

(No Model.)

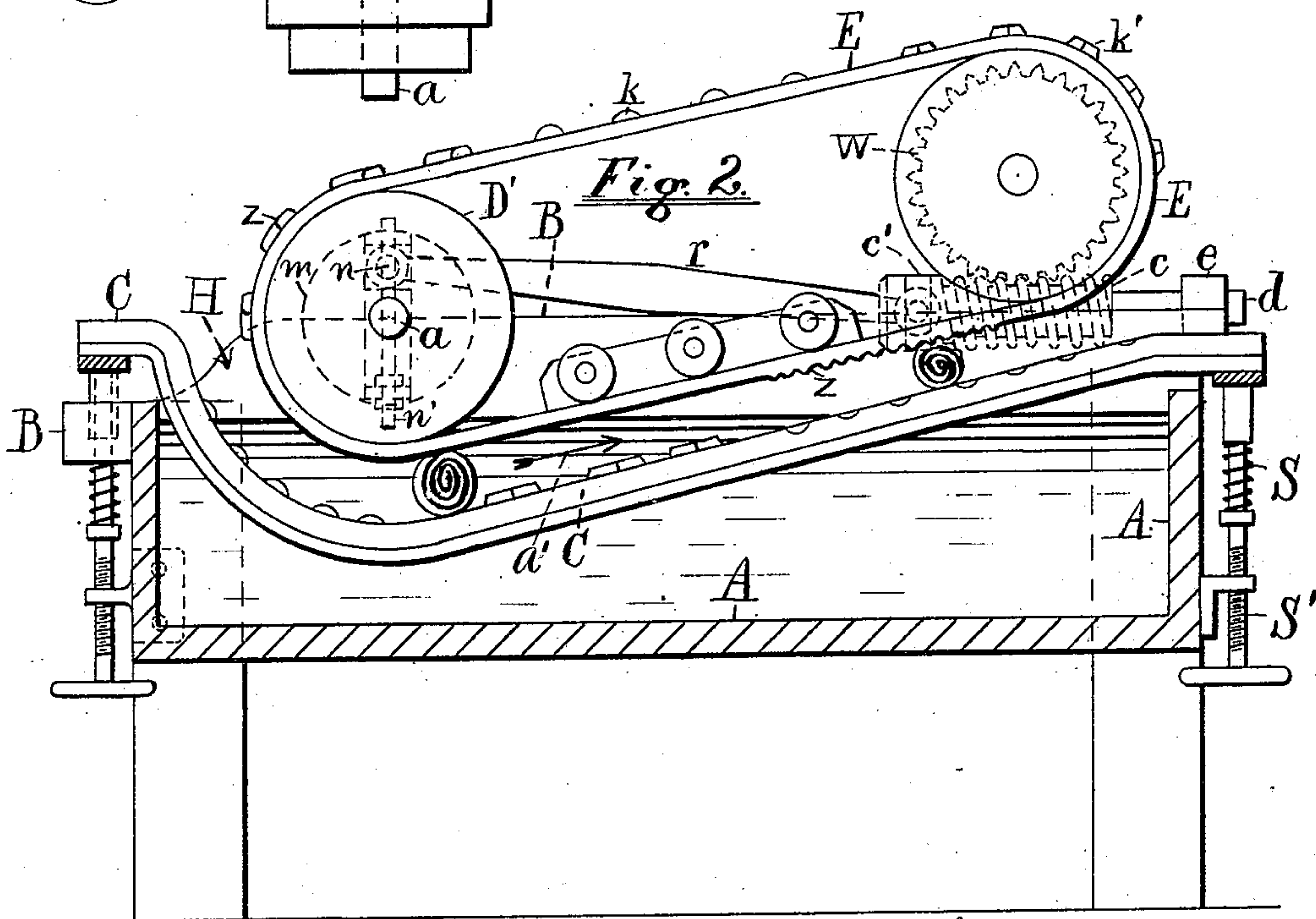
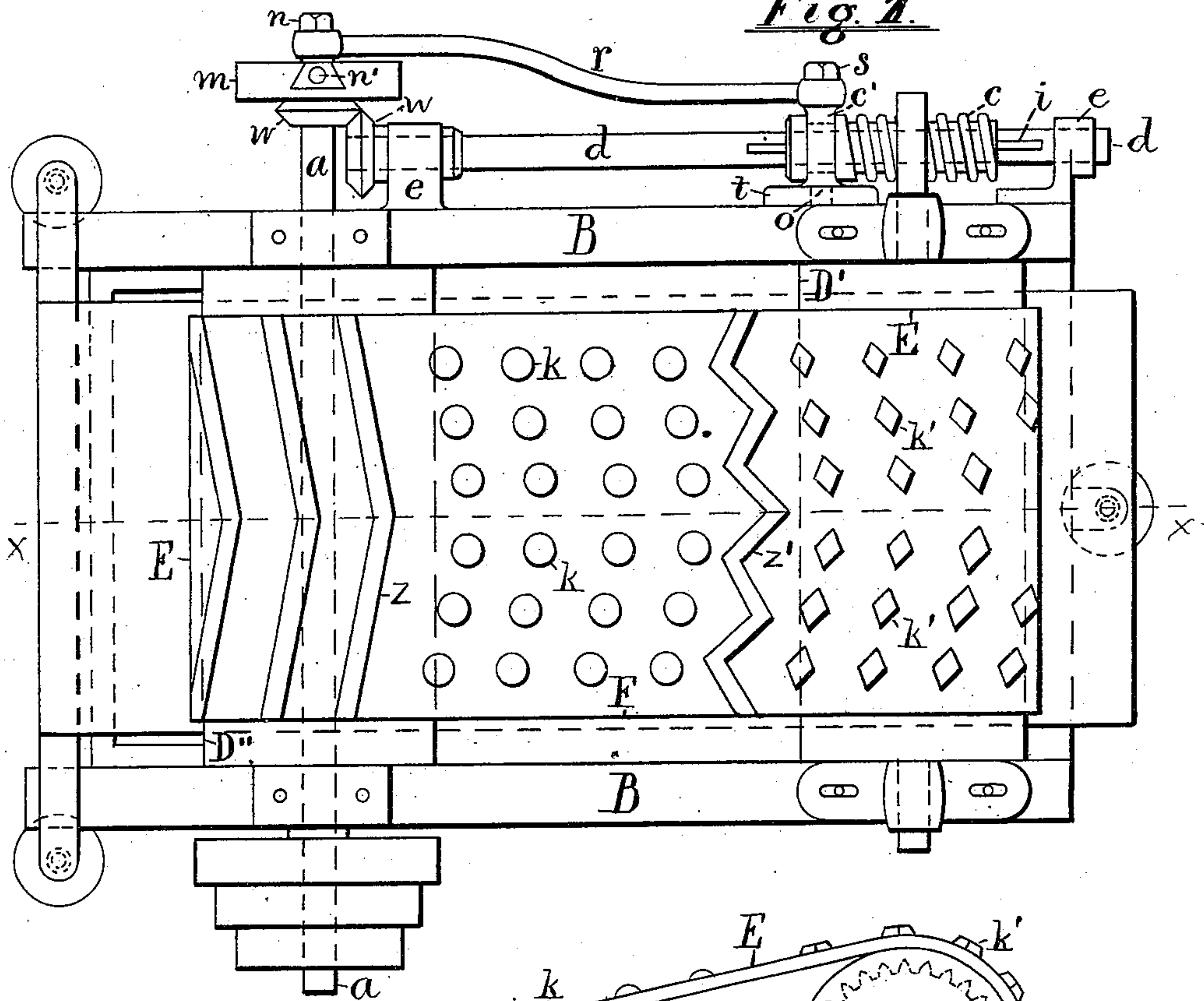
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G. YULE.  
Hat-Felting Machine.

