(No Model.)

# J. SNOVER.

## PAPER CALENDERING MACHINE.

No. 440,377. Patented Nov. 11, 1890.

Fig. 1.

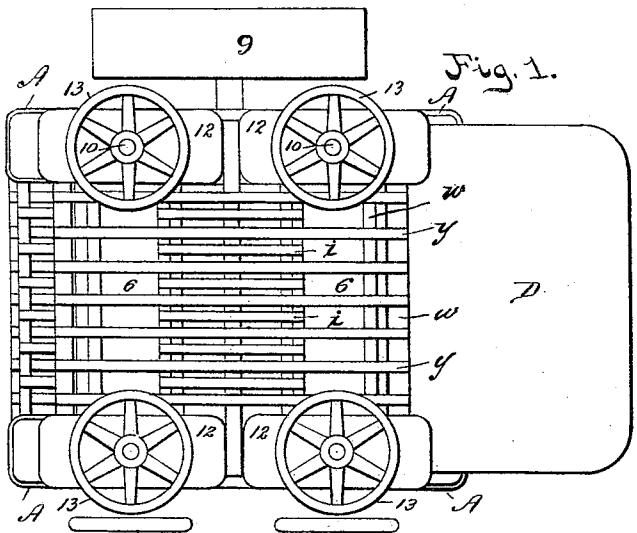



Fig. 2.

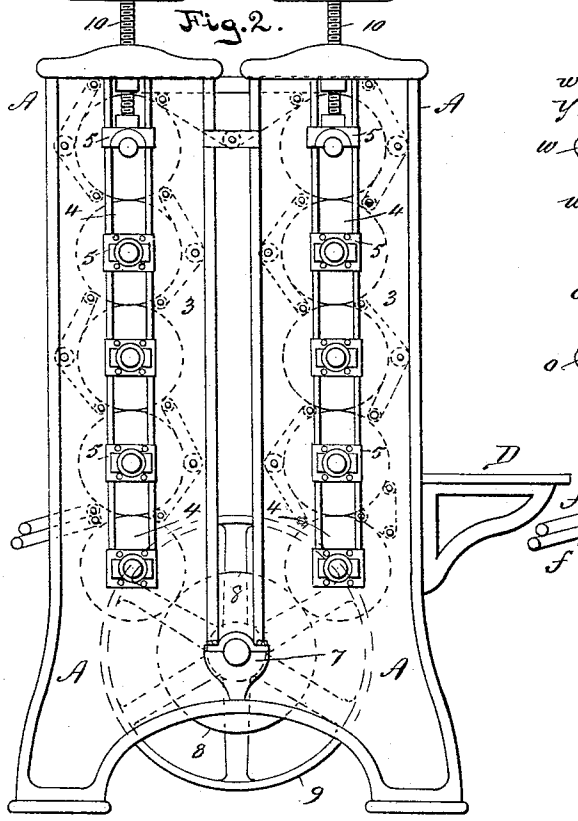
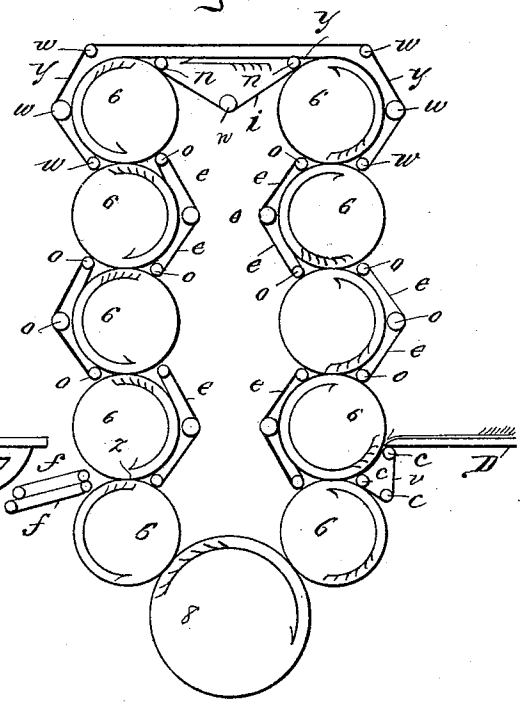



Fig. 3.




