

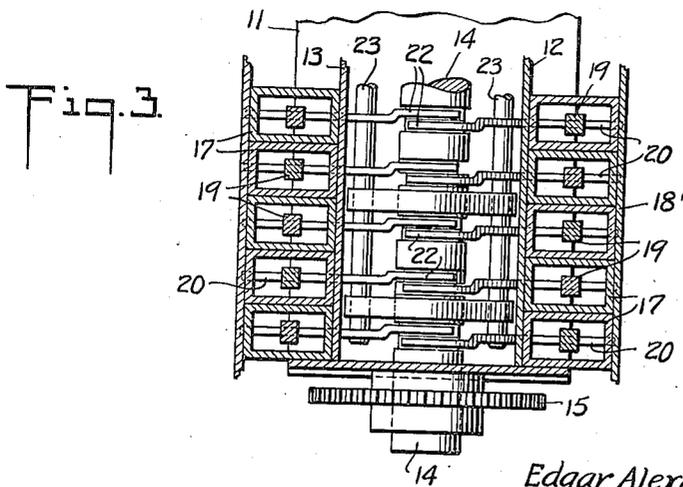
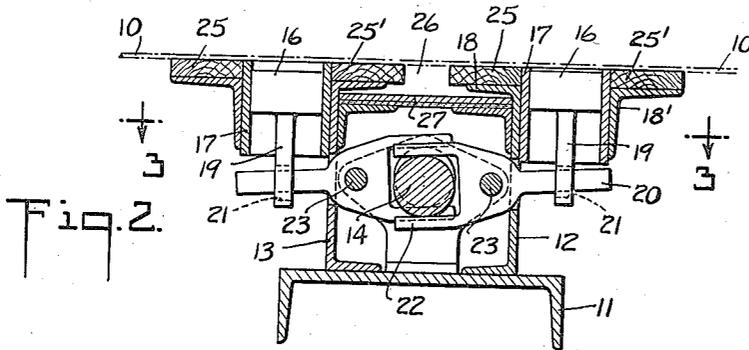
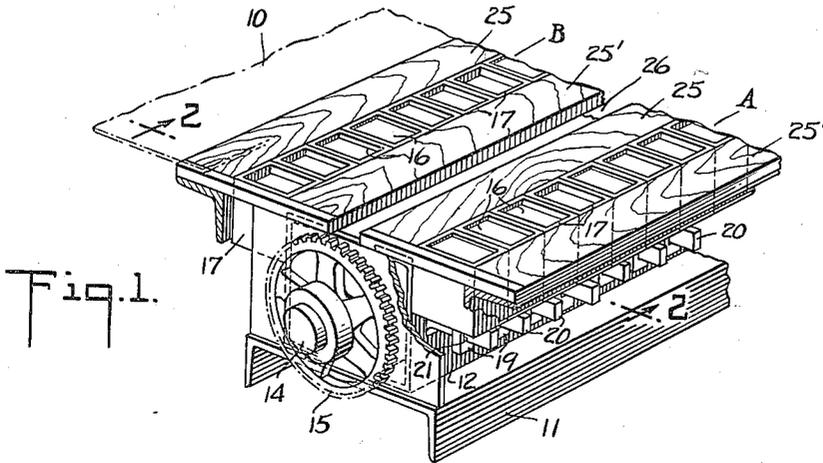
July 19, 1938.

E. A. CHARLTON

2,124,028

PROCESS AND APPARATUS FOR THE MANUFACTURE OF PAPER

Filed Dec. 17, 1934



INVENTOR  
Edgar Alexander Charlton  
BY  
*Frank J. Tooley Jr.*  
ATTORNEY

## UNITED STATES PATENT OFFICE

2,124,028

## PROCESS AND APPARATUS FOR THE MANUFACTURE OF PAPER

Edgar Alexander Charlton, New York, N. Y., assignor to International Paper Company, New York, N. Y., a corporation of New York

Application December 17, 1934, Serial No. 757,767

1 Claim. (Cl. 92—45)

This invention relates to improvements in the manufacture of paper, and more particularly, to an improved method of and apparatus for imparting to the paper making device or screen a shaking motion or vibration in such a manner that a thorough and even distribution and interlacing of the fibres making up the web of paper will be obtained.

In the manufacture of paper wherein use is made of a paper machine of the Fourdrinier type a suitably prepared fibrous stock is deposited on a moving screen or wire and there subjected to suction or other means to drain the water in the stock from the wire, leaving the fibres of the stock on the wire in the form of a web. Various mechanisms have been devised to impart to the Fourdrinier screen or wire a shaking or vibratory motion to the end that a more even distribution of the fibres will take place. However, all of the known devices are costly to make and are somewhat complicated in their structure. When paper is to be produced at high speeds, it has been found inadvisable to use a shake or vibratory action, not because such action is undesirable, but because of the frequent mechanical breakdowns of the conventional shake mechanism.

It is accordingly an object of this invention to provide a device for imparting a shaking motion to the wire of a paper machine and which will require little change to existing paper making machinery which is simple in construction and operation.

Another object of this invention resides in the provision of one or more units constructed and arranged to impart to the under surface of the paper making wire a plurality of vibratory impulses in series, each series of vibratory impulses being cyclic in character, and being set up by a plurality of reciprocating plungers or pistons.

These and other objects of this invention will become more apparent from a study of the following description taken with reference to the accompanying drawing, in which:

Figure 1 is a top plan view of the invention showing so much of a conventional Fourdrinier paper-making machine as is necessary to a clear understanding of the invention;

Figure 2 is a vertical sectional view taken along the lines 2—2 of Fig. 1; and

Figure 3 is a horizontal sectional view taken along the lines 3—3 of Fig. 2.