No. 230,101.

Patented July 13, 1880.

*Fig. 1.*



Attest:  
*Wm. F. Howe,*  
*Geo. H. Rodenschatz.*

Inventor.  
*George Yule, per*  
*Thos. S. Crane, Atty.*

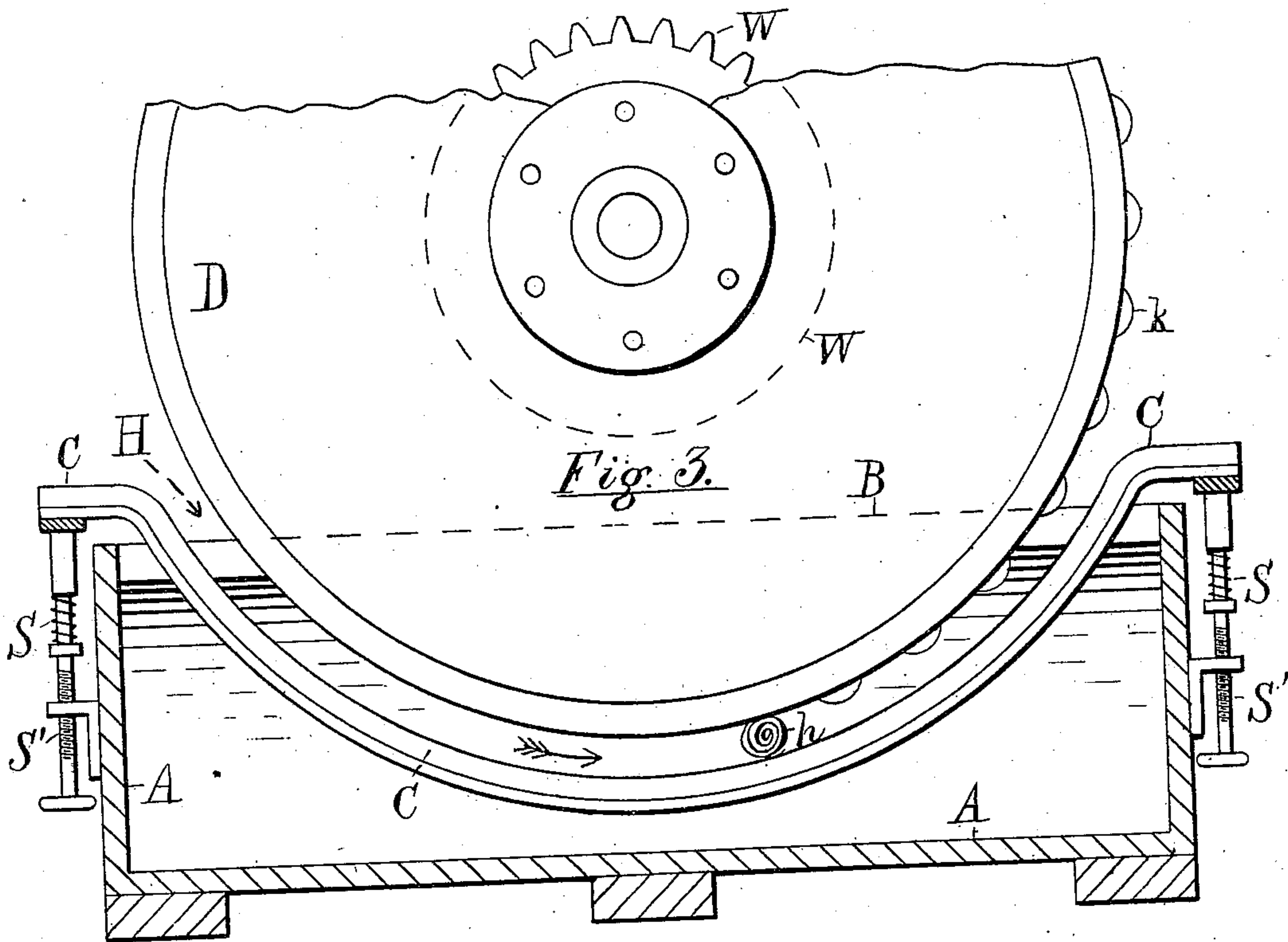
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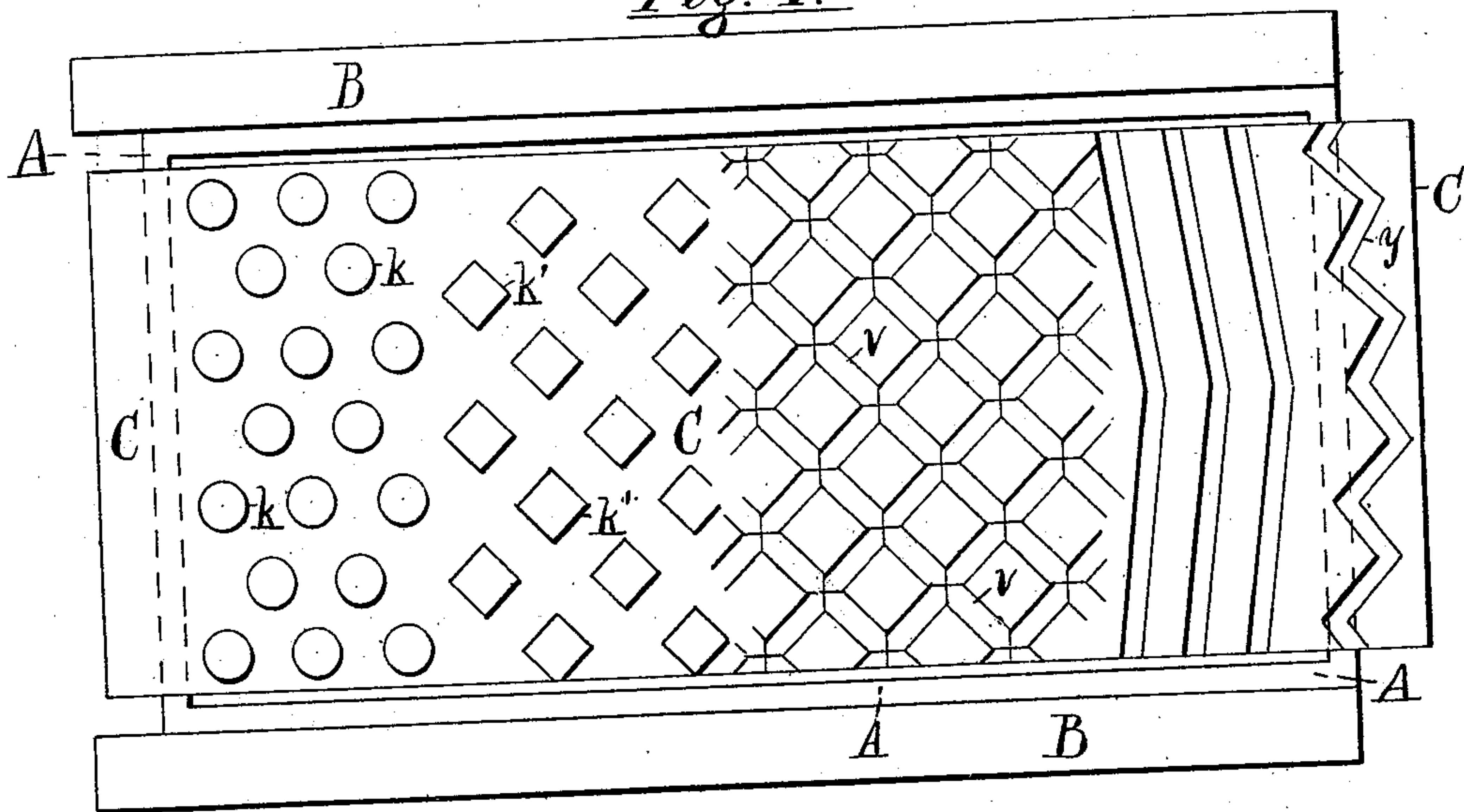
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*Fig. 3.*



