

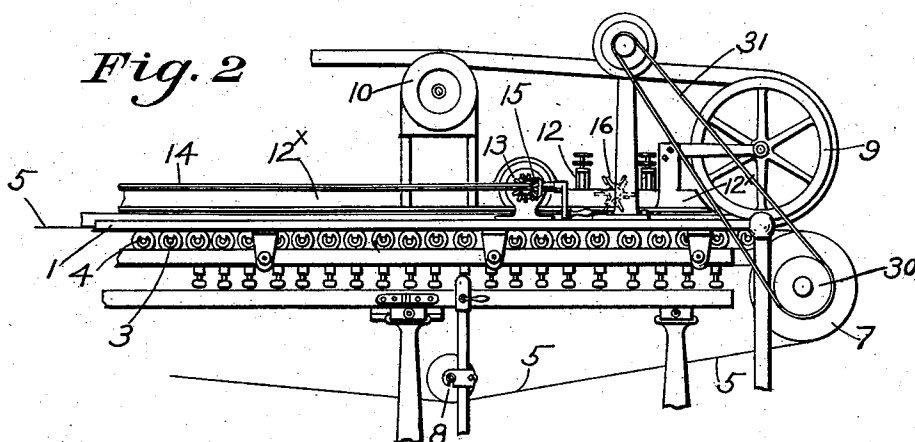
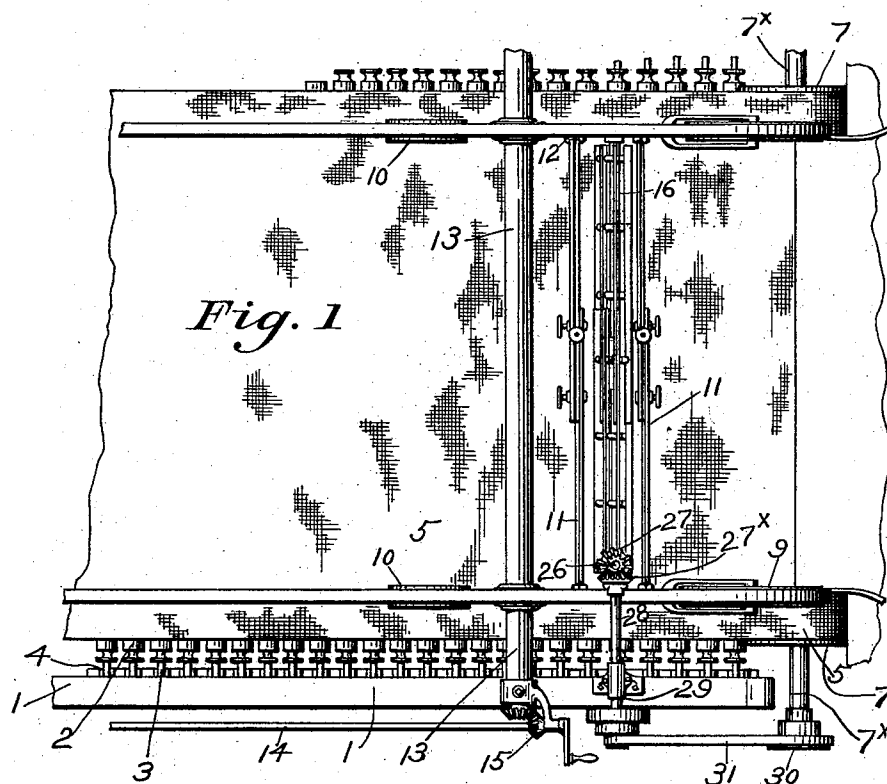
(No Model.)

4 Sheets—Sheet 1.

F. P. NICELY.  
PAPER MACHINE.

No. 570,949.

Patented Nov. 10, 1896.



Witnesses:

T. J. Klossowski  
C. H. Krueger

Inventor:—

Frank P. Nicely  
By his Atty  
C. B. Reichelt

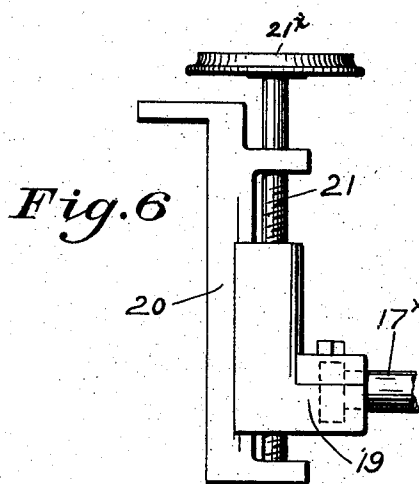
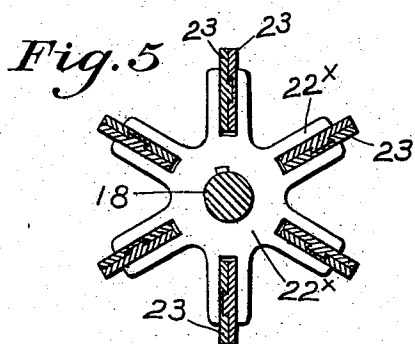
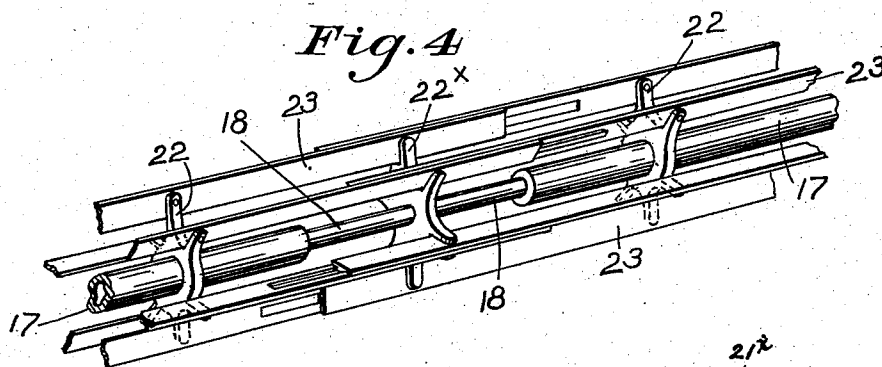
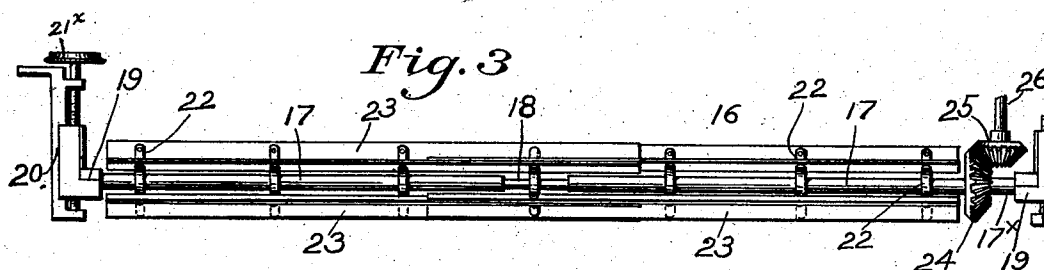
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4 Sheets—Sheet 2.

F. P. NICELY.  
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Patented Nov. 10, 1896.



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(No Model.)

