulp, whereby the paper produced therefrom will contain numerous specks or particles which greatly depreciate the value of the paper. Furthermore, plates so constructed require considerable pressure to effect the reclosing of the same and also necessitate the employment of a cleaning device for removing the dirt or foreign matter strained from the pulp from the surface of the plates.

By my construction of plate and the arrangement of the same in the machine the above-enumerated disadvantages are obviated, as will fully appear hereinafter.

I will first describe the construction of my strainer-plates and the means for attaching them to a backing or support, reference being had to Figs. 2 and 3 of the drawings.

I take a flat plate *a*, of any suitable metal—such as copper, brass, phosphor-bronze, &c.—and of the proper thickness and dimensions, and form therein a number of corrugations *b*, forming a series of alternate depressions and elevations upon the upper and lower surfaces of the plate, as shown. Said corrugations may be formed either by stamping with dies or by using suitable rolls, or the plate may be cast with the corrugations therein, if desired. In each of the elevations upon the upper side of the plate is formed a narrow slit *c*, through which the pulp is strained, said slits being formed by any suitable means and in any desired manner. The plate *a*, as thus formed, is now secured to a metallic framing or support *d* in any suitable manner. I, however, prefer to employ either of the means shown in Figs. 2 and 3. In Fig. 2 the plate *a* is divided into sections, the edge of one section overlapping the adjacent edge of the next section, and said sections are secured to the frame *d* by means of rivets or bolts *f*. In Fig. 3 the plate *a* is also made in sections and the adjacent ends thereof bent down and entering transverse grooves cut in the frame, and a molten alloy *f'*, that will expand upon cooling, is run into said grooves in the frame and

serves when hardened as a key for securing the plate-sections to the frame and effects a rigid joint.

The advantages of the described construction of strainer-plate over those which are made perfectly flat are obvious, but may be enumerated as follows: First, the corrugated plate is considerably stronger than a flat plate of the same thickness; secondly, it can be reclosed when the slits become enlarged from use with the use of but little pressure; thirdly, the dirt or other foreign matter which cannot pass through the slits will gravitate into the depressions on the upper side of the plate and will not become disintegrated, and, fourthly, by reason of the upper and lower surfaces of the plate being formed of gentle undulations or curves, the formation of hanks or knots is avoided.

The strainer-plate described is adapted for use in any of the present forms of strainers, such as flat, suction, jog, or revolving strainers. When used in revolving knotters or strainers, I slit both the upper and lower corrugations when the length of fiber is suitable, so as to give double the area of slitted surface, and this plate may be used in flat strainers, if a very large area of slitted surface is desired; but in this case the corrugations will no longer act as dirt-arresters.

Instead of dividing the plate *a* into sections, as shown, the same may be allowed to remain in one piece and secured to the framing in any desired manner, as will be understood.

I will now describe the construction of my machine, together with the arrangement of the strainer-plates above described therein.

A indicates the frame of the machine, of any suitable construction, upon the legs or standards *a'* of which is supported the vat or trough *A'*, within which the strainer-plates are to be arranged and secured. In arranging said strainer-plates within the trough I prefer to incline them from the ends of the trough toward the center thereof, as shown, instead of horizontally, as generally practiced. This I do for the reason that the dirt or other foreign matter strained from the pulp will during the operation of the machine gradually gravitate along the plates toward the center of the trough, whence it will be discharged through an opening provided for the purpose, thus also obviating the employment of a cleaning device for removing the dirt from the plates. In Fig. 1 I have shown the plates *a* so arranged, said plates being supported upon a ledge or flange *a²* on the sides of the trough and arms *a³*, rising from the bottom of the trough at the center thereof. Beneath each of the plates *a*, at a sufficient distance therefrom to allow of a free passage of the pulp to the paper-machine, is arranged a diaphragm *g*, of rubber or other flexible or elastic material, which is secured in position by means of strips *g'*, between which and the flanges *g²* *g³* of the trough the edges of the diaphragms are

secured. The latter, as will be seen, also partake of an inclination corresponding to that of the plates.

Near the bottom of the trough, at the center thereof, I provide an opening *Z*, which is adapted to serve as a discharge-opening for the dirt and other matter strained from the pulp.

