

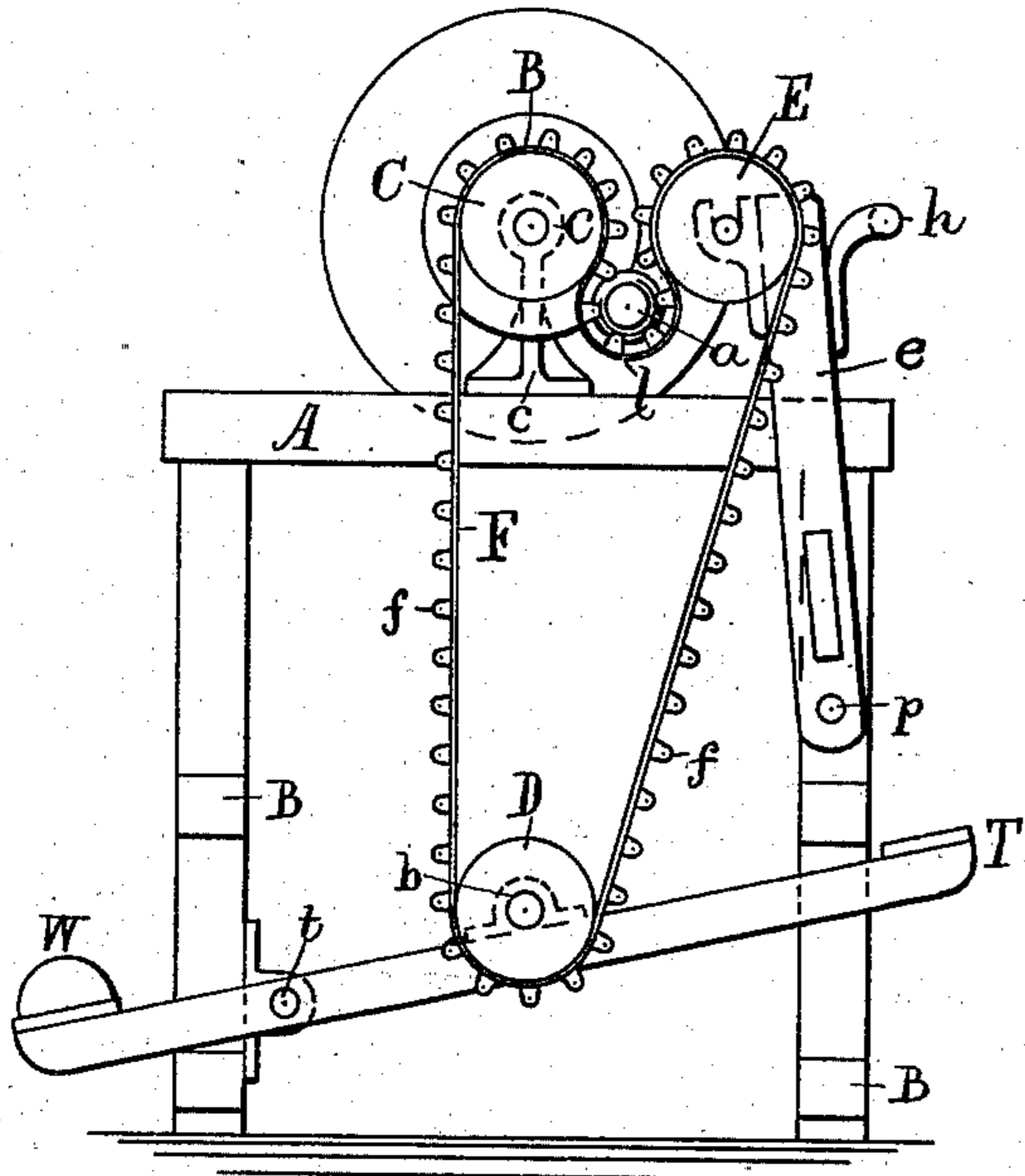
(No Model.)

