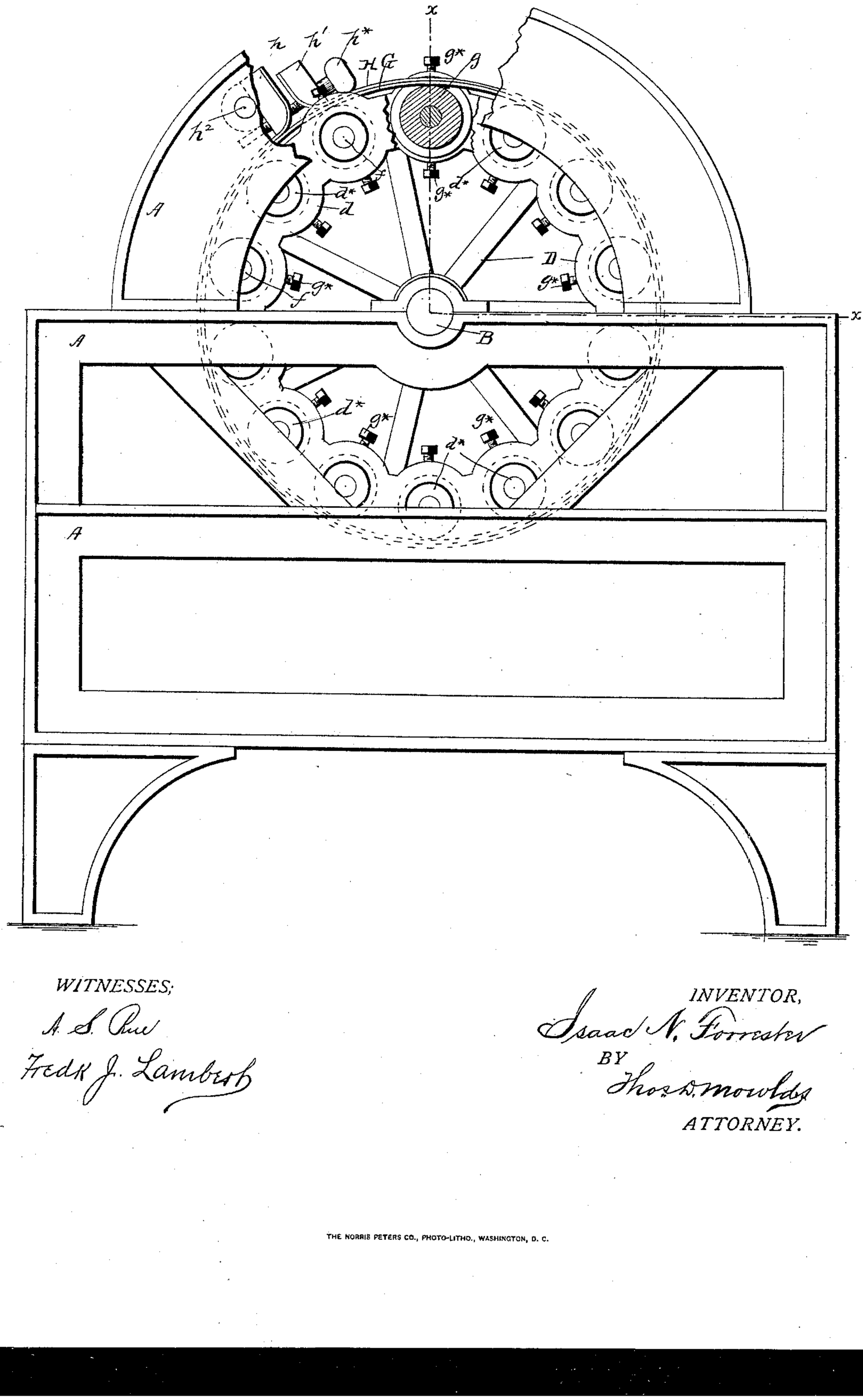
(No Model.) 2 Sheets—Sheet 1.

I. N. FORRESTER.

CLOTH NAPPING MACHINE.

No. 458,725. Patented Sept. 1, 1891.

Fig. 1.



