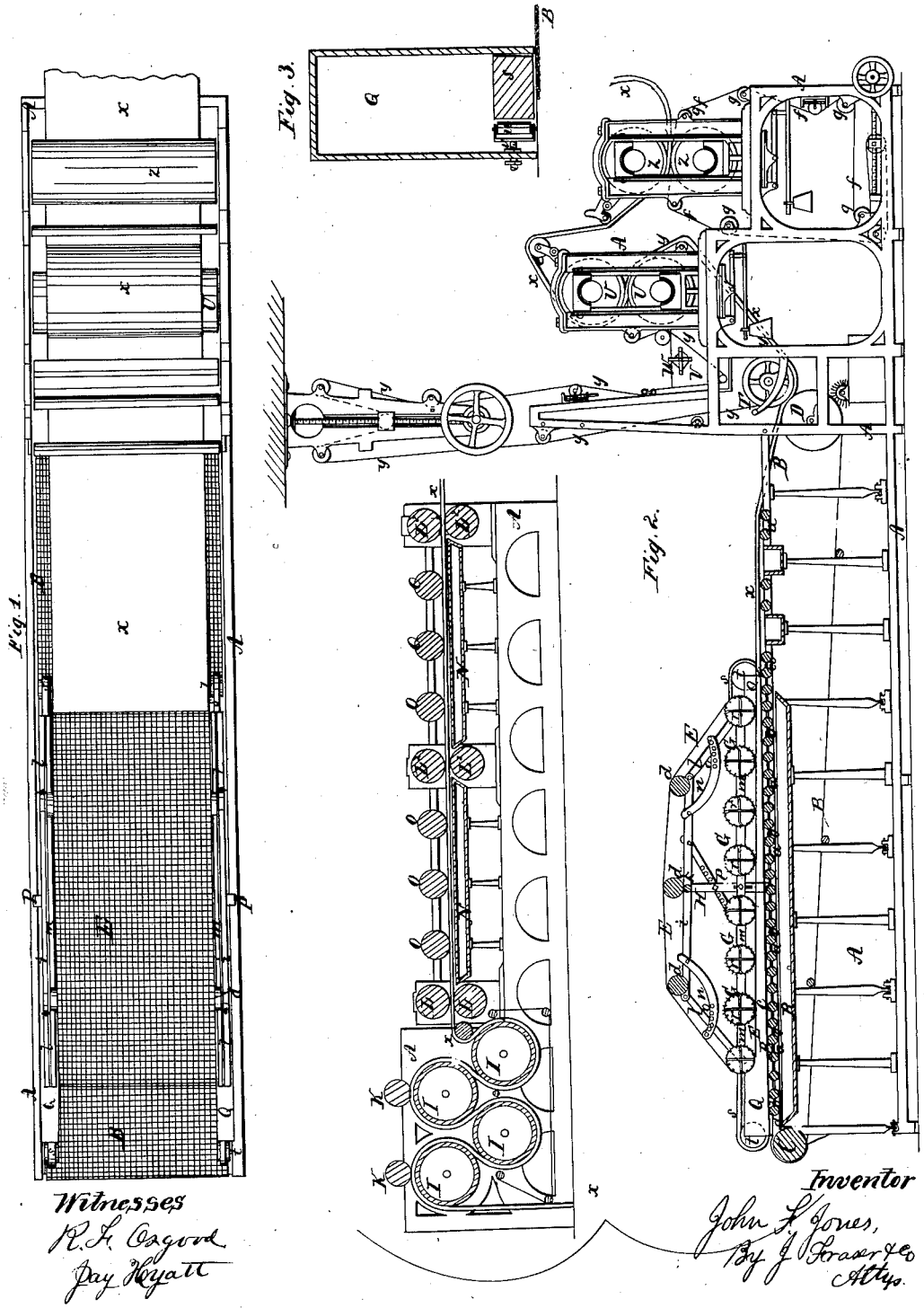
J. F. Jones.

Pasteboard Mach.

No. 49,884. Patented Sept. 12, 1865.



Witnesses

R. F. Osgood

Jay Hyatt

Inventor

John F. Jones,

By J. Fraser & Co

Attys.

UNITED STATES PATENT OFFICE.

JOHN F. JONES, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN MACHINES FOR MAKING PAPER-BOARD.

Specification forming part of Letters Patent No. **49,884**, dated September 12, 1865.

To all whom it may concern:

Be it known that I, JOHN FRANKLIN JONES, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Machinery for the Manufacture of Paper-Board; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a plan of that portion of the machinery which forms the board and the "first" and "second" press for pressing it; Fig. 2, a central longitudinal vertical section of the machinery for forming the board, a side elevation of the first and second press, and a longitudinal vertical section of the drying apparatus; Fig. 3, an enlarged cross-section of the deckle-box and its connecting parts.

Like letters of reference indicate corresponding parts in all the figures.