G. YULE.  
Hat Felting Machine.

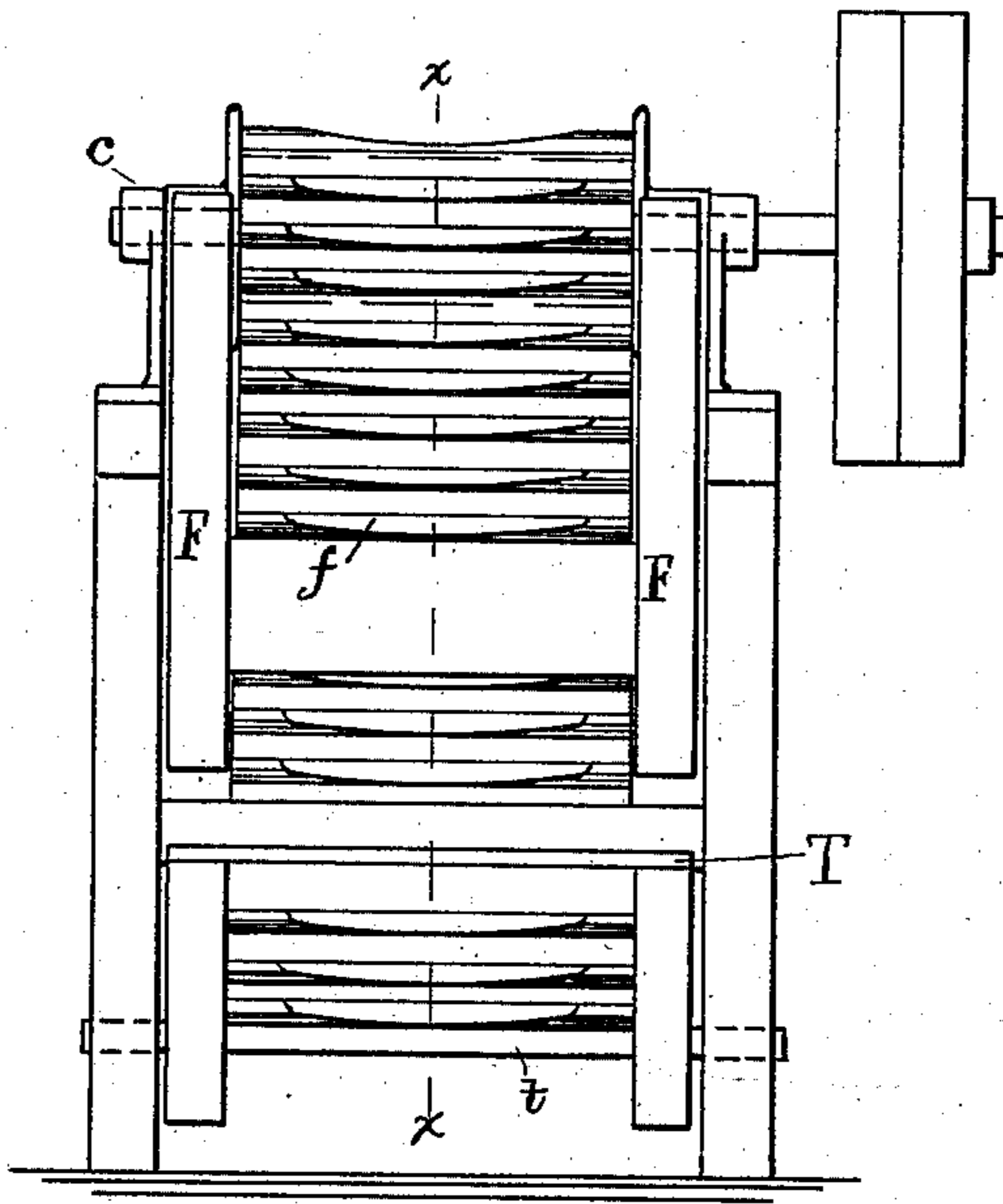
No. 238,016.

Patented Feb. 22, 1881.

