No. 620,548. Patented Feb. 28, 1899.

J. W. MOORE & J. A. WHITE.

PAPER MAKING MACHINE.

(Application filed Mar. 30, 1896. Renewed Nov. 12, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

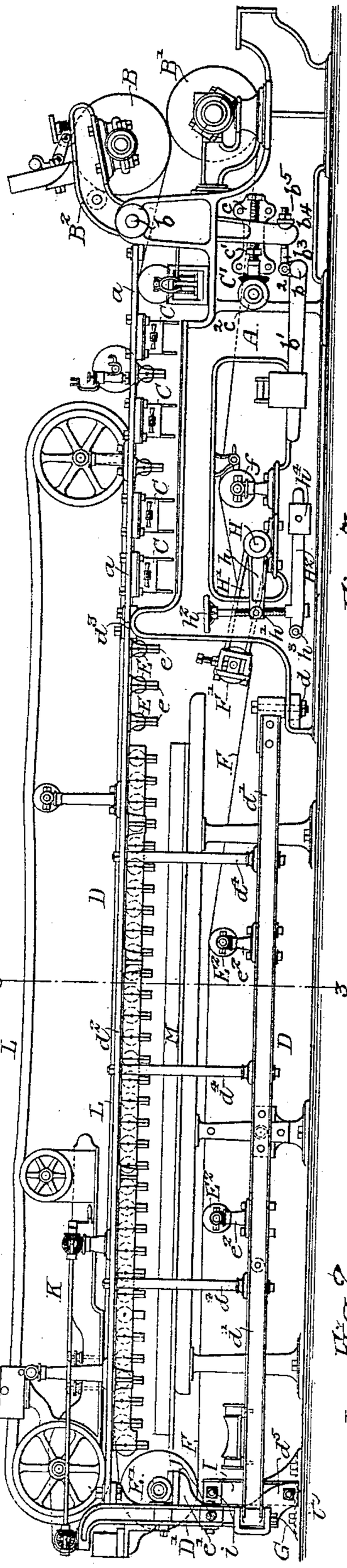


Fig. 2.

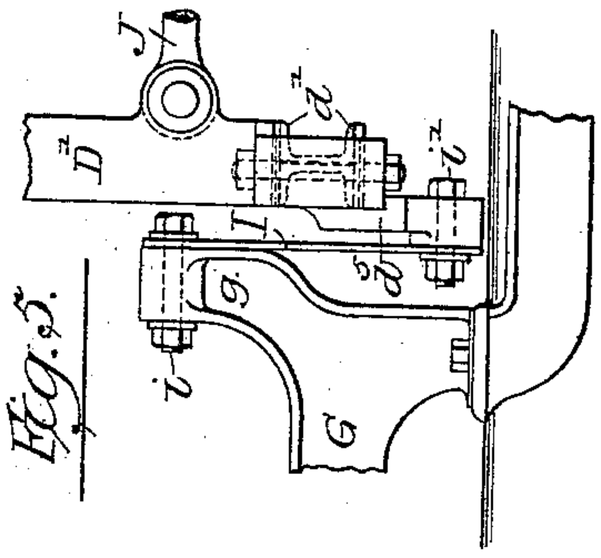


Fig. 3.

