

No. 694,427

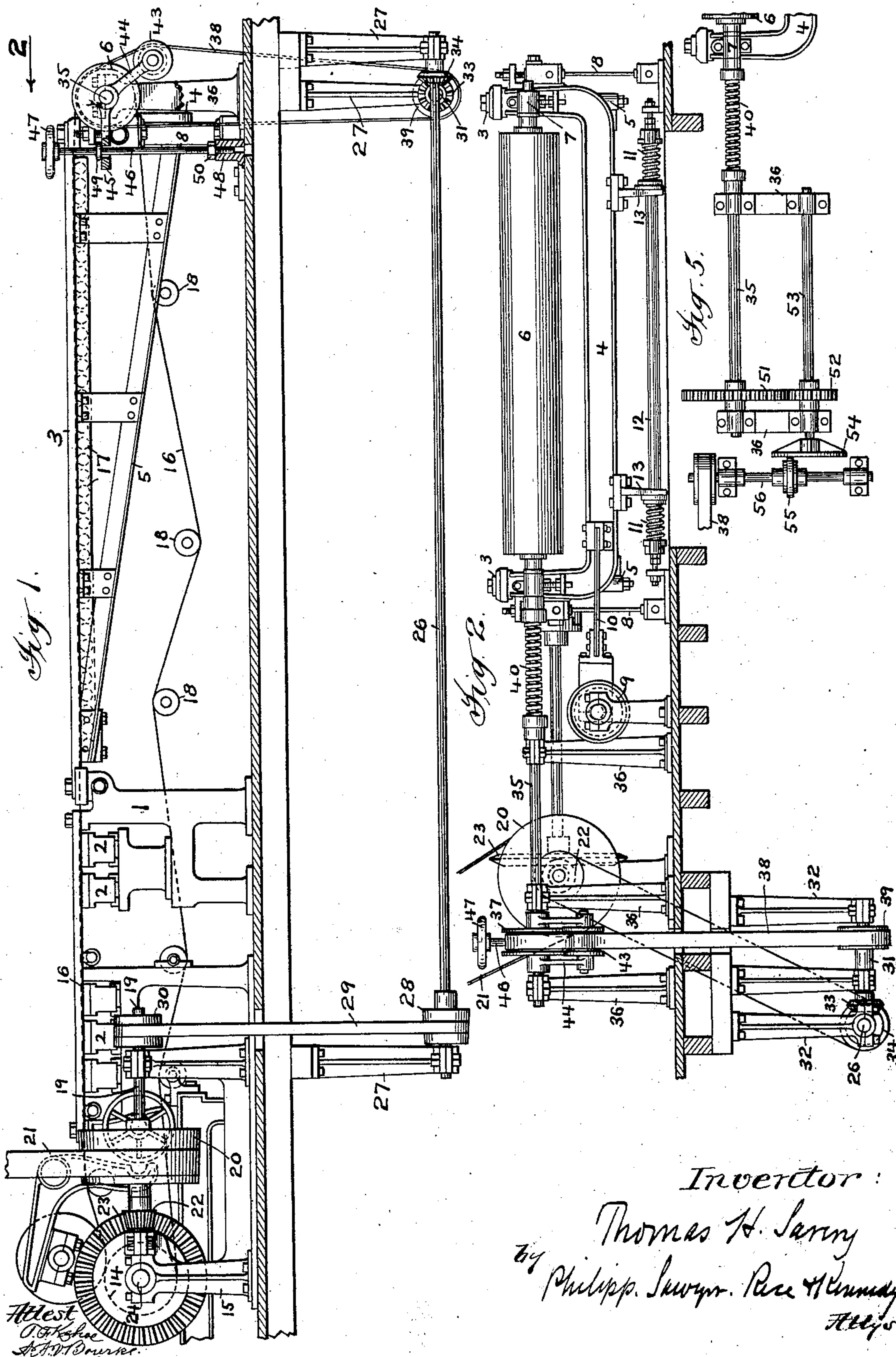
Patented Mar. 4, 1902.

