

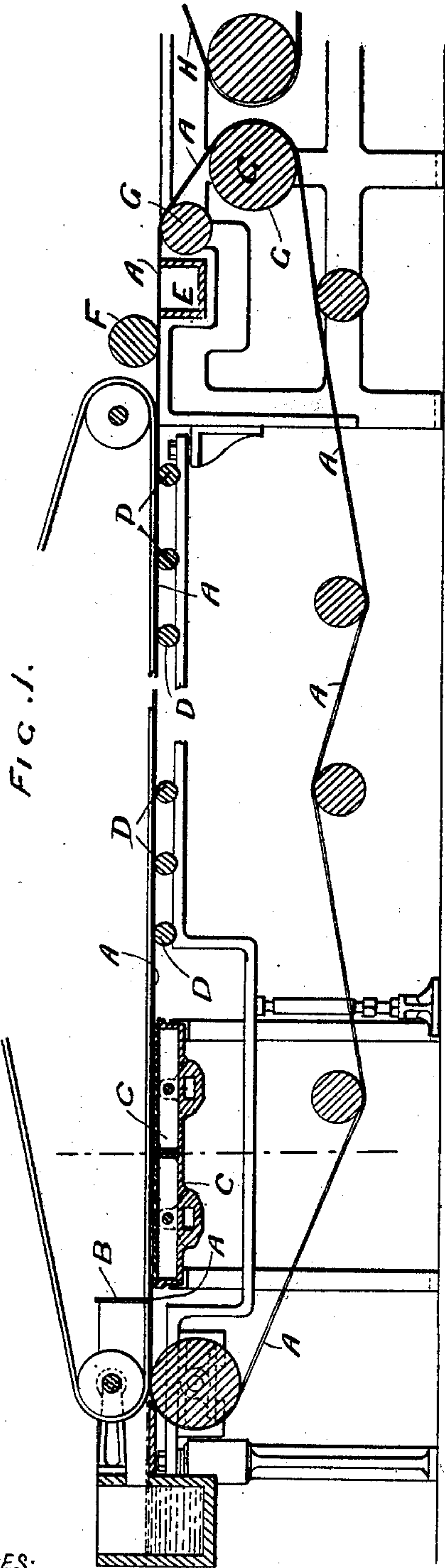
No. 660,808.

Patented Oct. 30, 1900.

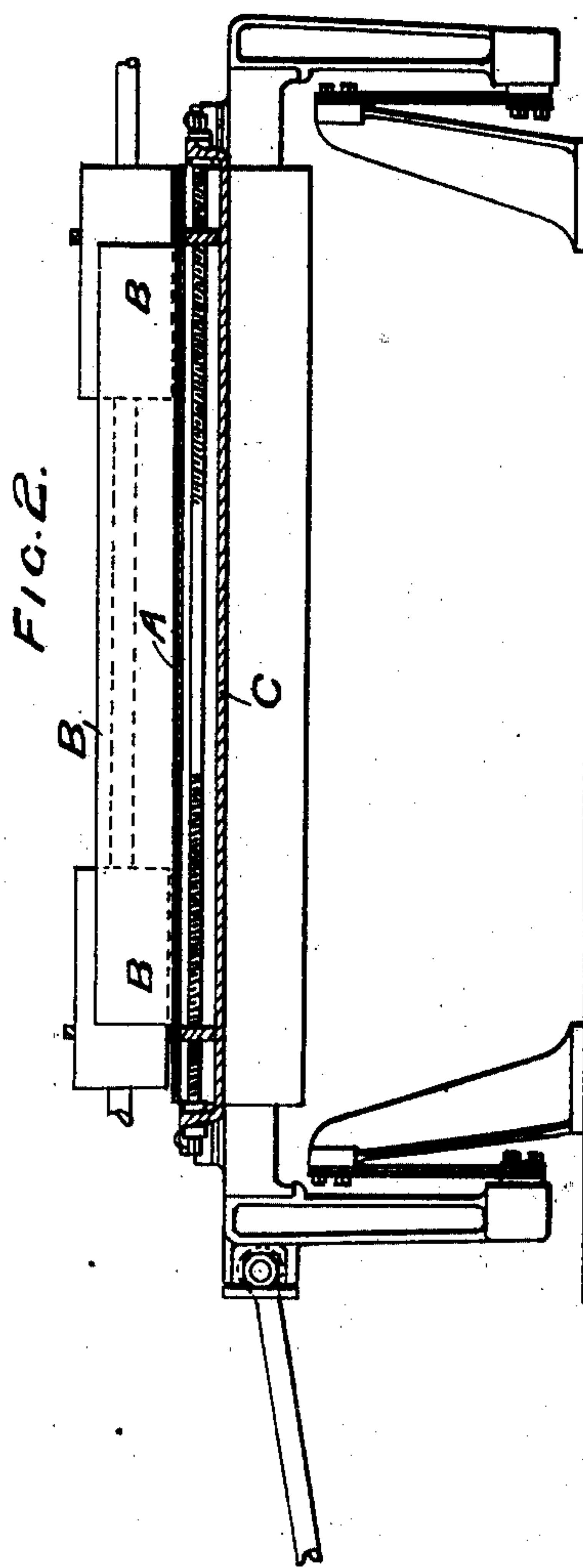
J. H. ANNANDALE.
MANUFACTURE OF PAPER.

(Application filed Feb. 17, 1900.)

(No Model.)