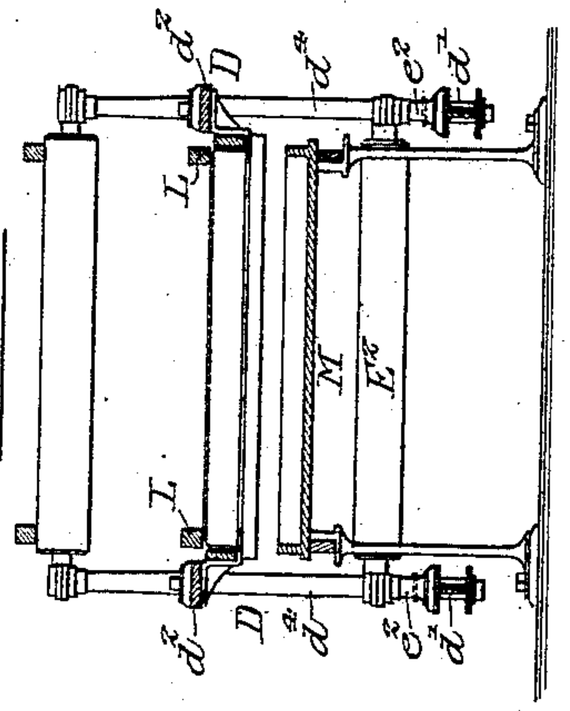
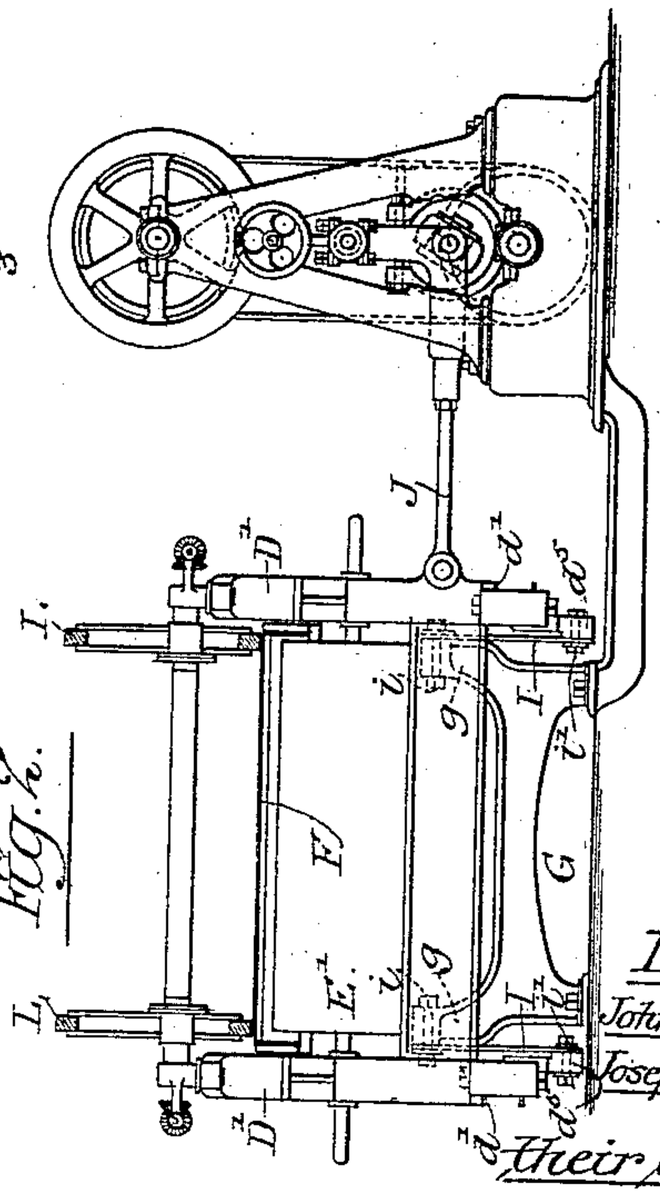


Fig. 4.



Witnesses:
Louis M. Whitehead.
Wm. A. Barr.

Inventors:
John Warren Moore.
Joseph Attwood White.
— by —
Their Attorneys:
Howson & Howson

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FIG. 4.