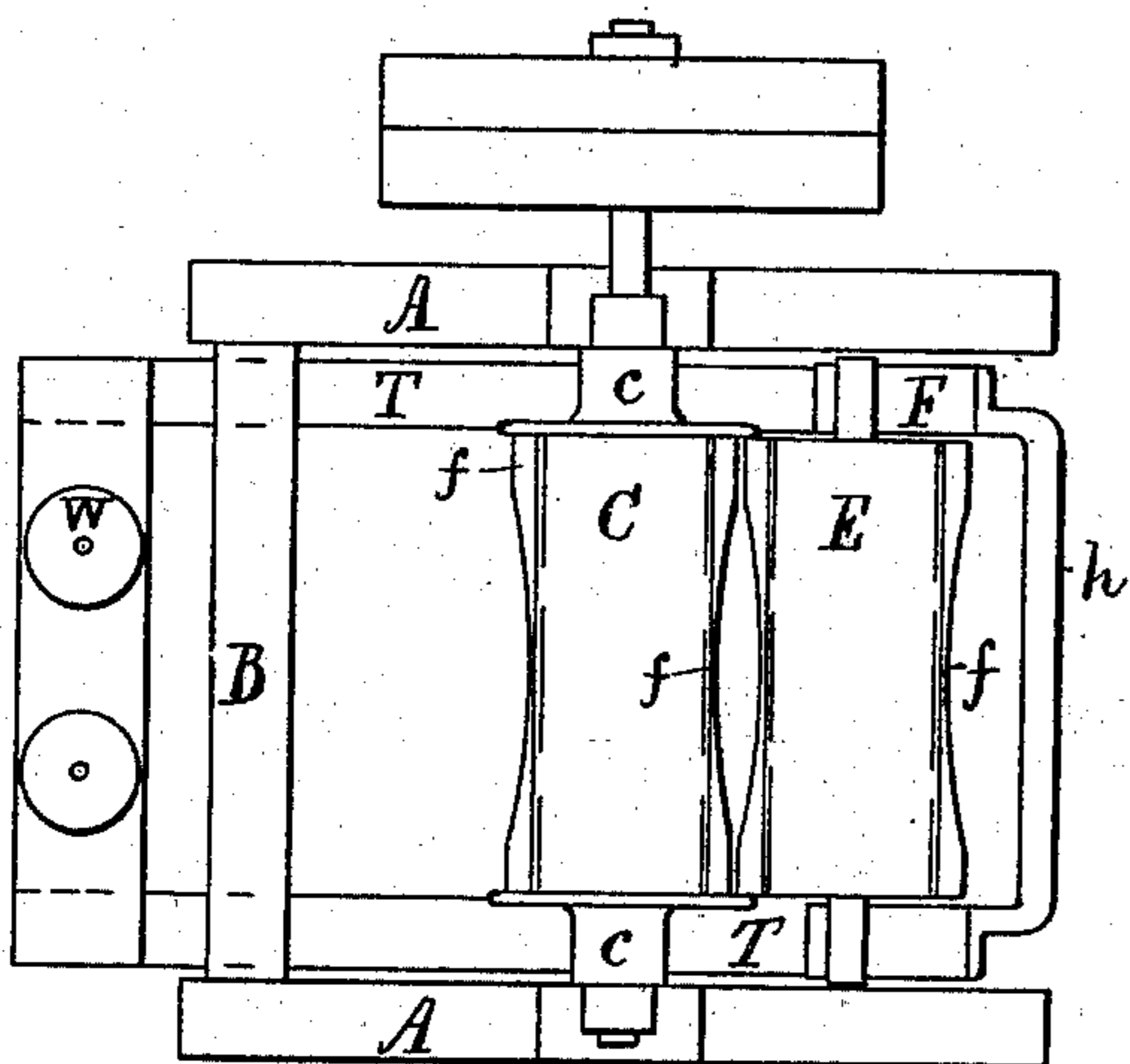
*Fig. 1.*



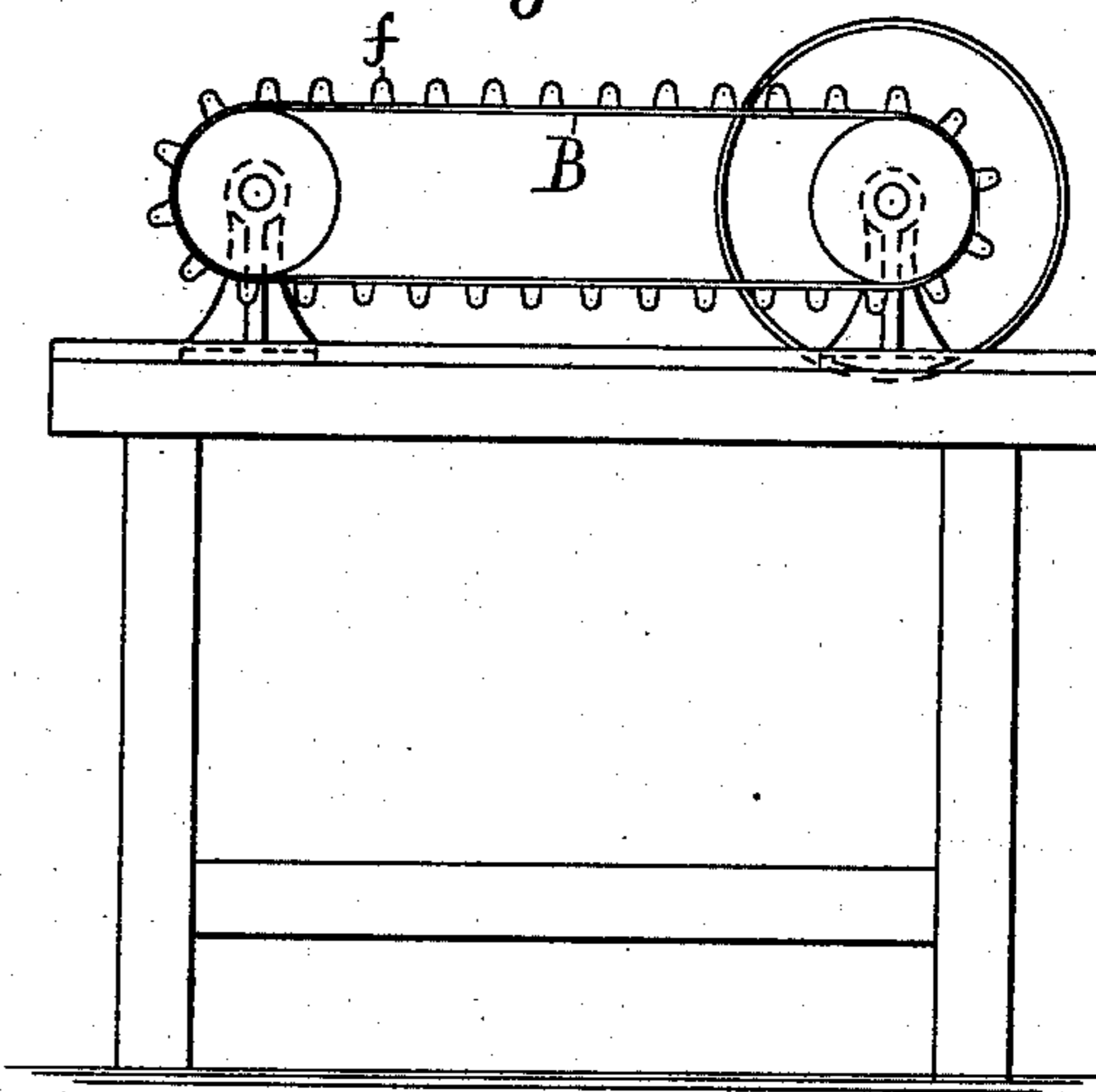
*Fig. 2.*



*Fig. 3.*



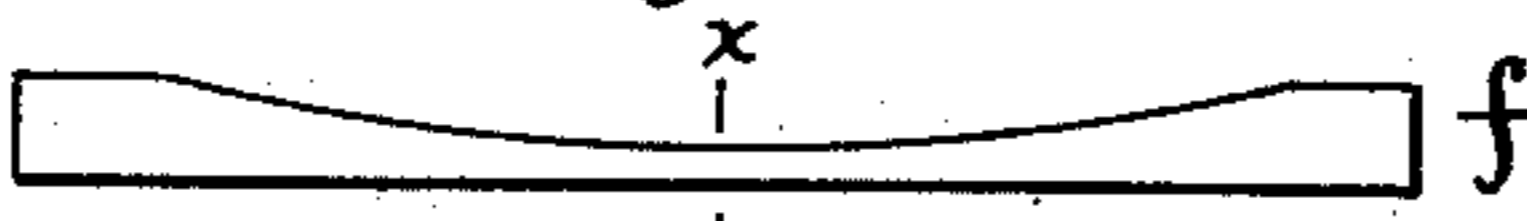
*Fig. 4.*



*Fig. 6.*



*Fig. 5.*



*Attest:*

*A. W. Crane*

*W. Dietz*

*Invention.*

*G. Yule, per*

*Thos. S. Crane, Atty.*

# UNITED STATES PATENT OFFICE.

GEORGE YULE, OF NEWARK, NEW JERSEY.

## HAT-FELTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 238,016, dated February 22, 1881.

Application filed October 23, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE YULE, of Newark, in the county of Essex and State of New Jersey, have invented an Improvement in Hat-Felting Machines, of which the following is a specification.

My invention relates to an improvement in hat-felting machines; and it consists in the construction of an apron for rolling and pressing the hat-bodies, and a special combination of the same with an arrangement of movable rollers.

The object of my invention is to provide a more effective and rapid means of hardening hat-bodies, especially when they are newly formed, and consequently very tender.