*Fig. 4.*

*Attest:*  
*Wm. H. Howe.*  
*Geo. H. Bodenschatz.*

*Inventor.*  
*George 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. 230,101, dated July 13, 1880.

Application filed March 22, 1880. (No model.)

*To all whom it may concern :*

Be it known that I, GEORGE YULE, of the city of Newark, in the county of Essex and State of New Jersey, have invented a new and  
5 useful 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, first, in operating a felting-apron by a roller revolving  
10 in fixed bearings, and having an oscillating as well as a rotary motion imparted to it for the purpose of reciprocating and traversing the apron simultaneously; second, in operating a felting-drum, in combination with a stationary  
15 bed, by a gear-wheel mounted concentric with the drum upon a shaft revolving in fixed bearings, and having the oscillating and rotary motions imparted to it for rubbing, rolling, and traversing the goods upon the bed, in the  
20 manner set forth; third, in providing the surface of such rubbers or beds with projecting isolated knobs of round or other form to penetrate the goods as when worked by the hands of an operator; fourth, in providing the sur-  
25 face of a felting-apron with inclined and zig-zag ribs adapted to intersect the rolls of goods irregularly.

I am aware that aprons for felting-machines have been operated to roll hats back and forth  
30 upon a bed for the purpose described, and to traverse them along at the same time, as in patent to M. Chittenden in 1877, wherein the apron is propelled by a friction-dog applied to its edge, and in patent to W. Keenan in 1878,  
35 wherein the entire apron and its driving-rollers are mounted in a frame to be reciprocated bodily by a connection to an oscillating lever; but in none of these and other inventions is the roller employed as the sole agent to im-  
40 part the required conjoint motion to the apron, and in none of them is provided mechanism capable of producing the conjoint motion in a roller mounted in fixed bearings.

I do not, therefore, claim the apron having  
45 a conjoint reciprocating and traversing motion, except as the said motion is derived entirely from the roller and the latter is mounted in fixed bearings.

I am also aware that inclined ribs have been  
50 used on the surface of a revolving drum, as in patent to E. Beesley in 1879, and I therefore

claim them only in combination with a traveling apron, as herein described.

Figure 1 of the drawings annexed is a plan of a felting-machine containing my improve- 55 ment. Fig. 2 is a sectional elevation taken on line *x x*, Fig. 1. Fig. 3 is a similar elevation of a felting-drum mounted upon a hot-water tank over a yielding bed; and Fig. 4 is a plan of the tank and bed with all the other 60 parts of the machine removed.