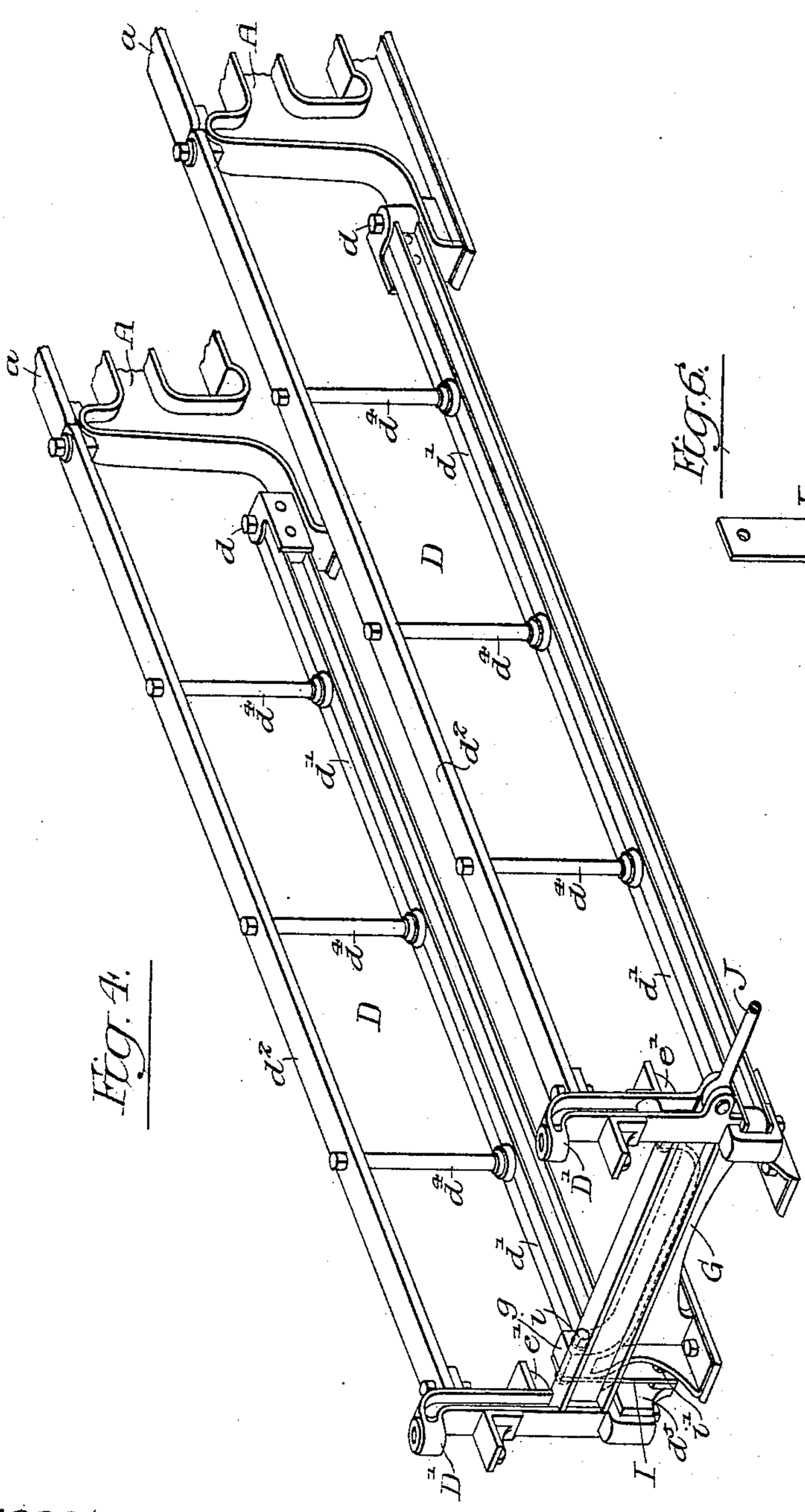
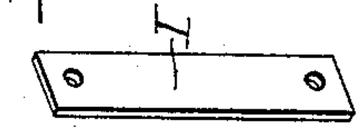


FIG. 6.



Witnesses:-
Louis H. Whitehead.
Wm. A. Barr.

Inventors:-
John Warren Moore.-
Joseph Atwood White.
by their Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

JOHN W. MOORE AND JOSEPH ATWOOD WHITE, OF PHILADELPHIA, PENNSYLVANIA.

PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 620,548, dated February 28, 1899.

Application filed March 30, 1896. Renewed November 12, 1898. Serial No. 696,315. (No model.)