The devices applicable to the second sizing operations are too rough and violent in their operation to treat the hats at first; and my invention is designed to handle the hats less roughly than by the ordinary sizing-machines, while operating upon them as effectively. To secure these objects I employ the ribs often used to press upon such felts, but shape them concave, to fit the convex form of a roll of hat-bodies, and mount them upon a yielding surface, like a rubber or canvas apron. While a straight rib indents a bundle of felts at the middle only, and necessitates a frequent changing of the felts inside the bundle, and renewed subjection to the action of such a rib to expose all parts of the roll to the felting-pressure, a series of concave ribs acting in succession upon the same roll would indent the ends simultaneously with the middle, and produce as great an effect in one or two operations.

I have shown my apron, having the concave ribs attached, in combination with both movable and stationary rollers, and am aware that the combination of an apron with such rollers is not new, and that the use of ribs upon aprons and rollers is also common to produce an irregular pressure upon hats in felting, a patent to J. T. Waring, dated June 8, 1880, No. 228,704, showing concave ribs applied to the surface of a roller for a similar purpose, while my own patent, dated July 20, 1880, No. 230,101, shows straight and inclined ribs arranged in a variety of ways. In no construction, however, is the advantage secured which I obtain by mounting the concave ribs upon a belt or

apron, as herein set forth; and the combination of such ribs and apron with one another, and with either arrangement of rollers herein shown, is therefore the essential feature of my invention, and adapted to produce the desirable results stated above.

In the drawings, Figure 1 is a section of my improved machine, taken on line *xx* in Fig. 2, while Fig. 2 is a front elevation of the same. Fig. 3 is a plan of the improved machine, and Fig. 4 is a side elevation of an endless apron, mounted in the usual way upon two stationary rollers, and provided with my improved concave ribs. Fig. 5 is a side view, and Fig. 6 a section, on line *xx* in Fig. 5, of a concave rib, *f*.

A is the frame of the felting-machine in Figs. 1 to 3; B, the tie-bars; *c*, bearings for a stationary roller, C, mounted upon the middle of the frame, at the top; D, a movable roller, mounted in bearings beneath C, and pressed downward at pleasure by the treadle T, to which the bearings are attached; *t*, the fulcrum for the side bars of the treadle, upon which the bearings *b* are mounted, and W a weight applied to an extension of the side bars, to counterbalance the weight of the entire treadle and roller.