Referring now to the drawing in which like numerals indicate like parts, and more specifically to Figure 1, the numeral 10 represents a Fourdrinier wire or paper making wire, which, at one

end, is usually passed around a breast roll and at the other end around a couch roll by means of which the wire is normally driven. Inasmuch as the breast roll, couch roll and driving mechanisms form no part of this invention they have not been shown. According to standard practice the Fourdrinier screen is supported at intervals on table, or tube rolls, and at the couch end of the wire the usual suction boxes may be employed.

The invention, as will now be explained, pertains to means for imparting a "shake" or vibratory movement to the stock deposited on the paper making wire in such a manner that the fibres making up the stock are evenly deposited across the wire in web form and are thoroughly interlaced or matted together. The stock, containing a very high proportion of water and of the desired consistency, is deposited on the wire through a conventional head box and slice mechanism. If desired, use may be made of a conventional apron and in standard practice the slice is made adjustable. The agitating or shaking device constituting the subject matter of this invention, may be positioned at intervals under the wire. Preferably these shake devices are so located with respect to the wire as to assist in the initial formation of the paper web. Accordingly they are positioned either between the table rolls or used as substitute for certain of the table rolls.

In the embodiment shown each shake or vibration unit comprises a base 11 supporting a housing 12 the side walls of which are formed by channel members 13. A shaft 14 suitably journaled in bearings at each end of the housing is provided at one end with a drive wheel 15 which in turn is geared or connected to a motor or other driving mechanism (not shown).

The shaft 14 comprises in effect a cam shaft for the unit and is accordingly provided with a plurality of cam surfaces whose design is such as to impart to the plungers or pistons the desired reciprocatory movement as will now be more fully explained. The plungers or pistons 16 are arranged in rows, and in the embodiment shown two such rows are provided. Each piston or plunger is mounted for reciprocatory movement in a housing or cylinder 17 secured to frame members 18, 18', the frame members 18 being in turn fastened to the side walls of the housing 12, and the frame members 18' being secured in any conventional manner to the frame (not shown) of the paper machine. Each of the plungers or pistons are provided with connecting rods 19, the said rods being secured thereto in any well known manner.

The piston or plungers are driven by the shaft 14 through rocker arms 20, the outer ends of which ride in slots 21 formed in the ends of the connecting rods 19. The inner end of each of the rocker arms is bifurcated as at 22 to fit around its respective cam on the shaft 14. Each series of rocker arms is pivotally mounted on a rod 23 which is secured at each end to the end walls of the unit.

As shown the cams on the cam shaft for actuating a row of pistons or plungers are spaced 90° apart so that when the first plunger of the row is at the top of its stroke the third plunger is at the bottom of its stroke, this cycle being repeated throughout the row. Each plunger, when at the top of its stroke has its top surface substantially in the same plane as the top surface of its respective housing, but below the surface of the paper making wire. The operation of the plungers or pistons in the second row is the same but they operate in opposite phases. Thus the plungers of one row are 180° ahead of the plungers in the other row. This will be readily appreciated from a study of Fig. 1 wherein the first plunger in row A is at the top of its stroke whereas the first plunger in row B is at the bottom of its stroke.

The unit is also provided with boards 24 whose top surfaces lie in the same plane as the plunger housings or cylinders and which are supported on the horizontally positioned flanges 25, 25' of the frame members 18, 18' respectively. An opening 26 is provided centrally of the unit to permit drainage of water from the paper making wire, the operating parts of the unit being protected by a shield 27.

In operation one or more of the above described units may be used. Rotation of the cam shaft 14 will impart to the plungers a reciprocating movement, each row of plungers being, at any given point in opposite phase, the plungers of each row being arranged in cyclic groups of four plungers each. The upper faces of the plungers at the top of their stroke are not flush with the top of the cylinders and accordingly do not contact with the under surface of the paper making wire. Since water is constantly draining from the paper making wire in each cylinder upon downward movement of its plunger will either become filled with water or at least partially filled with water. Upward movement of the plunger will cause corresponding movement of the water in the cylinder. The water, therefore, in effect

becomes a water piston. Although a certain amount of this water will be forced through the wire into the forming web of paper rapid reciprocation of the plungers will reduce this action to a minimum. Moreover a certain amount of water pressed into the forming web of paper will not produce any deleterious effect. On the contrary such water will assist in a thorough interlacing of the fibres in the forming web.

From the above description it will be appreciated that due to the reciprocation of the plungers as previously described a series of vibratory impulses will be imparted to the wire in such a manner as to shake the wire in a vertical direction. This shaking motion will assist in interlacing the fibres of the forming web of paper so that a better web formation will be secured. It will be understood, however, that the cycle of reciprocation of the plungers may be varied. Thus the first plunger of each group may be at the top of its stroke and, the second plunger at the bottom of its stroke. In this way each plunger of a group would be at the top of its stroke in the following cycle, 1, 4, 3, 2. Still other variations may be employed as desired.

It will be understood by those skilled in the art that while the invention has been described and set forth hereinbefore by way of exemplification with reference to a particular embodiment thereof, that the invention is not limited to the specific details of such embodiment or exemplification but may be variously embodied within the scope of the claim hereinafter made.

What is claimed as new is:

In an apparatus for the manufacture of paper and the like, a paper making screen on which a fibrous stock containing water is deposited and through which water is drained to form a web of fibrous material, a shake device positioned beneath said screen to impart thereto vibrations to distribute said fibres evenly throughout said web and to enhance to felting thereof comprising a base, cylinders supported by said base, plungers mounted for reciprocation in said cylinders, and means to reciprocate said plungers, the upper faces of said plungers at the top of their stroke being below the top of said cylinders, the water draining through said screen and collected in said cylinders serving to transmit the upward thrust of said plungers to the screen.

EDGAR ALEXANDER CHARLTON.