To all whom it may concern:

Be it known that we, JOHN WARREN MOORE and JOSEPH ATWOOD WHITE, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Paper-Making Machines, of which the following is a specification.

Our invention relates to certain improvements in paper-making machines known as the "Fourdrinier" machines, in which the making-wire is traversed over a shake-frame which is agitated, allowing the pulp to form on the wire in such a manner that the fiber will knit together and form a sheet of paper.

The main object of our invention is to suspend the shake-frame, dispensing with the supporting-bearings heretofore used.

A further object of the invention is to so construct the shake-frame that the upper and lower carrying-rolls for the making-wire will have the same lateral movement; and a still further object is to readily adjust the upper couch-roll and the wire-stretching roll, as fully described hereinafter.

In the accompanying drawings, Figure 1 is a side view of our improved paper-making machine. Fig. 2 is an end view. Fig. 3 is a section on the line 3 3, Fig. 1. Fig. 4 is a perspective view showing the shake-frame with the rolls detached. Fig. 5 is an enlarged view of a portion of Fig. 2, and Fig. 6 is a perspective view of one of the suspension-plates.

It will be understood that our invention relates particularly to the Fourdrinier end of a paper-making machine—that is, the portion on which the paper-pulp settles to form the continuous sheet of paper.

A is a fixed frame, and on this frame are the bearings for the upper and lower couch-rolls B B′. The upper roll is carried by levers B^2, pivoted to the frame of the machine at b, and the levers can be moved so as to adjust the upper couch-roll toward or from the lower couch-roll.

b' is a weighted lever pivoted at b^2, and connected to the short arm of this lever is a screw-threaded rod b^3, having a block b^4, adjustable on the rod. Back of the block is a nut b^5. The rod is adapted to the forked end of the lever b^2, and the block rests in a socket in the lever. By this means the upper couch-roll B′ is pressed downward. This mechanism is duplicated on the opposite side of the machine. By this arrangement of levers free access to the rolls from the side is permitted, which is not the case in machines of the prior art.

On each side of the machine are plates C′, having bearings for a screw c. On the screw is a nut c', adapted to slide on the plate and so arranged that it cannot turn with the screw, so that when the screw is turned it will move forward in contact with the lever B^2 or back off from the lever. The two screws c are geared together by a cross-shaft c^2 and bevel-gears, and on the cross-shaft is an operating handle or wheel.

When it is wished to elevate the upper couch-roll, the weighted levers are raised, releasing the block b^4 from engagement with the levers B^2. The shaft c^2 is then turned, moving the nuts c' forward in contact with the levers B^2, forcing the lower arm of each lever forward and elevating the upper arm and the couch-roll carried thereby. By backing off the nuts the upper couch-roll is lowered and the weighted levers can be readily connected.

Secured to the fixed frame A are the fixed rails a, and carried by the frame are the suction-boxes C C of the ordinary construction.

Pivoted to the fixed frame or other fixture at d, at each side of the machine in the present instance, are the lower rails d' of the shake-frame D. The upper rails d^2 are secured at d^3 to the fixed frame A in line with the fixed rails a. We preferably provide sufficient play at this joint to allow the shake-frame D to vibrate freely. The upper and lower rails of the shake-frame are rigidly secured together by the columns d^4, arranged at intervals, as shown, and they are also secured together by the end frame D′. We preferably secure the upper rail to the end frame D′ in the same manner that it is secured to the fixed frame A and pivot the lower rails to this end frame; but this construction is not essential. Thus it will be seen that the shake-frame proper consists of upper and lower rails, columns connecting the rails and an end frame, as clearly illustrated in Fig. 4, the lower rails constituting the main members of the frame and rigidly

supporting the upper rails at points throughout their length, whereby perfect alinement of said upper rails is insured.