E is a roller mounted upon a swing-frame, *e*, at a level with roller C, the frame being pivoted to the front posts of the main frame A at *p*, and a cross-bar or handle, *h*, being fitted to the swing-frame at the top to move it to and from the stationary roller C. With the rollers thus arranged I use my belt F, provided with the concave ribs *f*, in the following manner: The rollers C and E are brought in contact by pushing in the swing-frame *e*, and the belt is then applied to the three rolls, with the treadle fully depressed. The ends of the belt being firmly secured in any suitable manner, the frame F is then pulled forward and the treadle elevated, stretching the slack of the belt over the space between the rolls C and E. Upon releasing the pull on the frame *e* the belt can be depressed between the top rolls, forming a pocket or loop, *l*, to receive the roll of felts *a*. (Shown in that position in Fig. 1.) Pressure is then applied to the treadle, while the swing-frame is pushed forward by the hand, and the roll C being revolved by the pulleys

G upon its shaft H the belt moves continuously over the three rollers, subjecting the roll *a* to a pressing action upon all sides at once, and promoting the felting operation most rapidly by the pressure of the ribs *r* upon the entire length of the bundle at once. When the rolling of the bundle has been continued a proper time the felts can be removed by pulling forward the swing-frame, and thus straightening the loop *l*. The swinging movement of both frame and treadle affords great facility for graduating the pressure upon the roll *a* while it remains in the machine.

From the above description it will be seen that the action of the ribbed belt, arranged to surround the entire bundle of felts, must be much more rapid and effective than the operation of two smooth or ribbed surfaces in contact with the same bundle; but as there are many machines in which traveling belts are employed I have shown a means of improving their efficiency by merely applying my concave ribs to the belts already in use. In such case they may be made of wood, metal, or india-rubber, and riveted transversely to the belt to pass over the carrying-rollers readily; but in my improved machine I prefer to use an apron having india-rubber ribs cemented thereto, and its body consisting of canvas covered all over with a coating of india-rubber. I have also used thick belts of pure india-rubber having the ribs molded thereon before vulcanizing.

I am fully aware that ribs have been arranged in almost every possible position in felting-machines heretofore, and that knobs and projections have also been applied to aprons or belts, as in the Patent No. 230,101, heretofore secured by me; but the uniform height of all such ribs and projections, or their arrangement parallel to the opposing parts, compelled them to act upon the middle of a roll of hats much more effectively than upon the remainder of the roll, while my improved rib operates equally upon all parts of the roll in contact with it at once.

I am also aware that concave rollers have been used in felting-machines; but the unyielding nature of such a body makes it unsuitable to perform the earlier stages of the felting operation when the felt is tender, and in any case, as the combination of a series of concave ribs with a flexible surface like a belt not only renders it more yielding than a solid roller, but enables the same to act upon all sides of the felt-roll at once, I consider that the function of such ribs, mounted upon

such a yielding body, is essentially different from that of any roller or other construction previously known. That being the case, it is plain that the essential advantages of my invention may be secured by arranging isolated projections, ridges, or knobs of proper height in series gradually increasing in prominence from the center of a belt toward the margin, and thus securing an equal pressure upon the whole length of the bundle of hats at once. I therefore prefer to call my concave ribs "sections," to indicate that the concave profile of the belt is not continuous, but divided into separate portions or sections, which operate, in turn, upon the roll of felt as it rolls successively in contact with them.

The utility of my invention depending thus largely upon the belt provided with concave sections of projecting material upon its surface, it is not essential that the belt should be operated in the precise manner described herein, nor with the movable rolls described to produce the very best results. The bearings of the rolls D and E may thus be arranged in sliding boxes, and moved to and fro by any convenient mechanism, or other arrangement of rollers devised to press the belt against the felts and graduate the force exerted at pleasure.

I do not limit myself, therefore, to the use of the particular materials described for the belt or its ribs, nor to the construction herein described for the mechanism to be used in operating the belt, as they may be changed in many respects without affecting the essential feature of my invention, which is the combination of a flexible apron or belt with a series of ribs arranged to operate in succession upon the bundle or roll of hats, the said ribs being higher or more projecting from the belt at its edges than in the middle, to correspond with the bulging convex profile of a bundle of hat-bodies, as fully described herein.

I therefore claim as my invention as follows:

1. The felting apron or belt constructed with concave sections adapted to fit and felt a roll of hat-bodies, substantially as herein set forth.

2. The felting-apron provided with the concave sections, in combination with the rollers C, D, and E, arranged and operating substantially as herein described.

GEORGE YULE.

Attest:

M. J. DEWITT,  
THOS. S. CRANE.