The invention consists, first, in the employment of two endless wire-mesh aprons, between which the pulp is pressed; second, in the construction and arrangement of the swing-frame that supports the upper endless apron, and the adjustment of the same; third, in the employment of deckle-boxes of proper size and length on each side for the purpose of confining the pulp while being pressed between the aprons; fourth, in the manner and means of holding in the deckle-straps to their work within the deckle-boxes; fifth, in the arrangement of the coucher, felt, first press, tank, and felt-beater, in connection with the lower endless apron, for the purpose of carrying the web forward to be pressed without injury of wire or loss of pulp; and, sixth, in the employment of a steam table or tables for the purpose of properly drying the web after it has left the drying-cylinders.

The machinery on which the ground pulp is run to be pressed into board is mounted in one end of a frame, A, of any suitable construction. This machinery is on the Fourdrinier plan, having the usual endless wire-cloth apron, B, passing from one end to the other of the frame A around suitable rollers, C D, and supported at the top by small rollers *a a a*, Fig. 2, forming a bed for receiving the necessary pressure from above. I prefer to fill the spaces between the rollers *a a* with strips *b b* of perforated sheet metal, which serve the purpose of properly sustaining the apron between the rollers and still allowing the expressed water to pass through.

The especial feature of my invention connected with this portion of the machine is the use of a second endless wire apron, E, above the first, leaving between the two a space, *c*, sufficient to receive the necessary thickness of pulp to be pressed into board. This apron passes around a series of cylinders, G G G, &c., and rollers *d d d*, mounted in a swing-frame, H, which consists of swing-bars *i i* on each side, turning on an axis, *k*, inclined arms *l l*, jointed to said bars at the top and inclining downward and outward, and connecting-bars *m m* at the bottom, which form the support for the cylinders G G.

The angle of the arms *l l* with the swing-bars *i i* may be made more or less obtuse by means of braces *n n*, having adjusting-holes *o o*, through which and the arms passes a bolt, by which means not only is the wire apron made taut or straight at any time, but the parts are securely braced. The ends of the connecting-bars *m m* are also provided with adjusting slots or holes, so as to compensate for the adjustment of the arms *l l*, and to adjust up and down, if desired, independent of the rest of the frame.

The swing-frame H is suspended between two vertical standards, P P, extending upward from the main frame A, and made adjustable vertically, so as to separate the two aprons to a greater or less extent by any desirable means. The swing-bars *i i* and the standards P P may be connected by adjusting-braces or equivalents having a series of holes, through any of which and the standards passes a bolt, by which means the frame H, and consequently the upper apron, may be adjusted to any inclined position desired.

The cylinders G G G perform the double function of pressing and dipping cylinders—that is, pressing the pulp down to form the

board and dipping up and discharging such water as rises above the pulp under compression. To this end each cylinder is hollow, and is covered either by a wire-cloth or by wound wire. In the interior are a number of dippers, *r r*, substantially of the form represented, which dip up the water that enters through the wire and discharge it through the hollow journals or bearings of the cylinder.

The upper wire apron is made somewhat narrower transversely than the lower one, and on each side of the latter rests a longitudinal box or inverted trough, Q, usually extending the whole length (or a little more) of the upper apron, the transverse space between the boxes being that (or a little more) of the width of said upper apron, just so that the latter will run between them. These boxes I denominate the "deckle-boxes," as the ordinary deckle-straps *s s* run through them from end to end, passing over pulleys *t t* in the usual manner. These deckle-boxes or equivalents are absolutely essential in the forming of paper-board by the machinery I am describing, as the pulp that is fed in at the induction end of the machine is several inches thick, and would otherwise escape laterally by the compression, as the deckle-strap itself is comparatively thin. The deckle-boxes confine the pulp closely, so that there can be no escape, while the deckle-straps themselves, running inside these boxes, are not subject to the great pressure, and serve only to keep tight the joint or crack at the bottom of the boxes.

In order to keep the deckle-strap up close to its work, I employ a suitable number of rollers, *u u*, Fig. 3, pressing against its outer edge, which rollers are adjustable out or in by means of a screw, *v*, as shown, or in some equivalent manner. It may also be desirable to use similar rollers on top the deckle-strap within the box, to hold the said strap down to its work.

The operation of this portion of the machine thus described is obvious. The pulp is fed in at the induction end, and passes between the two endless aprons B E, and is compressed between the cylinders and rollers G G *a a*. The cylinders G G being adjusted in an inclined position by means of the swing-frame H, the pulp is compressed thinner and thinner as it passes through. The employment of the double aprons instead of a single one, as in the ordinary Fourdrinier machine, enables me to produce any desired thickness of board, and in a continuous or indefinite length, at one operation. The aprons confine the mass of the pulp and prevent the rollers interfering with the web. It is obvious that by raising or lowering the swing-frame, and consequently the upper endless apron, thick or thin board may be formed at pleasure. I am aware of no device where double aprons are employed for this purpose having the vertical and angular adjustments set forth. Such are necessary in forming thick paper-board on the ordinary Fourdrinier plan, as by the use of a single apron nothing more substantial than thick paper can be made. As the pulp is compressed between the endless aprons such water as rises above, between the deckel-boxes, is dipped up and discharged by the cylinders G, as before described; but most of the expressed water falls between the rollers *a a* and into the ordinary trough or receptacle, R, below, whence it escapes in the usual manner.