T. H. SAVERY.
PAPER MAKING MACHINE.

(Application filed June 25, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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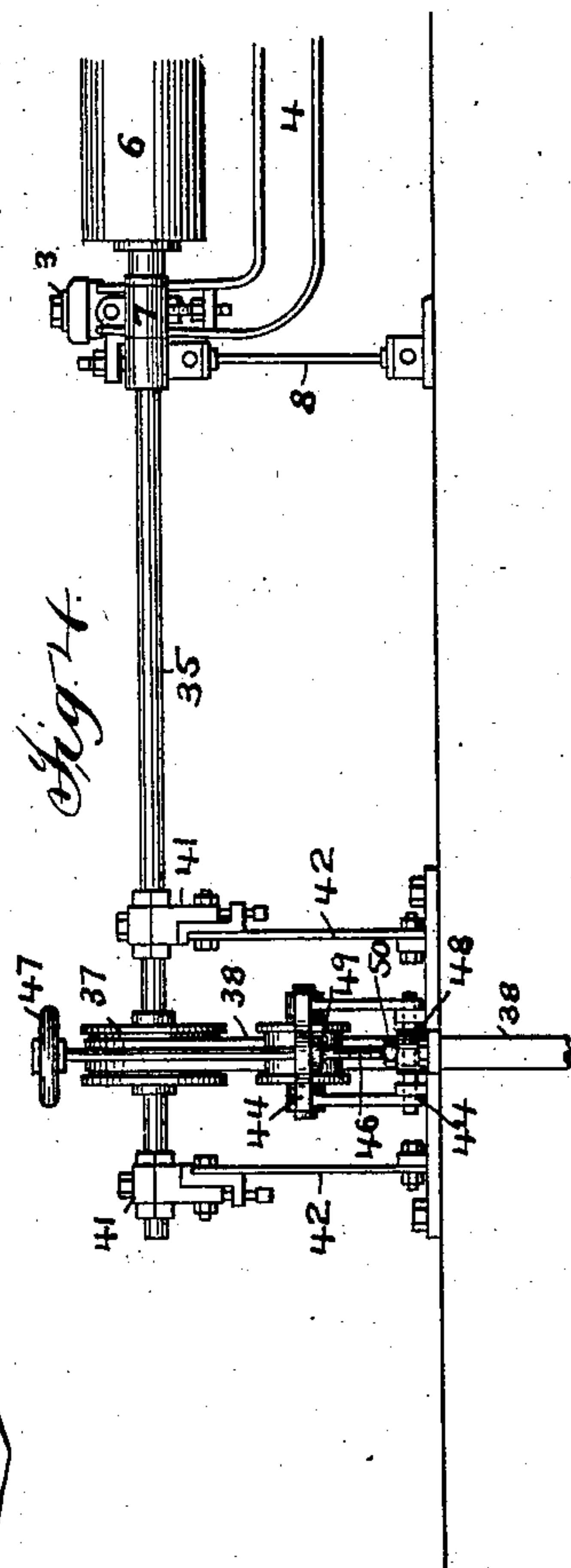
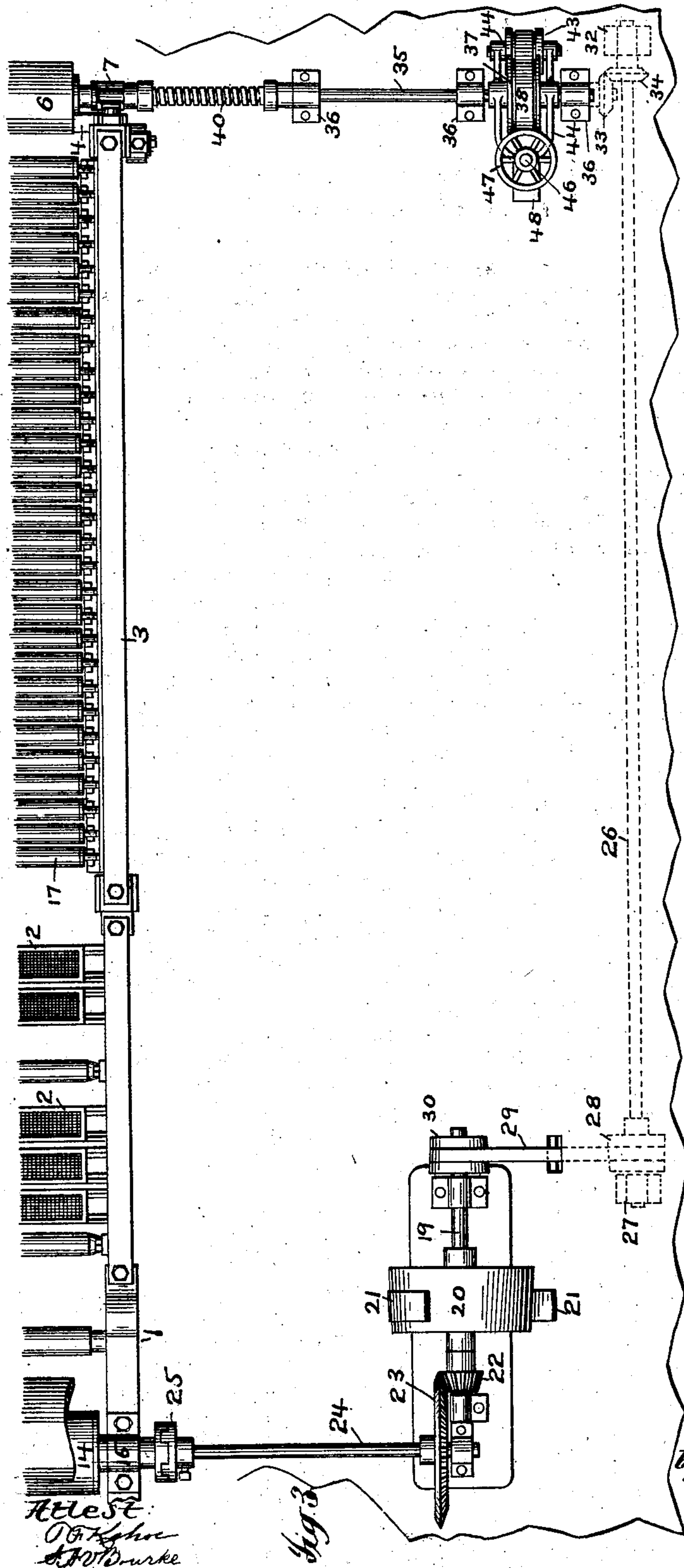
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UNITED STATES PATENT OFFICE.