4 Sheets—Sheet 3.

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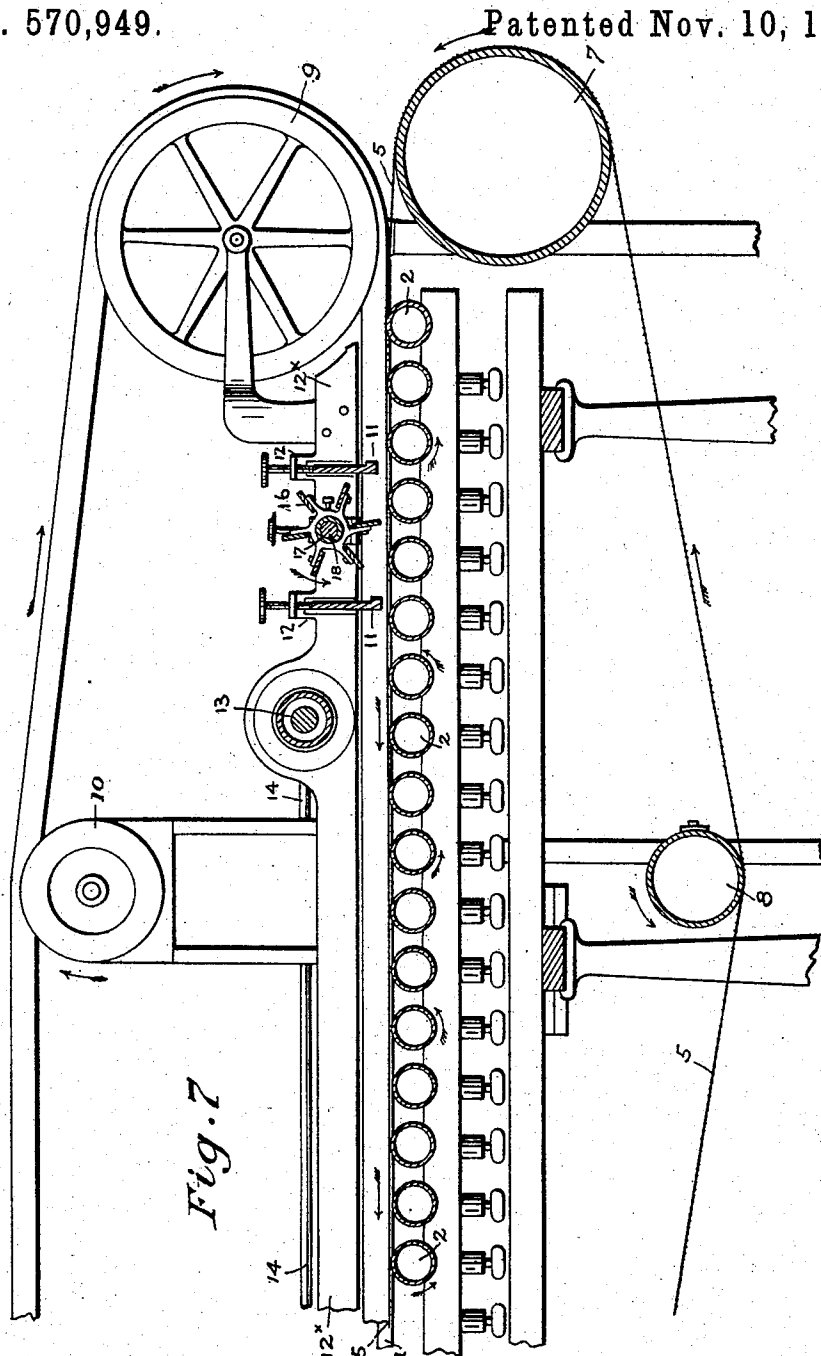


Fig. 7

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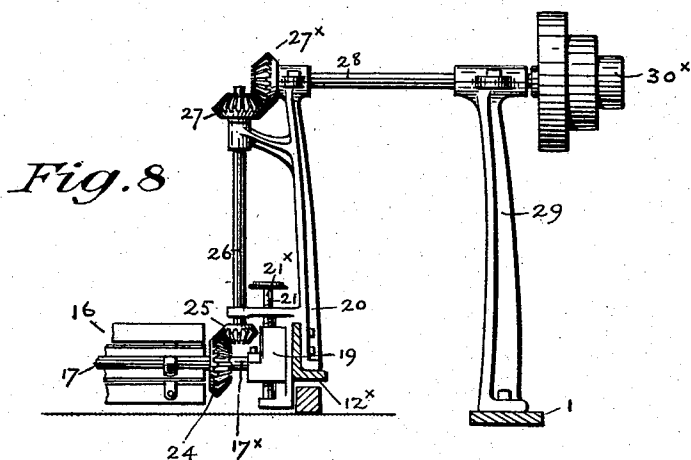
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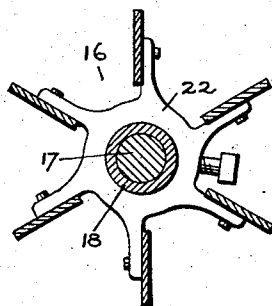
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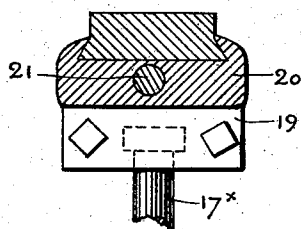
Patented Nov. 10, 1896.



*Fig. 9*



*Fig. 10*



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# UNITED STATES PATENT OFFICE.

FRANK P. NICELY, OF SOUTH BEND, INDIANA.

## PAPER-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,949, dated November 10, 1896.

Application filed January 20, 1896. Serial No. 576,064. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK P. NICELY, a citizen of the United States, residing at South Bend, in the county of St. Joseph, Indiana, have invented certain new and useful Improvements in Paper-Machines, of which the following is a specification.

This invention relates to improvements in paper-making machines, particularly of the Fourdrinier type, for thoroughly mixing and intermingling the fiber of the pulp, thereby producing a paper of stronger and more uniform texture than is otherwise obtainable.