WITNESSES;

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

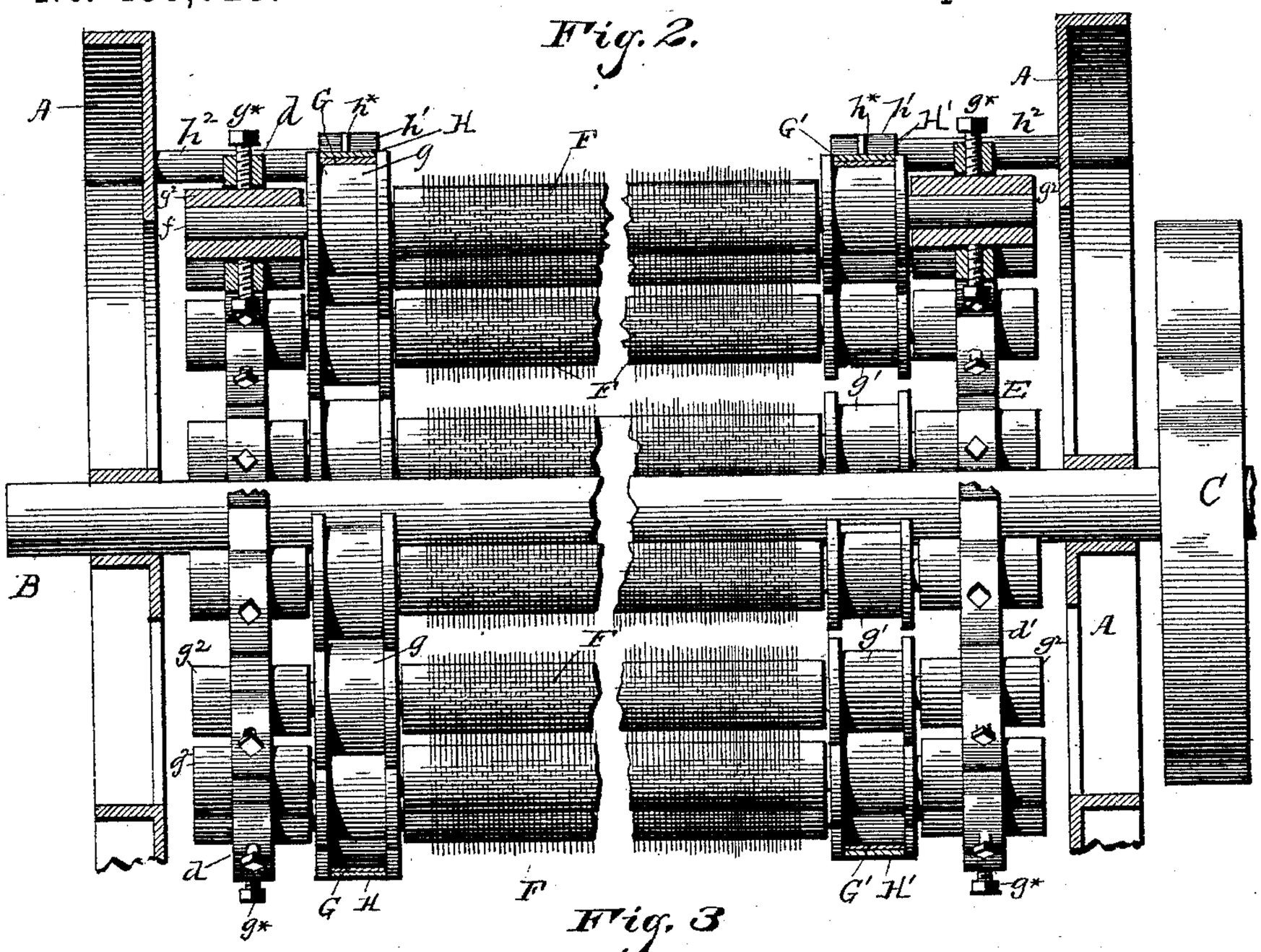
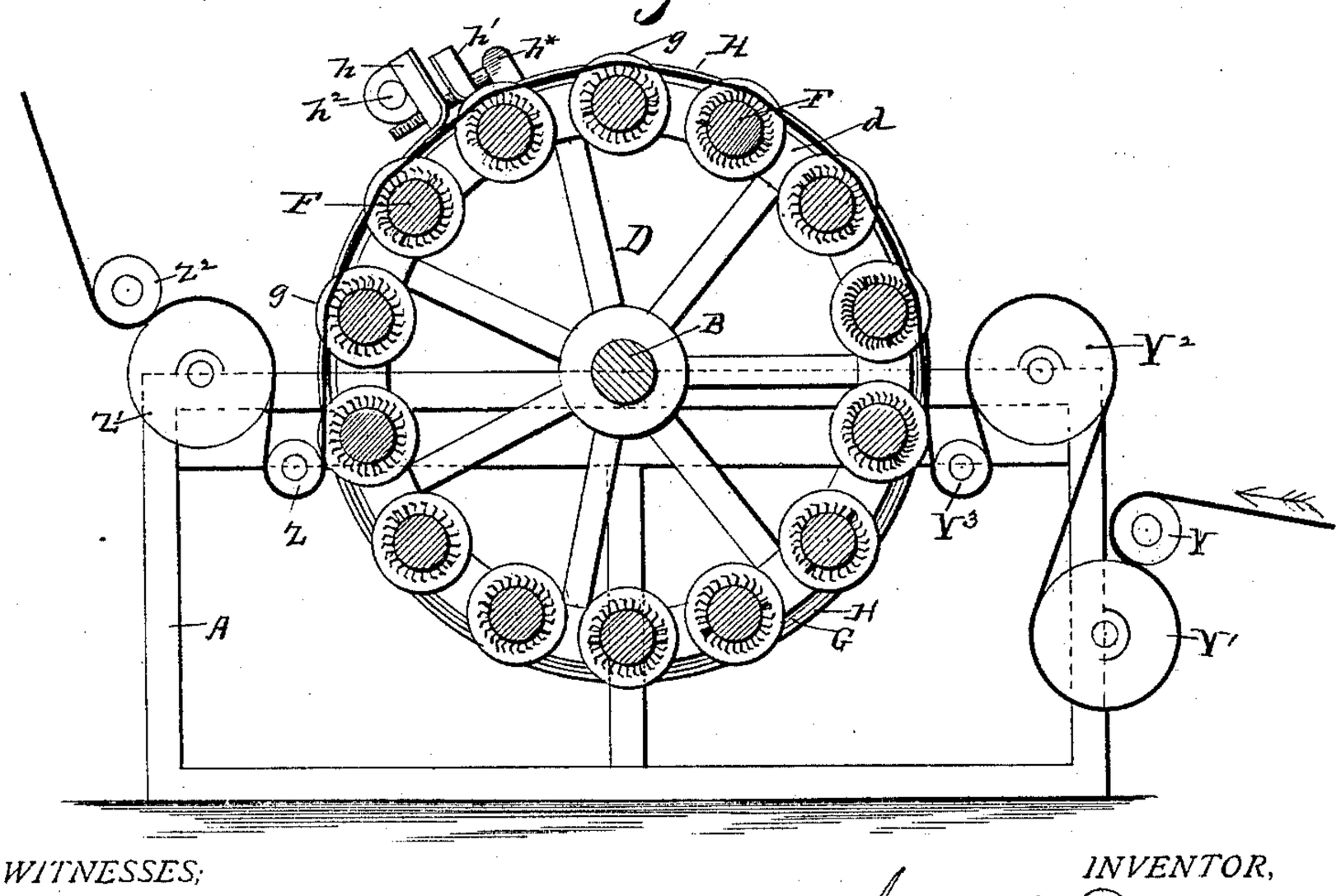