WITNESSES:
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UNITED STATES PATENT OFFICE.

JAMES HUNTER ANNANDALE, OF POLTON, SCOTLAND.

MANUFACTURE OF PAPER.

SPECIFICATION forming part of Letters Patent No. 660,808, dated October 30, 1900.

Application filed February 17, 1900. Serial No. 5,637. (No specimens.)

To all whom it may concern:

Be it known that I, JAMES HUNTER ANNANDALE, a citizen of the United Kingdom of Great Britain and Ireland, residing at Polton Paper Works, Polton, county of Mid-Lothian, Scotland, have invented certain new and useful Improvements in the Manufacture of Paper, (for which application for patent has been made in Great Britain, No. 15,027, dated July 21, 1899,) of which the following is a specification.

This invention comprises improvements in the art of paper-making; and it has for its object the production in continuous web form in a paper-making machine run at a high speed of paper possessing the superior texture of hand-made paper and that from pulp which need not be subjected to the prolonged and expensive beating or like treatment requisite to make a close-texture machine-made paper.

Under my invention I may employ a paper-making machine of the improved construction hereinafter described, or a machine which may be of the ordinary type except as regards the location of the first vacuum-box.

The accompanying drawings illustrate in longitudinal section at Figure 1 and in transverse section at Fig. 2 the "wet end" of a "Fourdrinier" paper-making machine in which my invention may be carried out.

In lieu of allowing the pulp which is distributed over the "wire" A by the slice B to be carried along in the wet state or floating in water during the length of travel in which the wire A is affected by the shake or cross motion imparted to the wet end of the machine and applying the first vacuum-box at a point where this shake or cross motion reduced to a minimum hardly affects the pulp I subject the pulp to the action of a vacuum-box C immediately upon its passage under the slice B or other distributor and while it is under the influence of the maximum shake of the wire, so that the paper is "made" while the fibers of the pulp are undergoing the felting action due to the shake. This result I attain in an ordinary paper-making machine by employing a first vacuum-box C of larger area and more gentle and gradual action than usual and locating it under the wire A in proximity to the slice B, so that the bulk of

the water in the pulp is drawn off, and the paper is thus made upon the wire A instantaneously, even while the wire A is passing over the comparatively small space between the slice B and the farthest side of the first vacuum-box C at the point where the shake is most in evidence. The result insures a close and even texture of paper being obtained and any cloudy effect is prevented.

While paper having the characteristics of hand-made paper may be thus produced in existing paper-making machines, I prefer to employ a machine of improved construction in which the wire A is greatly shortened and the tube-rolls D are for the most part removed and their place taken by the large first vacuum-box before referred to. The second vacuum-box E is or may be fitted beyond the dandy-roll F; but instead of being carried through couch-rolls the wire is led around tail-rolls G, which terminate the wet end of the machine, and the paper may be lifted from the wire by a blower placed between the tail-rolls G. The paper is thence led over a second endless wire or felt H and is thereon subjected to the action of couching-rolls to express the excess of moisture and which may displace the first press-rolls of the ordinary machine. Even when a second wire is used this will serve to obliterate the former wire mark.

The action of the vacuum-box C in drawing off the water from the pulp while it is subjected to the shaking motion of the wire is in effect the same as that due to the shaking and raising of the molds in making paper by hand, and the paper produced in the machine as above described is necessarily akin in evenness and closeness of texture to the hand-made paper produced from a like quality or preparation of pulp. The rate of production and that of thoroughly well-made paper is naturally by my invention enormously increased, and the process becomes invaluable in the making of strong paper and in the making of good-texture papers at almost any speed.

By observation and experiment I have proved that the production of close texture in paper is dependent on the removal of the water simultaneously with the fullest operation of the shake and that it is this which

gives such closeness of texture and strength to hand-made papers, as the water in such case is rapidly removed by the suction caused in lifting the mold from the vat.

5 The development of the machine up till now has been on directly opposite lines, and the machine-wire has been extended from twenty to, in some cases, seventy feet, with the object of getting a better result in texture of paper. The effect has actually been deleterious, as the shake being applied only at the breast of the machine it has practically disappeared by the time it reaches the first vacuum-box, where the pulp has reached a consistency when alone the shake can be of value. The shake only felts the paper when the quantity of water is so reduced that the individual fibers rub against or jostle one another, and the instant this occurs the felting result is attained.

20 The ordinary idea is that machine-made paper is made faster than hand-made. My observations and experiments have proved that while the latter is made better it is made very much faster. The passage of the pulp over the "making" part of an ordinary machine takes ten to fifteen seconds, and the

making is not so good as might be. In a mold from the time the pulp is leveled the sheet can be made perfectly in three seconds, and it is this making that I propose exactly to reproduce by my process on the machine. 30

Having now described the invention, what I claim, and desire to secure by Letters Patent, is—

35 The method of producing paper, analogous in texture to hand-made paper, which consists in applying a transverse shake or vibratory motion to the paper-pulp while flowing in a thin stream, said shake varying in degree at different points along the course of the pulp, being greatest at the head of said stream and subjecting said pulp to suction at the point of maximum shake at the head of the stream of pulp whereby the paper is "made" at the point of maximum shake, substantially as described. 40 45

In witness whereof I have hereunto set my hand in presence of two witnesses.

JAMES HUNTER ANNANDALE.

Witnesses:

WALLACE FAIRWEATHER,
JNO. ARMSTRONG, Jr.