The web or layer of board *x* formed by the apparatus above described passes forward to the roller D, where it is taken off from the wire by the following means: At a suitable position to bear directly against the face of the roller D (and not compress or sag the apron) is a coucher, T, Fig. 2. This coucher is made soft by covering it with sponge, felt, or any equivalent material. Around this coucher passes a felt, *y*, upward and forward, in an inclined position, between the first press, consisting of large rollers U U, and downward into a wash-tank, V, where it is cleaned by the ordinary felt-beater, W, thence upward around suitable rollers, and then down to the coucher again. The web of board, adhering to this felt, passes up, as indicated by dotted lines, between the first press U U, where the upper roller takes it off, and it is carried over a roller, *e*, thence down between the second press, consisting of rollers Z Z, similar to the first press. A felt, *f*, runs between the second press, passing around a system of rolls, *g g*, as clearly represented in Fig. 2.

There are several advantages in the arrangement of the first and second press as above described. The web is carried forward constantly, instead of being carried backward over the machine, as in some other arrangements, and therefore the endless aprons are not obstructed, but are easily accessible to the operator at all times and under all circumstances. By going forward the web is also formed more perfectly and without breakage. There is also a great saving of pulp, which in ordinary machines escapes around the roller D, the coucher T in this case pressing directly against the roller in such a manner as not to sag or depress the apron, but to take the web therefrom without breaking it or leaving any material portion of the pulp. By this arrangement, also, the felt *y* takes the web directly from the wire and carries it upward to the first press, whereas in ordinary machines it is necessary to transfer the web at the commencement, by hand, from the roller D to an independent felt, by which it is carried to the pressing-rollers. In my device, also, the first press gives the back-pressure, or the pressure to the under side of the web, first, thus reversing the action. This in itself is not material; but the advantage consists in carrying the web over and downward to the second press, instead of under and backward, as in ordinary machines, in doing which it is necessary to transfer first by hand, and then the gravity of the web itself, having no support under it, is such as to

frequently break it. In my arrangement the support is under the web. This arrangement of the first and second press is also particularly applicable to paper-making.

From the second press Z Z the the web *x* passes to the drying apparatus, which forms a direct continuation of the machine above described, but is represented at the left hand of the drawings, in Fig. 2, as there is not sufficient space to extend it. A series of ordinary drying-cylinders, I I, in suitable numbers, is employed, (four only being shown,) of ordinary construction. The web passes between these cylinders, and calender-rollers K K are employed above the upper cylinders for the purpose of pressing. From the drying-cylinders the web passes between calender-rollers L L, and thence over a steam-table, N, of suitable extent, which is made hollow for the purpose of admitting steam, and is of sufficient width to correspond with that of the web itself. Above the steam-table is arranged a series of calender-rollers, O O, which press the web closely upon the steam-table, and by having a revolving motion greater than the motion of the web under them serve to smooth and glaze the surface of the web. The web, by being thus pressed closely upon the steam-table, receives the heat over a great surface at once, which dries it very effectually and expeditiously, and makes it stiff and firm, and renders the same fit for cutting into sheets. After leaving the steam-table above described, I prefer, especially in forming paper-board, to pass the web through another pair of calender-rollers, L^2 L^2, and over a second steam-table similar to the first; and the process may be carried still further, if desired, and additional steam-tables employed; but two will be generally found sufficient under ordinary circumstances. After passing the steam-tables the web will be in the proper condition to be cut into sheets, and it is only necessary to pass it through the proper cutting apparatus.

What I claim as my invention is—

1. The combination of two wire-mesh aprons, B E, between which the pulp passes, with suitable pressure-rollers, G G *a a*, or equivalent, for forming board in a continuous or indefinite length.

2. The construction and arrangement of the frame H, made up of the parts and adjusted in the manner hereinbefore set forth, and used in connection with the endless apron E and cylinders G G, substantially as and for the purpose herein specified.

3. The deckle-boxes Q Q, in combination with the endless aprons B E, substantially as and for the purpose herein set forth.

4. The employment of the adjustable rollers *u u*, in combination with the deckle-straps *s s* and boxes Q Q, for the purpose of holding said straps to their work, substantially as described.

5. The arrangement of the soft coucher T, felt *y*, first press U U, wash-tank V, and felt-beater W, used in connection with the endless apron B and roller D in such a manner as to take the web from the said apron and convey it upward to the press without injury or loss of pulp, substantially as herein set forth.

JOHN F. JONES.

Witnesses:
R. F. OSGOOD,
J. HYATT.