Witnesses.

Wm. S. Bellows

G. H. Chamberlain.

Inventor.

James Snover

by Chapin & Co

Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

JAMES SNOVER, OF HOLYOKE, MASSACHUSETTS.

## PAPER-CALENDERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 440,377, dated November 11, 1890.

Application filed May 9, 1890. Serial No. 351,138. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES SNOVER, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Paper-Calendering Machines, of which the following is a specification.

This invention relates to paper-calendering machines, the object being to provide an improved machine of this class in the use of which paper is double-calendered in once passing through the machine, and the said double-calendering is by this improved machine effected at a great saving of labor as compared with calendering-machines heretofore made; and the invention consists in the peculiar construction and arrangement of the parts of the machine, all as hereinafter fully described, and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a top plan view, and Fig. 2 an end elevation of a paper-calendering machine constructed according to my invention. Fig. 3 is an end view of the driving and calendering rolls of the machine and of the tape-guiding rolls thereof, the sheet-feeding and guiding tapes being shown in operative positions on said latter named rolls. The journals on the ends of the rolls in said Fig. 3 are not shown.

In the drawings, A is the frame of the calender, of the usual heavy iron construction, but each end portion of said frame is constructed with two suitably-united vertically-slotted uprights 3 3, instead of one, as in the ordinary single-stack calenders, in order to provide for the novel arrangement of the calendering-rolls below described. Each of said end frame portions 3 is made, preferably, of a single casting, as shown, and has the two vertical slots 4 4 therein, which are fitted to receive the journal-boxes 5, in which the journals of the calendering-rolls 6 are supported and rotate, said boxes being free to move more or less vertically in said slots, in the ordinary manner. A bearing 7 is provided in each frame part A centrally between said slots 4 for the journals of a driving-roll 8, which is located at the lower end of the calender-frame, as shown, a driving-pulley 9 being fixed on one of the journals of said driving-roll, to which a belt may be applied in the usual way for driving the machine.

The above-described construction of the frame A provides for the reception therein of two "stacks" or series of calendering-rolls 6, as shown, instead of one as usually made, and the lower roll of each of said series of rolls has a surface-bearing or contact on the said driving-roll 8, above and to one side of the axis thereof. The requisite calendering-pressure upon each of said series of rolls is effected by means of the screw-shafts 10, which screw through the cap-plate 12 and against the journal-boxes of the top roll of each of said series, said screw-shafts being operated by the hand-wheels 13. The normal pressure which is required to be maintained on each stack or series of calendering-rolls in order to effect the proper calendering of sheets of paper which may pass between said rolls is sufficient to produce the requisite degree of frictional contact between the lower rolls of each of said series and said driving-roll 8 for driving both of said series of rolls by the said roll 8. The above-described two series of calendering-rolls act, as below described, alternately upon the sheets of paper which pass through the machine.

The usual tape-holding and guiding rolls *o o o* are hung in the usual manner in the frame of the calender in the positions indicated in Fig. 2 and shown in Fig. 3 relative to the calendering-rolls 6, and said rolls *o* support the usual series of sheet-carrying tapes *e* in contact with the sides of the calendering-rolls, whereby sheets of paper fed to the rolls are guided therebetween in a well-known manner.

A table D is attached to the frame of the calender and projects from one side thereof opposite the lower two rolls of the series on that side of the calender, said table serving the purpose of holding a pile of sheets of paper preparatory to feeding the same between the rolls of the calender. Beneath the inner edge of said table are hung three rolls *c c c*, as aforesaid, in the frame of the machine, over which are carried a series of paper-feeding tapes *v*, which tapes have such contact with the calendering-rolls as imparts to them the proper motion to cause them to carry a

sheet of paper that is pushed from the table between them and one of said rolls between said two lower rolls, and said sheet is thence caught between said rolls and carried therebetween in the usual way, upward instead of downward, between the rolls of the first series, for as paper-calenders are ordinarily made the sheets of paper are fed thereto at the top of the stack or series of rolls, and from thence are conveyed between the rolls downwardly, and are delivered at the lower end of the same series into which they are fed.