THOMAS H. SAVERY, OF WILMINGTON, DELAWARE.

PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 694,427, dated March 4, 1902.

Application filed June 25, 1901. Serial No. 65,908. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. SAVERY, a citizen of the United States, residing at Wilmington, county of Newcastle, and State of Delaware, have invented certain new and useful Improvements in Paper-Making Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to certain improvements in paper-making machines, and more particularly to paper-making machines of the Fourdrinier type. In paper-making machines of the Fourdrinier type, as is well known, a making-wire is employed. This wire runs from the couch-roll to and around the breast-roll, which is located at the extreme end of the machine, and after passing around the breast-roll it runs over suitable guides back to the couch-roll. It is customary in such machines to drive the couch-roll, said roll operating to drive the making-wire, which in turn drives the breast-roll. The length and width of the making-wire in such machines have of late years been constantly increasing, and the length and diameter of the breast-roll have increased in proportion, so that at the present time the breast-rolls are very long and heavy, being in some instances one hundred and sixty inches in length and sixteen inches in diameter. The strain imposed upon the making-wire by driving the heavy breast-roll is very considerable, and if, furthermore, this roll does not move at the same surface speed as the making-wire the wire will necessarily slip on it and wear.

It is the object of this invention to produce a paper-making machine of the type referred to in which means independent of the wire shall be provided for driving the breast-roll.

