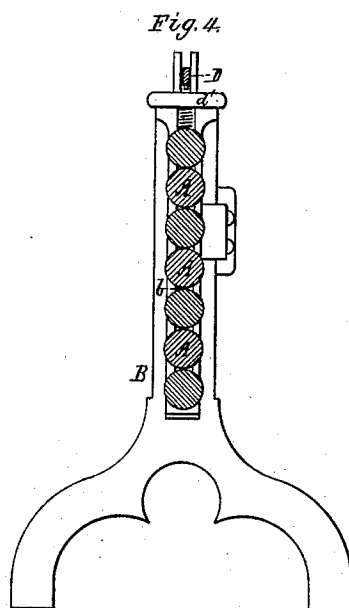
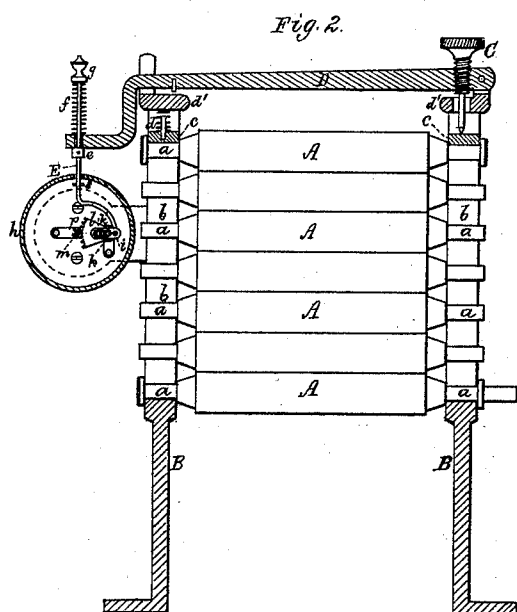
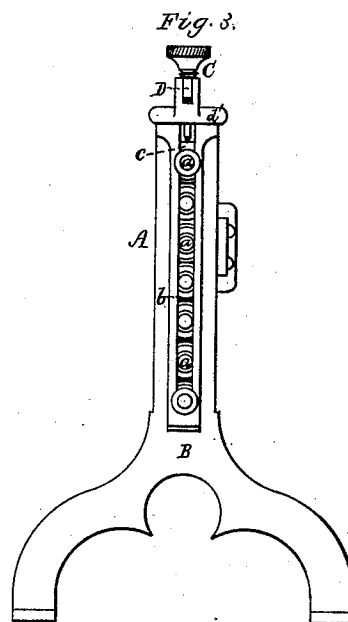
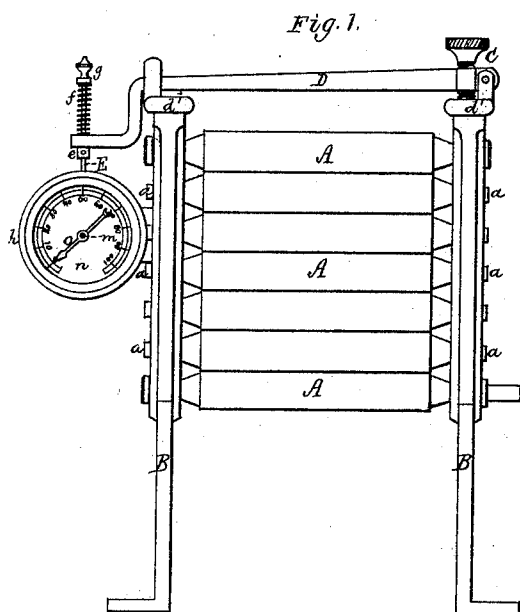


L. HOLLINGSWORTH.

GAGE FOR PAPER.

No. 175,983.

Patented April 11, 1876.



Witnesses.
S. N. Ripen.
L. W. Miller.

Lyman Hollingsworth.
by his attorney.
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UNITED STATES PATENT OFFICE.

LYMAN HOLLINGSWORTH, OF BOSTON, ASSIGNOR TO HIMSELF AND MARK H. CORNELL, OF BRIDGEWATER, MASSACHUSETTS.

IMPROVEMENT IN GAGES FOR PAPER.

Specification forming part of Letters Patent No. **175,983**, dated April 11, 1876; application filed February 21, 1876.

To all whom it may concern:

Be it known that I, LYMAN HOLLINGSWORTH, of Boston, of the county of Suffolk and State of Massachusetts, have invented a new and useful Machine for Gaging the Thickness of Paper proceeding from a Paper-Making Machine; and do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a front elevation, Fig. 2 a vertical and longitudinal section, Fig. 3 an end elevation, and Fig. 4 a transverse section, of the said machine.

In such drawings, A A A denote a series of rollers, arranged one over and upon another, and having their journals *a a* disposed in vertical slots, *b b*, in two standards, B B, all being as represented.