The improved construction of paper-calendering machines herein shown and described, in which are employed two series or stacks of calendering-rolls having co-operative relation with each other, renders it necessary that means should be provided for transferring the sheets of paper one after another in regular succession from one of said series of rolls through which they shall have been passed to the second series thereof, whereby the second calendering operation is performed on said sheets, and to that end a series of tape-guiding rolls *w* is supported in the frame of the machine at the upper end thereof, and outside of each series of calendering-rolls and on said tape-guiding rolls *w* are placed a series of sheet-carrying tapes *y*, which are adapted by their engagement with the upper rolls 6 of each series of the calendering-rolls, as shown, to be given a paper-carrying motion from the outside of the upper roll of one series across between the two roll-stacks and over and against the outer side of the upper roll of the opposite series, as shown in Fig. 3, said tapes *y* serving to so present each sheet of paper to the action of the two upper rolls, or what may be termed the "receiving-rolls," (since the latter receive the sheets of paper from the series of rolls to which they are primarily fed,) between which the sheets are caught and carried downward between the several pairs of rolls of the receiving series, guided, as aforesaid, by the carrying-tapes *e e*, to the junction *z* of the lower two rolls of said last-named series, the sheets being conveyed between said two rolls outwardly and delivered, preferably, between the sheet-carrying tapes *f f*, (shown in Fig. 3,) and by the latter conveyed to any suitable table thereunder, although, if preferred, the sheets may be delivered directly upon a table. The said carrying-tapes *f f* are supported upon ordinary rolls hung in any proper and well-known manner to the frame of the machine and rotated by any suitable connection therewith, this manner of conveying sheets of paper from calendering-machines being a common and well-known one to persons familiar with paper-feeding and paper-calendering machines.

To form a suitable support to operate in conjunction with the above-referred-to carrying-tapes *y* between the upper rolls of the two series of calendering-rolls, and over which the sheets pass as they are carried from one series to the other, a series of carrying-tapes *i* is hung on suitable rolls *n* beneath the said carrying-tapes *y*, and between the upper rolls of the two series, as shown in Fig. 3, and the sheets of paper upon leaving the series of rolls to which they are fed pass between the carrying-tapes *i* and *y*, and are conveyed to the said receiving-rolls, as above set forth.

The general operation of the within-described paper-calendering machine is as follows: In double-calendering paper by passing the same once only through the machine instead of twice passing said paper through a paper-calender, as is required in machines as heretofore constructed. The paper to be calendered is placed upon the table D, and from thence is fed, sheet by sheet, to the lower end of the series of calendering-rolls adjoining said table, in the direction indicated by the arrow over said table in Fig. 3, and said sheets are thence carried by the rolls 6 upward and around outside of and over the top roll thereof to the outside of the upper roll of the second or receiving series of calender-rolls, and the sheet is then engaged by this last-named series of rolls and carried downward therebetween and delivered between the two lower rolls thereof, as described. In the above-described operation of double-calendering paper by means of the said improved machine only two operatives are required—viz., one to feed the sheets from the table D and another one to receive them from the opposite side of the machine—while in the use of the ordinary paper-calendering machines, consisting of a single stack or series of rolls, two operatives are required for running the machine—one a feeder from a table at the top of the stack and the other a receiver upon a table at the lower end of the stack—and hence it is seen that only a single calendering is effected in using calendering-machines heretofore made by passing the paper once through the machine by the aid of two operatives, while by the use of the within-described improved machine the paper is double-calendered with the same expenditure for labor.

What I claim as my invention is—

1. A paper-calendering machine consisting of two separate series of calendering-rolls, each series having alternate action upon paper which is passed through the machine, combined with sheet-transferring devices, substantially as described, between said two series of rolls, substantially as set forth.

2. A paper-calendering machine consisting of two separate series of calendering-rolls, combined with a driving-roll engaging with both of said series and sheet-transferring devices, substantially as described, between said two series of rolls, substantially as set forth.

JAMES SNOVER.

Witnesses:
WM. S. BELLOWS,
H. A. CHAPIN.