With this and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, as will be hereinafter fully described and then specifically pointed out in the claims hereunto appended.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a side view of so much of a paper-making machine as is necessary to an understanding of the invention. Fig. 2 is

an end view of the construction shown in Fig. 1, the view being taken in the direction of the arrow 2 in said figure. Fig. 3 is a plan view, and Figs. 4 and 5 are detail views illustrating modified forms of construction.

Referring to the drawings, which illustrate one embodiment of the invention, 1 indicates the fixed portion of the frame of the machine. This fixed portion of the frame serves to support the usual suction-boxes 2 and has pivoted to it the side rails 3 of the shaking frame. The shaking frame employed may be of any usual construction, but will preferably be that described in my Patent No. 675,072, dated May 28, 1901. The construction of this frame is fully described in said patent, to which reference is made. For the purpose of this application it is sufficient to say that the rails 3 are connected at their forward ends to the upper ends of a U-shaped frame 4, said U-shaped frame being further connected to the rails by means of struts 5. This U-shaped frame serves to support the breast-roll 6, this roll being mounted in suitable bearings 7, carried on said frame.

The shaking frame may be operated in any suitable manner. Preferably, however, as in the patent referred to, it will be supported on springs 8, the connections between the frame and the springs being such as to permit vertical adjustment of the frame. As shown, the frame is vibrated by means of a rotating crank mechanism 9 and a spring-pitman 10, the vibrating action being assisted by means of springs 11, mounted on a rod 12 and bearing against forks 13, carried on the U-shaped frame, the construction being substantially that described in the patent before referred to. At the other end of the stationary frame the couch-roll 14 is mounted, said roll, as shown, being supported in suitable bearings in standards 15. The wire 16 passes around the couch-roll, over the suction-boxes 2, over the table-rolls 17, over the breast-roll, and then is returned over suitable guides 18 to the couch-roll. As is customary in Fourdrinier machines the couch-roll is driven, and the mechanism employed for this purpose may be of any suitable construction. As shown, the machine is provided with a power-shaft 19, said shaft carrying a suitable pulley 20, around which runs

a belt 21, said belt being driven from any suitable source of power. The shaft 19 is provided with a bevel-gear 22, said gear meshing with a bevel-gear 23, which is mounted on a shaft 24, said shaft being suitably connected, as by means of clutch-collars 25, to the couch-roll shaft.

According to the present invention the breast-roll is driven independently, thereby relieving the making-wire of the great strain which is imposed upon it when it drives this roll. The power for driving the breast-roll may be derived from any suitable source of power, and the means by which it is driven may be of any desired construction. Preferably, however, as in the construction shown, the breast-roll will be driven from the power-shaft which drives the couch-roll. The driving connections between the power-shaft and the breast-roll may be widely varied. As shown, a driven or counter shaft 26 is used, which shaft may be located either above, below, or alongside the machine. As shown, it is located below the machine and below the floor upon which the machine is mounted, being supported in suitable hangers 27. This shaft is provided with a belt-pulley 28 and is driven by means of a belt 29 from a belt-pulley 30 on the power-shaft 19.

At the forward end of the machine and also below the floor which supports the machine there is provided a short shaft 31, said shaft being supported in suitable hangers 32. This short shaft 31 is provided with a bevel-gear 33, which meshes with another bevel-gear 34, mounted on the shaft 26. A third shaft 35 is provided in the construction shown, said shaft being supported in suitable bearings on standards 36. This shaft 35 carries a belt-pulley 37, said pulley being driven by means of a belt 38 from a belt-pulley 39 on the shaft 31, before referred to.

It may be here remarked that it is desirable to provide means which will compensate for any inequality between the surface speed of the wire and the breast-roll, this compensating means being of such a character as to insure that the breast-roll will always move at the same surface speed as the wire, for if the two do not move at the same surface speed the wire will rub on the roll and become worn. The compensating means employed may be variously constructed and may be located at any suitable point in the driving connections.