On the journals of the upper roller are two saddles, *c c*, upon one of which a helical spring, *d*, bears, the upper end of such spring resting against the cap *d'* of the standard, in whose slot the said journal is sustained.

There bears on the other saddle a projection from a lever, D, which, in this case, is the point of a screw, C, which is screwed into and through the lever D. The said lever extends over the rollers and across both caps of the standards, and is pivoted to one of the said caps; it extends between vertical guides projecting upward from the other of said caps, and is connected with a lifter-rod, E. The said rod goes through the lever and extends both above and below it. Directly below the lever there is, upon the rod, a collar, *e*, for the rod to bear against, and there is on and circumscribing that part of the rod which projects above the lever a helical spring, *f*, which, at its lower end, rests on the lever, and at its upper end bears against a button or shoulder, *g*, fixed on the rod. The purpose of this spring is hereinafter explained.

The said lifter-rod passes into a circular box or case, *h*, and at its lower end is pivoted to an adjustable arm, *i*, extended from a rocker-shaft, *k*, from which there projects a toothed sector, *l*. The arm *i*, formed as shown, is slotted to receive the said shaft and a clamp-

screw, *k'*. The latter goes through the slot of the arm and screws into the sector, all being as represented.

At the axis of the case is a shaft, *m*, provided with a toothed pinion, *p*, to engage with the toothed sector. The shaft projects through the center of a plate, *n*, having upon it a circular scale of divisions, with which an index-pointer or hand, *o*, fixed on the shaft operates.

The purpose of the screw C is to enable the index-pointer to be adjusted to the zero, or any particular division of the scale of the plate *n*, as occasion may require.

Furthermore, within the case *h* there extends through the lifter-rod E a pin, *s*, which, with the upper part of the case, serves to limit the rise or elevation of the said rod. Should the paper at any time become accidentally folded between or improperly wound about any one or more of the rollers, so as to raise them higher than necessary to bring the pin *s* up to the upper part of the case, the spring *f* will allow of the upward movement of the lever D, and prevent such from breaking the lifter-rod or its stop-pin, or doing other damage to the indicating mechanism.

The journals of the lower roller A rest in bearings at the bottoms of the slots of the standards, and there is upon one of them a crank, or some other proper means of effecting rotary motion of such roller.

In the use of the above-described machine, a sheet of paper, in passing from a paper-making machine, is led successively in opposite directions between the rollers. For instance, it is first passed between the uppermost roller and the next or second one below; thence downward partly around the second roller, and between it and the next or third one, next downward and in an opposite direction between said third roller and the fourth, and so on throughout the series.

The rollers, by their pressure upon the paper, smooth its surfaces, and by their vertical movements they serve to aid in gaging or determining its thickness.

Should the paper, in passing between the rollers, be either thicker or thinner than the

standard thickness to be obtained, the lever D will be moved so as to cause the index-pointer to be revolved more or less on the divided limb, such movement serving to indicate to an attendant that he must regulate or vary the supply of pulp to the machine. Should the paper be too thick, or weigh more per square yard than is desirable, the lever D will be more or less moved upward in consequence of the rollers being pressed upward by the sheet. A contrary effect will take place should the sheet run short in thickness or weight per square yard.

When the paper is being made of the required thickness, the position of the index-pointer on the scale is to be noted, or such pointer, by means of the screw C, is to be set to the zero or some other part or division of the scale. This having been done, variations in the thickness of the paper will be indicated by the movements of the index-pointer in one direction or the opposite relatively to such assumed point on the scale.

Heretofore it has been very difficult for papermakers to produce paper of uniform thickness and weight per square yard. The above-described paper-gaging machine admits of such results being readily accomplished with all practical accuracy.

I do not claim the broad ground of the com-

bination of two rollers and a mechanism to indicate on a scale or dial the degree of movement of one away from the other. My invention embraces the lever D, combined with the series of rollers and the lifter E of the registering apparatus; therefore,

I claim as my invention—

1. A paper-gaging machine, substantially as described, composed of the series of rollers A and the indicator or lever D, lifter E, arm *i*, shaft *k*, toothed sector *l*, pinion *p*, shaft *m*, index-pointer *o*, and divided limb or plate *n*, all arranged, supported, and applied essentially as set forth.

2. The spring *f* and the stop *s*, in combination with the lever D and the lifter E, case *h*, arm *i*, shaft *k*, toothed sector *l*, pinion *p*, shaft *m*, index-pointer *o*, and divided limb or plate *n*, and the rollers A, all being arranged and applied as shown and described.

3. The combination of the screw C with the lever D and the lifter E, case *h*, arm *i*, shaft *k*, toothed sector *l*, pinion *p*, shaft *m*, index-pointer *o*, and divided limb or plate *n*, and the set of rollers A, all being essentially as set forth.

LYMAN HOLLINGSWORTH.

Witnesses:

R. H. EDDY,
J. R. SNOW.