For the purpose of imparting the usual pulsating motion to the pulp to cause the same to pass through the slits of the plates I employ the following-described means: *J* indicates a crank-shaft having suitable bearings in the frame of the machine, said shaft carrying at one end a belt-pulley *j'*. Said crank-shaft is provided with two cranks *j, j*, to each of which is connected one end of a connecting-rod *k*, which is adapted to operate the vertically-arranged levers *l* through the media of the short intermediate links *l'*. The upper levers are pivotally connected to plates *e*, secured to the under side of the diaphragms *d*, while the lower levers are pivotally connected to arms *l²*, depending from the frame of the machine. For the purpose of guiding the diaphragms in their reciprocating movements guide-rods *m* are secured at their upper ends to the plates *e* and their lower ends to cross-heads *m'*, each of which has a stem *m²*, which is adapted to fit and reciprocate within a socket in the rings *m³*.

For the purpose of partially counteracting the downward movement of the diaphragms and making the reciprocating movements thereof smooth and even I provide coiled springs *n*, which encircle the stems of the cross-heads and bear at their lower ends upon the rings *n'*, which are adapted to be adjusted vertically to adjust the tension of the springs by screw-bolts *m⁴* and nuts, as shown. It will be seen that when the pulp is fed into the trough from each end thereof and the crank-shaft revolved the levers *l* will be operated to reciprocate the diaphragms and thereby impart a pulsating motion to the pulp, causing the same to be strained through the slits in the strainer-plates and causing it to be fed through the passage between the diaphragms and the plates to the pipe which conducts the pulp to the paper-machine. The dirt strained from the pulp will be left in the depressions on the upper side of the plate and will gradually gravitate to the discharge-opening *Z*.

It will be obvious that instead of employing two strainer-plates and two diaphragms, together with means for operating the latter, that the machine could readily be altered to adapt it to use but one plate and one diaphragm extending the full length of the trough, and the mechanism for reciprocating the diaphragms be changed in its position relatively to the machine-frame to cause it to properly reciprocate the one diaphragm without departing from the spirit of my invention.

What I claim is—

1. In a pulp-straining machine, the combination, with the pulp-vat, of the framing or

support *d*, supported therein, the straining-plate *a*, corrugated as described and provided with the slits *c*, said plate being made in sections the adjacent edges whereof overlap, and the securing bolt or bolts passing through the lapped edges of the plate-sections and into the support, as described.

2. In a pulp-straining machine, the combination, with the frame of the machine, the trough supported by said frame, the inclined strainer-plates supported within said trough, and the diaphragms arranged below said strainer-plates, of means for reciprocating the diaphragms and guiding the same, consisting of the crank-shaft *j*, having its bearings in the machine-frame, the connecting-rods *k*, pivotally connected to the cranks of the crank-shaft, the levers *l*, the lower ones of which are pivoted to the arms *l'* of the machine-frame, the intermediate links *l''* between the levers and the connecting-rods, the plates *e*, secured to the under side of the diaphragms and to which plates the upper levers *l* are pivotally connected, the guide-rods *m*, secured to said plates and to the cross-heads *m'*, each of which latter has a stem *m²*, and the rings *m³*, having sockets adapted to receive said stems, as described.

3. In a pulp-straining machine, the combination, with the frame of the machine, the trough supported by said frame, the inclined strainer-plates supported within said trough, and the diaphragms arranged below said strainer-plates, of means for reciprocating the diaphragms and guiding the same, consisting of the crank-shaft *j*, having its bearings in the machine-frame, the connecting-rods *k*, pivotally connected to the cranks of the crank-shaft, the levers *l*, the intermediate links *l''* between the levers and the connecting-rods, the plates *e*, secured to the under side of the diaphragms and to which plates the upper levers *l* are pivotally connected, the guide-rods *m*, secured to said plates and to the cross-heads *m'*, each of which latter has a stem *m²*, the rings *m³*, having sockets adapted to receive said stems, the rings *n'*, fitted around said stems, the adjusting-bolts *m⁴*, passing through the rings *m³* *n'*, and the coiled springs *n*, interposed between the rings *n'* and the cross-heads, as and for the purposes specified.

HENRY JOHN ROGERS.

Witnesses:

E. T. HUGHES,
V. HUGHES.