In the form of machine shown, however, the belt 38 is so constructed that it will slip with relation to its driving-pulleys. Should, therefore, the driving mechanism tend to drive the shaft 35, which carries the belt-pulley 37 and which is connected to the breast-roll shaft by means to be hereinafter described, at a speed which will cause the surface of the breast-roll to move at a speed which does not correspond to the speed of the wire, the belt will slip with relation to its pulleys. Any tendency to drive the breast-roll at a surface speed which does not correspond to the speed of the wire will

therefore be immediately corrected by this compensating mechanism.

The connections between the shaft 35 and the breast-roll shaft may be of any suitable character, but should be such as to permit the lengthwise movement of the breast-roll shaft due to the movement of the shaking frame. In the preferred form of the construction a flexible shaft 40 is provided, said shaft being connected to the shaft 35 and to the breast-roll shaft. As the shaking frame is vibrated, therefore, this flexible shaft maintains the connection between the shaft 35 and the breast-roll shaft without in any way interfering with the lengthwise movement of the breast-roll shaft produced by the movement of the shaking frame.

In Fig. 4 there is illustrated a modification of the connections by which the breast-roll shaft is driven and at the same time permitted to have the lengthwise movement due to the action of the shaking frame. In this construction the shaft 35 is connected directly to the breast-roll shaft and is mounted in bearings 41, said bearings being adjustably connected to spring-supports 42, which correspond in all respects to the spring-supports 8, on which the shaking section is mounted. As the shaking section is vibrated, therefore, the spring-supports 42 will also be vibrated, and the shaft 35 will partake of the movements of the breast-roll shaft. The belt 38 will of course permit the sidewise movement of the pulley 37, especially in view of the fact that the amplitude of the vibrations of the pulley are small. When the slipping belt is employed as a compensating device, means should be provided to control the tension of the belt with accuracy. In the construction shown, therefore, there is provided a belt-tightener which consists of a pulley 43, said pulley being mounted in bent levers 44, which are loosely supported on the shaft 35. These bent levers 44 are connected to a perforated block 45, through which passes a vertical shaft 46, said shaft being provided with a hand-wheel 47 and at its lower end engaging a threaded bearing in a block 48, secured at any suitable point—as, for instance, to the floor which supports the machine. This vertical shaft carries a collar 49, which bears upon the perforated block 48. A lock-nut 50 may be employed to hold the shaft in adjusted position.

In Fig. 5 there is illustrated a modification of the form of compensating mechanism employed. In the construction shown in this figure the shaft 35 is provided with a gear-wheel 51, which meshes with a pinion 52 on a counter-shaft 53. This counter-shaft 53 carries a friction-disk 54, which engages with a friction-driver 55, said driver being mounted on a shaft 56, which may be driven in any suitable manner—as, for instance, by means of a belt. With this construction it is apparent that should the driving mechanism tend to move the breast-roll at a speed dif-

ferent from that at which the wire moves a slip will occur between the driver 55 and the friction-disk 54.

While the means described for carrying out the invention are effective for the purpose, it is to be understood that the invention may be embodied in means differing widely in character. The invention is not, therefore, to be confined to the specific construction herein shown and described.

What is claimed is—

1. In a paper-making machine, the combination with the making-wire and the breast-roll, of means for driving the wire, and means independent of the wire for driving the breast-roll, substantially as described.

2. In a paper-making machine, the combination with the making-wire, the couch-roll and the breast-roll, of means for driving the couch-roll and the wire, and means independent of the wire for driving the breast-roll, substantially as described.

3. In a paper-making machine, the combination with the making-wire, the couch-roll and the breast-roll, of a driving mechanism, connections from the driving mechanism to the couch-roll and the wire, and connections from the driving mechanism to the breast-roll, substantially as described.

4. In a paper-making machine, the combination with the making-wire, the couch-roll and the breast-roll, of means for driving the couch-roll and the wire, and means independent of the wire for driving the breast-roll, said means including a compensating connection to insure that the surface speed of the breast-roll correspond to that of the wire, substantially as described.