Carried by the upper rails d^2 are the bearings e of the carrying-rolls E for the making-wire F. This wire is in the form of an endless apron and passes around a breast-roll E', adapted to bearings e' on the frame D' at the outer end of the machine. The return-run of the making-wire passes over a supporting-roll f on the fixed frame A, under a wire-stretching roll F', and over carrying-rolls E^2, adapted to stands e^2 on the lower rails d' of the shake-frame. Thus it will be seen by the construction above described that the upper and lower carrying-rolls for the making-wire are supported on the same frame and have the same lateral movement. Consequently the wire is not subjected to the strains to which it was heretofore, where the lower rolls did not have the same throw as the upper rolls.

At the outer end of the machine is a fixed standard G. This standard in the present instance has two arms g g, one at each end.

Depending from the end frame D' of the shake-frame D in the present instance are brackets d^5.

I I are two suspension-plates. (Clearly shown in Figs. 5 and 6.) These suspension-plates are secured at their upper ends to the arms g g of the standard G by bolts i or other fastenings and secured at their lower ends to the brackets d^5 by bolts i', so that the outer end of the shake-frame is suspended from the standard G by means of the suspension-plates I I. These suspension-plates may be made of any suitable material; but we prefer to make them of spring metal of a sufficient width and thickness to properly support the shake-frame. Thus by this construction the free end of the frame can be rapidly vibrated without jar and in such a manner that it will travel in what may be termed a "concaved" line. This construction dispenses entirely with exposed pivot joints and sockets, which are apt to wear away rapidly owing to the constant use of alum-water in the manufacture of paper.

We have found by actual experience that there is no material wear upon the plates and that they require very little attention, and the movement is such that a much better distribution of the pulp is effected than heretofore.

We usually, especially in large machines, duplicate the suspension-plates between the fixed frame and the standard, although we have found by experience that the two suspension-plates at the outer end are sufficient for ordinary work.

While we have shown the shake-frame pivoted to the couch-roll frame, it will be understood that it may be secured to any fixed frame, either forming part of the couch-roll frame, as shown, or independent thereof, the object being to attach the shake-frame to a fixed frame at one end, so that the frame will not vibrate at the point of attachment, while the other end is so suspended that it is free to vibrate.

The slack of the making-wire can be taken up by the roll F. This roll has journals adapted to boxes adjustably mounted in the ends of two arms H', carried by the shaft H. This shaft has an arm h at one side, on which is a swivel-nut h', and through this nut passes an adjusting-screw h^2, having its end secured to a counterbalancing-lever H^2, pivoted at h^3 to the frame of the machine and having a suitable weight h^4. By this construction the roll F' can be adjusted by the screw h^2 without altering the position of the counterbalancing-lever H^2, and the roll can be adjusted in the arms by raising and lowering the boxes.

We have shown in Fig. 2 a shaking mechanism connected to the frame by a rod J. This mechanism is driven in any suitable manner and is so adjusted that it will move the frame laterally a given number of revolutions. We do not limit ourselves to this construction of shaking mechanism, as other mechanism may be applied without departing from the main feature of our invention; but this particular mechanism is fully illustrated and claimed in a divisional application which was filed on the 6th day of December, 1898, under Serial No. 698,461, and therefore need not be described in this application.

In referring again to the drawings, K is the deckle-frame. L are the adjustable flexible deckle-straps, and directly under the upper carrying-rolls is the save-all M. These elements do not form any part of the present invention, but are simply shown to illustrate the complete paper-making machine of the Fourdrinier type.

It will be understood that the mechanism for carrying and raising the upper couch-roll may be applied to the press-rolls of a paper-making machine without departing from our invention.

We claim as our invention—

1. The combination in a paper-making machine, of a fixed frame, a shake-frame connected thereto, a standard, flexible suspension-plates secured to the standard and to the shake-frame whereby the shake-frame is suspended from the standard at its free end, with means for laterally vibrating the free end of the shake-frame, substantially as described.

2. The combination in a paper-making machine, of the fixed frame, the shake-frame connected thereto, a standard, flexible suspension-plates rigidly secured to the standard at their upper ends, and rigidly secured to the shake-frame at their lower ends, with means for shaking the said frame, substantially as described.