The object of my invention is to provide a simple means for thoroughly intermingling, mixing, and crossing the fiber of the pulp, and also for mixing whatever coloring-matter, chemical, or other substance which might be required with the pulp while on the web as it passes through the gates or slices; and the improvement consists, primarily, of a rotating reel consisting of blades secured to arms upon a shaft supported by brackets over the wire-cloth, preferably between the gates or slices, and caused to revolve in contact with the pulp upon the wire-cloth to thoroughly agitate and mix the pulp just as it settles thereon.

My invention further consists in certain details of construction to provide for the proper adjustment and operation of the paddles of said reel, as will hereinafter appear.

In the accompanying drawings, which illustrate my invention, Figure 1 is a plan of a portion of the gate or slice end of a paper-making machine of the Fourdrinier pattern embodying my invention; Fig. 2, a partial side elevation of the parts shown in Fig. 1; Fig. 3, a front elevation of a stirring-reel and its immediate connections for adjusting, supporting, and operating the same; Fig. 4, a perspective view, enlarged, of a part of the adjustable stirring-reel; Fig. 5, a still larger sectional detail at the middle of said reel; Fig. 6, a front elevation of the reel-supporting brackets and device for raising and lowering the reel in said brackets. Fig. 7 is an enlarged longitudinal central sectional elevation of the end of the machine at the sluices. Fig. 8 shows the driving and adjusting gear for operating the reel. Fig. 9 is an enlarged sectional elevation of the reel, similar to Fig.

5, showing the hub-plate for supporting the blades of the reel; and Fig. 10, an enlarged sectional detail of the journal-bearing, guide-bracket, and adjusting-screw of the reel-shaft.

The side rails 1 of the table-frame support the usual small rollers consisting of brass or copper tubes 2, having steel journals 3, supported in separate bearings 4 upon or secured to the said frame-rail 1, upon which rollers is supported a wire-cloth 5, or cloth extending from end to end of the said table-frame 1, and comprising an endless belt which passes around a couch-roller (not shown in the drawings) at the delivery end, around a breast-roller 7 at the slice or gate receiving end, and around smaller rollers 8, adjustably supported upon the frame-standards beneath the table to provide for the adjustment of the endless wire-cloth and also insure its true and undisturbed return movement from the couch-roller to the breast-roller, all in a well-known manner. The deckles are supported on end pulleys 9 and intermediate small rollers 10, and are adjusted laterally across the table over the surface of the wire-cloth to establish the width of the paper, and the gates or slices 11 are supported by and move with the standards 12 and side plates 12<sup>x</sup> of said deckle pulleys and rollers, and are also adjustable in the usual manner therewith, by means of a screw-shaft 13, crank-shaft 14, and miter-gears 15, to regulate the width of the web of pulp to be carried by the wire-cloth.

The reel may be constructed in any suitable manner, preferably as follows: The reel 16 has a three-part shaft 17 18, the end journals 17<sup>x</sup> of which are carried in bearing-blocks 19, in vertically-adjustable brackets 20 at the ends thereof by means of a screw-shaft 21 and handle 21<sup>x</sup>, supported vertically upon each of said brackets, and the brackets are secured to and adjustable laterally across the table with the side plates 12<sup>x</sup> of the deckle-supporting roller-standards. The reel, deckles, and sluices thus supported and connected are all conjointly adjusted by turning the crank-shaft 14 until they conform to the width of paper to be made.

The reel-shaft consists of a middle section 18, which telescopes in end sections 17, and

each of said sections has a suitable number of hub-plates 22, carrying radial slotted arms to receive and support blades 23, made in pairs and dovetailed together to slide one upon the other at their inner overlapping ends, as clearly shown in Figs. 4 and 5 of the drawings. The blades are fixedly secured by bolts or rivets to the hub-plates 22 of the end sections 17 of the reel-shaft and slide freely in the slotted arms of the hub-plate 22<sup>x</sup> of middle section 18 of said shaft, thus providing simple and effective means whereby the reel may be adjusted in length to conform to the adjustment of the sluices and deckles.