5. In a paper-making machine, the combination with the making-wire, the couch-roll and the breast-roll, of a driving mechanism, driving connections from said mechanism to the couch-roll and the wire, and driving connections from said mechanism to the breast-roll, said driving connections including a compensating means to insure that the surface speed of the breast-roll correspond to that of the wire, substantially as described.

6. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of means for driving the couch-roll and the wire, and means independent of the wire for driving the breast-roll, said means being constructed to permit the movement of the shaking frame, substantially as described.

7. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of a driving mechanism, driving connections from said mechanism to the couch-roll and wire, and driving connections from said mechanism to the breast-roll, said connections being constructed to permit the movement of the shaking frame, substantially as described.

8. In a paper-making machine, the combi-

nation with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, a driving mechanism, driving connections from said mechanism to the couch-roll and wire, and driving connections from said mechanism to the breast-roll, said connections including compensating means and being constructed to permit the movement of the shaking frame, substantially as described.

9. In a paper-making machine, the combination with the making-wire, the couch-roll and the breast-roll, of a power-shaft, driving connections from said power-shaft to the couch-roll and the making-wire, a counter-shaft, driving connections between the power-shaft and the counter-shaft, and driving connections from said counter-shaft to the breast-roll, said connections being arranged to permit slip in order to insure that the surface speed of the breast-roll correspond to that of the wire, substantially as described.

10. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of means for driving the couch-roll and the wire, a driven shaft, driving connections from said shaft to the breast-roll shaft, said connections being constructed to permit lengthwise movement of the breast-roll shaft produced by the movement of the shaking frame, substantially as described.

11. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of a power-shaft, driving connections from said shaft to the couch-roll and wire, a counter-shaft, driving connections from the power-shaft to the counter-shaft, a pulley, driving connections including a belt from the counter-shaft to the pulley, and driving connections between the pulley and the breast-roll shaft, said connections being arranged to permit the lengthwise movement of the breast-roll shaft due to the movement of the shaking frame, substantially as described.

12. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of means for driving the couch-roll and wire, and means independent of the wire for driving the breast-roll, said means including a flexible shaft, substantially as described.

13. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of means for driving the couch-roll and the wire, a driven shaft, and driving connections from said shaft to the breast-roll, said driving connections including a slipping belt, substantially as described.

14. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame, and the breast-roll mounted thereon, of means for driving the couch-roll and wire, a driven shaft, and driving con-

nections from said shaft to the breast-roll, said driving connections including a slipping belt and a flexible shaft, substantially as described.

5 15. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of a power-shaft, driving connections from the power-shaft to the couch-roll
10 and wire, a shaft driven from the power-shaft, and driving connections from said driven shaft to the breast-roll, said connections including a slipping belt and a flexible shaft, substantially as described.

15 16. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of a power-shaft, driving connections between the power-shaft and the couch-
20 roll and wire, a counter-shaft, means including a belt for driving said shaft from the power-shaft, a third shaft, driving connections including a slipping belt between the third shaft and the counter-shaft, and a flexible
25 shaft connecting said third shaft and the breast-roll shaft, substantially as described.

17. In a paper-making machine, the combination with the making-wire, the couch-roll,

the shaking frame and the breast-roll mounted thereon, of a power-shaft, driving connections from the power-shaft to the couch-roll and the making-wire, a counter-shaft driven from the power-shaft, driving connections between the counter-shaft and the breast-roll, said driving connections including a slipping
35 belt and means for adjusting the tension of the belt, substantially as described.

18. In a paper-making machine, the combination with the making-wire, the couch-roll, the shaking frame and the breast-roll mounted thereon, of a power-shaft, driving connections from the power-shaft to the couch-roll and making-wire, a counter-shaft driven from the power-shaft, and driving connections including a slipping belt and a flexible
45 shaft between the counter-shaft and the breast-roll, and a belt-tightener for adjusting the tension of the belt, substantially as described.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

THOMAS H. SAVERY.

Witnesses:

A. BALDERSTON,
R. E. CHAMBERS.