Fig. 3



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UNITED STATES PATENT OFFICE.

ISAAC N. FORRESTER, OF CAMDEN, NEW JERSEY.

CLOTH-NAPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 458,725, dated September 1, 1891.

Application filed December 11, 1890. Serial No. 374,370. (No model.)

To all whom it may concern:

Be it known that I, ISAAC N. FORRESTER, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Cloth-Napping Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in napping machines or gigs, and has for its object the production of a machine of the kind in which provision is made for regulating the speed of rotation of the napping-rolls and their resultant effect upon the cloth under treatment.

The invention consists in a friction device applied to such rolls, whereby their rotation is accelerated or retarded, as desired, when the cloth passes over them.

In carrying out my said invention I provide a series of card-clothed rolls mounted in rotating spiders and themselves independently revoluble therein, and upon the opposite ends of each of said rolls I mount pulleys of different diameters. Over each series of pulleys is set a rotary friction-band of metal or any other suitable material, and over this rotary band is set a stationary friction-band, which is adjustable in size, so that it can be taken up and caused to bind upon the rotary band. By this means the rolls are caused to rotate from either the larger or smaller pulleys, as desired, and the speed of their revolutions accelerated or retarded, as may be desired. In napping, the cloth is drawn over the rolls in the same direction in which the spider is revolved, and the rolls, with their card-clothing impinging upon the under surface of the cloth, are turned backward and produce the nap. When it is found that they are revolving too rapidly to raise the desired nap, the adjustable friction-band upon the larger pulleys is tightened and the rolls caused to move more slowly and take a deeper hold upon the cloth. On the other hand, when it is found that they are already raising too heavy a nap the adjustable stationary friction-belt upon the smaller pulleys is tightened and the movement of the rolls accelerated, so that a lighter nap will be raised.

The following detail description more fully indicates the nature, purpose, and construction of my said invention.

The accompanying drawings illustrate the said invention.

Figure 1 is an end elevation of the machine, having parts of the frame broken away. Fig. 2 is a partial elevation and partial section taken on line *x x*, Fig. 1, the friction-bands being cut off at the bottom. Fig. 3 is a transverse vertical section.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A A is the frame of the machine. B is a main shaft mounted therein, and carrying the driving-pulley C and roll-spiders D E. The spiders each consist of a hub fast upon the main shaft, radial arms extending out from said hubs and attached to rims *d d'*, in which the boxes *d* d** of the work or napping rolls F are mounted.