The reel is driven in any suitable or preferred manner, as, for example, by means of spur-wheels, chain and sprocket, or, as in this case, miter-wheels 24 25, secured, respectively, upon the end of the reel-shaft 17 and the lower end of a vertical shaft 26, supported on the brackets 20, the upper end of said vertical shaft being geared to a horizontal shaft 28 by miter-wheels 27 27<sup>x</sup>, the said shaft being adapted to move endwise in the miter-wheel 27<sup>x</sup> and on its bearing upon the upper end of bracket 20, and also supported in a bracket 29, secured to the side rails 1 of the frame. A cone-pulley on the outer end of the shaft 28 and a corresponding reversely-disposed cone-pulley 30 on the corresponding end of the breast-roller shaft 7<sup>x</sup> are connected by a belt 31, by which means the reel may be driven at varying speeds. The belt 31 may be twisted in a well-known manner when it is required to reverse the direction of rotation of the reel.

The operation of my improved attachment will be readily understood in connection with a machine of the Fourdrinier type above described.

The pulp from the beating-cylinder passes through the strainers, stirrers, and separating-plates in the usual manner on the endless wire-cloth, (which latter with my improved attachment need not receive a shaking motion,) the thickness of the pulp upon the screen being gaged by the slices between which my improved reel is suspended and revolves, as described, either in the same or in an opposite direction to that of the movement of the web of pulp. The reel is so adjusted vertically that its blades will be brought in sufficient contact with the pulp to thoroughly agitate the latter and cause the fibers of the pulp to be thoroughly commingled, intertwined, and more evenly distributed, their natural tendency being to lay in parallel lines. The agitation and intertwining of the fibers due to the shaking movement of the machine in the Fourdrinier type, and to which is due the superior quality of paper produced by machines of this class, may be secured in an equally effective manner by the simple reel attachment herein described without shaking the wire-cloth and the entire breast-roll end of the machine, as heretofore required in such machines, thereby greatly re-

ducing the original cost, the cost of maintenance, and the power required to operate such machines.

If desired, my improvement can be used with said shake.

It is apparent that several reels may be employed, if employed advantageously, for mixing the paper fiber or for mixing other materials with the paper-pulp.

I am aware that efforts have been heretofore made to agitate the pulp at the head of the machine adjacent to the slices, one of said devices employing a vibratory rake and another a plain or fluted roller. I have found that, first, a reel provided with blades may have the blades so set and attached that they may be made to dip truly at the surface of the paper-pulp and to such a nicely-regulated distance across the full width of the machine that the best possible results are obtainable and that neither the roller nor the rake will dip into the pulp and stir the mass to mingle and interlace the fibers in a manner like that done by the blades, nor are the fluted portions separately adapted for adjustment, as are the blades. The vertical adjustment of the reel permits the paper-maker to use his option as to the dip of the reel into the pulp, according to the thickness of the sheet of paper made, and by arranging the reel between the slices the pulp may be admitted and held to a sufficient height beneath the reel to admit of said vertical reel adjustment to suit the length of the fiber of the pulp without regard to the thickness of the paper, which is regulated by the height of the discharge-slice, and the entire operation is by means herein described easily determined and regulated by the intelligence of the operator.

I claim as my invention and desire to secure by Letters Patent—

1. In a paper-making machine, the combination with the frame of the machine, the endless wire-cloth, the deckles, the adjustable slice and a longitudinally-adjustable reel, comprising a shaft, hub-plates having radial arms and blades supported and secured to said arms, all adapted to operate and be adjusted conjointly for the purpose specified.

2. In a paper-machine of the Fourdrinier type, the combination with the frame of the machine, the endless wire-cloth, the slices, and a reel longitudinally and vertically adjustably supported between said slices to agitate the pulp upon the wire-cloth and between the slices, substantially as described.

3. The reel-mixer for paper-making machines comprising the three-part shaft, the end hubs carrying radial arms, the middle hub carrying slotted arms, and blades made of two sections dovetailed and overlapping each other at their inner ends, secured to the outer hub-arms and adapted to slide in the slotted arms of the intermediate hub or hubs, substantially as described.

4. In a paper-making machine, the combination with the frame, of the endless wire-

cloth supported upon a breast-roller thereon,  
the deckle and deckle-frame, the reel adjust-  
ably supported upon brackets on the deckle-  
frame, the vertical and horizontal shafts  
5 geared together and to the reel-shaft by mi-  
ter-wheels, a cone-pulley on the horizontal  
shaft, a breast-roller and shaft, a similar pul-  
ley on the breast-roller shaft and a connect-  
ing-belt, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in the presence of two subscribing witnesses.

FRANK P. NICELY.

Witnesses:

B. KRUEPER,

T. J. KLOSSOWSKI.