3. The combination in a paper-making machine, of the fixed frame, a shake-frame, connected thereto, a standard at the outer end, flexible suspension-plates, one plate being secured at its upper end to one side of the standard and secured at its lower end to one side of the shake-frame, the other plate being simi-

larly secured to the other side of the standard and shake-frame, with means for laterally vibrating the free end of the shake-frame, substantially as described.

4. The combination in a paper-making machine, of a fixed frame, a standard, a lower couch-roll mounted on the fixed frame, a shake-frame, a breast-roll and carrying-rolls thereon, an endless making-wire adapted to the breast-roll and to the couch-roll, and supported by the carrying-rolls, flexible plates by which the shake-frame is suspended from the standard, and means for laterally vibrating the said shake-frame, substantially as described.

5. The combination in a paper-making machine, of a fixed frame, a shake-frame consisting of lower supporting-rails mounted on the fixed frame, upper rails, a making-wire having the upper run carried by said upper rails, and rigid connections whereby said upper rails are supported at points throughout their length upon the lower rails, substantially as described.

6. The combination in a paper-making machine, of the fixed frame, a shake-frame secured to said fixed frame, the shake-frame consisting of upper and lower members rigidly connected together, bearings for the wire-carrying rolls on the upper members and on the lower members, with means for reciprocating said shake-frame at one end, substantially as described.

7. The combination in a paper-making machine, of the fixed frame, a shake-frame attached to the fixed frame, a standard, flexible suspension-plates by which the outer end of the shake-frame is suspended from the standard, said shake-frame carrying the upper and lower carrying-rolls for the wire, with means for shaking the frame, substantially as described.

8. A shake-frame for paper-making machines, comprising a top formed of side portions having the making-wire roller-bearings, and a bottom formed of like side portions, having making-wire roller-bearings, the top and bottom portions being each connected rigidly together vertically, and movably joined together at one end transversely, as set forth.

9. The combination of a shake-frame for paper-making machines, comprising top and bottom side portions rigidly fixed together vertically, and movably connected together, at one end, of means attached to one of said connected ends for pendulously suspending the same as set forth.

10. In a Fourdrinier machine, a shake-frame comprising top and bottom portions joined rigidly together vertically and movably connected together transversely, combined with springs attached to said connected frame ends and supported independently of the machine and shake-frame to pendulously suspend one end of the latter, as set forth.

11. In a Fourdrinier machine, a shake-frame comprising top and bottom frame portions, joined rigidly together, one above the other, combined with an end frame movably connecting one end of said frame portions together transversely, and the pendulous springs hung from a suitable standard and attached to the shake-frame at the said connected end portions to suspend the latter, as set forth.

12. A shake-frame for paper-making machines, comprising top and bottom side portions joined rigidly together, vertically, and an end piece having the breast-roller and movably connecting one of the said side frame portions transversely, combined with springs having one end secured to a stationary support and the other end attached to the lower frame portions adjacent the said connected end, as set forth.

13. In a paper-making machine, the combination with an endless apron, of swinging arms, a tightening-roll supported thereon, pivoted weighted levers, and extensible connections between the swinging arms and the levers, whereby the levers may be maintained substantially horizontal irrespective of the position of the tightening-roll, as set forth.

14. In a paper-making machine, the combination with an endless apron, of swinging arms, a tightening-roll supported thereon, pivoted weighted levers, screws engaging the levers, and levers supporting said screws to form extensible connections between the swinging arms and the weighted levers, as set forth.

15. The combination in a paper-making machine, of two pivoted levers, a roll mounted in bearings on one arm of each lever, a weighted lever detachably secured to the other arm of each lever, and means acting upon said levers to raise the roll, substantially as described.

16. The combination in a paper-making machine, of the two rolls, a lever on each side of the machine carrying the upper roll, a pivoted lever detachably connected to the long arm of the said carrying-lever, a screw with a traveling nut thereon, means for turning said screw so as to raise the roll when the weighted lever is detached, substantially as described.

JOHN W. MOORE.
JOSEPH ATWOOD WHITE.

Witnesses:
HENRY G. STEVENSON,
J. DANIEL EBY.