Y Y', &c., are a series of rolls at the entrance side of the device, and Z Z', &c., are a series of rolls at the discharge side of the device, by means of which the cloth is held at the proper tension and drawn over the napping-rolls, as will be more fully explained. The napping-rolls F are fixed to axes *f*, which carry the friction-pulleys *g' g'* at opposite ends of the said rolls, and are journaled in the boxes g^2 g^2 in the spider-rim. These boxes are radially adjustable in the rim by means of the set-screws *g* g**, threaded through the rim at bottom and top of the boxes. The series of friction-pulleys *g* at one end of the napping-rolls are of greater diameter than the pulleys at the other end thereof, and these pulleys are preferably so differentiated in diameter as to make the pulleys *g* of greater and the pulleys *g'* of less diameter than the outer diameter of the said rolls. As seen, the rolls F are arranged in a circle in the rim of the spiders, and over each circular series of pulleys *g* and *g'* is set a friction band or belt G G', which fits snugly to but is free to revolve with the spider. These bands are preferably made of steel about one-quarter of

an inch thick and are then turned both inside and out and made to fit snugly upon the pulleys. They may, however, be made of leather belting or other flexible belting material. These bands being free to rotate with the revolutions of the pulleys with the spiders, I have denominated them "rotary friction-bands," to distinguish them from two stationary friction-bands, which will presently be described. It is evident that when the cloth is drawn over the napping-rolls while the spiders revolve in the direction of the progress of the cloth the said rolls will be turned backward or independently revolved on their axes by the contact of their card-clothing with the under surface of the cloth; and it is evident that if friction is applied to the larger pulleys *g* the speed of their movement must be diminished, and if applied to the smaller pulleys *g'* it must be accelerated, owing to the differential diameters of the pulleys of the two sets. The slower movement or greater resistance produced by friction upon the larger pulleys *g* produces a heavier napping upon the cloth, while the accelerated movement and reduced resistance effected by friction upon the smaller pulleys gives a lighter nap.

To apply the friction to the one or the other set, as may be desired, I set over each rotary band G and G' a stationary friction-band H and H', respectively, and provide means for adjusting them so as to make one or the other tight upon its inclosed rotary band. These bands H and H' are preferably formed of leather or other flexible belting material, and are divided, as shown, at one point, and connection is made between the ends thereof by means of castings or studs *h h'* thereon and a connecting and set screw *h**, by means of which the tension of the stationary band upon the rotary band is applied, removed, or regulated. The casting or stud *h* is supported on a bracket or arm h^2, supported in the fixed framing of the machine.

It is apparent that by adjusting the band H to pinch upon the band G (when band H' is loose) the independent rotation of the napping-rolls must be by means of the larger pulleys *g*, and their movement will be slower and the resistance of the card-clothing to the cloth greater and a heavier nap will be raised, while if band H is loosened and band H' tightened the reverse will be the case. By this means, therefore, the cloth can be napped to any degree desired. The cloth in reaching the napping-rolls must pass between the pressure-roll Y and friction-roll Y', which hold it with proper pressure, thence over the stretcher-roll Y^2 and under the guide-roll Y^3 to the napping-rolls of the machine, and in leaving the machine it passes under guide-roll Z and over tension-roll Z' and between it and pressure-roll Z^2, the two sets of rolls at entrance and exit serving to hold and draw the cloth, which is indicated by X, properly over the machine. Power may be applied to the pressure-roll Z^2.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a napping-machine, the combination of napping-rolls free to turn by contact with the moving cloth, differential pulleys mounted on said rolls, and friction devices operating on said pulleys to retard or accelerate the rolls, as set forth.

2. In a napping-machine, the combination of one or more napping-rolls having pulleys of differential diameters on the opposite ends thereof and friction-belts acting on the same, as and for the purpose set forth.

3. In a napping-machine, the combination of napping-rolls, differential pulleys on opposite ends of the rolls, and a rotary endless belt or band set over and free to turn with the pulleys, and a friction device to operate on said band, as set forth.

4. The combination, with a revoluble frame or support having adjustable boxes in the rim thereof, of napping-rolls having their axes set in said boxes and having differential pulleys on the ends thereof, and a free band or belt surrounding said pulleys.

5. The combination, with a series of napping-rolls, of two series of pulleys of differential diameters set on the opposite ends thereof, rotary bands set over said series of rollers, and stationary adjustable bands set over said rotary bands, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ISAAC N. FORRESTER.

Witnesses:

CHARLES E. LEX,

THOS. D. MOWLDS.