A is the hot-water tank, heated by a steam-jet to the required temperature, and provided at the top edges with a framing, B, to which the mechanism is secured. 65

C is the felting-bed, shaped to fit the under side of the felting apron or drum, and immersed in the water sufficiently to soak the hats *h* as they pass through the machine.

D is a felting-drum, (shown in Fig. 3,) and 70 D' and D'' felting-rollers carrying an apron, E, (shown in Fig. 2.) The roll D'' is fitted loosely to the driving-shaft *a*, which extends across the frame B, near one end of the machine, and has its lower side immersed several 75 inches in the water. Roll D' is situated near the other end of the tank, and is set with its bottom several inches above the water, and an apron, E, extends over both rolls, and partakes of an oscillating and traversing motion 80 imparted to roll D' by a worm-wheel and worm of special construction.

The worm-wheel W is secured to the shaft *b*, carrying roll D', just outside the edge of the frame B, and the worm *c* is carried on a shaft, 85 *d*, which is mounted in boxes *e* parallel to the side of the tank. The worm *c* is fitted loosely upon a spline, *i*, on the shaft *d*, so that it will revolve with the shaft, but be able to move 90 freely to and fro, as required.

The end of shaft *a* extends beyond the frame B and shaft *d* sufficiently to carry a crank, *m*, and imparts a rotary motion to shaft *d* by a pair of bevel-wheels, *w*.

A connecting-rod, *r*, extends from the crank 95 *m* to the worm *c*, which is provided with a collar, *c'*, at one end, fitting loosely into a groove turned in the worm, and kept from revolving with the worm by a stud, *o*, secured to the collar and fitted into a guide, *t*, fastened to the 100 frame near the shaft *d*. The collar being provided with a connecting-pin, *s*, the motion of



the crank *m* is transmitted to the worm upon the revolution of the driving-shaft *a*, and a compound rotary and oscillating movement is thus imparted to the roll *D'*, and a reciprocating motion to the apron *E*, which also has a forward traverse motion imparted to it by the revolutions of the worm *c*.

By constructing the crank *m* with an adjustable pin, *n*, and screw *n'* the stroke of the worm may be varied at pleasure, or the same entirely arrested, leaving the gears *w* to move the apron *E* continuously forward in the direction of the arrow *a'*, (shown in Fig. 2.)

The compound movement imparted to the apron by the mechanism described very closely resembles the rolling action of the hand upon a bundle of hats; and to still further simulate the action of the ball of the hand, which penetrates the roll of soft material in different places as it is rolled successively over and over in hand-felting, I provide my felting apron, drum, or bed with knob-like or ribbed projections to effect the same object. The knobs are shown at *k*, and the same effect may be produced by lozenge-shaped projections *k'*.

In Figs. 1 and 2 are shown inclined and zigzag ribs *z z'*, the latter of which have a very powerful effect in hardening the felts, from their intersecting the roll at so many different places.

In Figs. 2 and 4 are shown the sorts of grooves I employ in the bed to act in conjunction with the ribs upon the apron *E* or drum *D*.

At *u* are shown the inclined grooves, their arrangement, as well as that of the ribs *z*, always being in pairs starting from opposite edges of the machine, and slanting forward in the direction of the apron's progressive movement to an angle or apex in the middle of the bed.

At *v* diagonally-intersecting grooves are shown, and at *y* a zigzag groove for the same purpose as the zigzag ribs *z'*. The felting-bed thus constructed is mounted upon the usual springs *S S*, adjusted by screws *S'* to the required pressure, and the hats are traversed over the bed by the apron or drum *D* as many times as is necessary to produce the required effect.

By the use of the adjustable crank-pin *n* the worm may be arranged to propel the apron exclusively in one direction when the hats are first inserted in the machine, thus hardening them gently in hot water at first, when they are quite tender, and they may afterward be rolled and felted to any desired degree with the reciprocating motion of the apron.

In the view of the drum shown in Fig. 3 the driving-shaft is shown provided merely with a worm-wheel similar to that shown on roller *D'* in Fig. 2; but in such case the remainder would be made as shown in Fig. 1, and a driving-shaft of suitable character substituted for the roll-shaft *a* employed in the machine using two rolls and an apron.

It will be seen from the description of the

rolls and apron that the shaft *a* has a double function, as it revolves at a different speed from the roll it carries and serves to drive the worm and roll *D'* as well as carry the roll *D''*.

It will also be seen that the mechanism employed is of the very simplest character, and much more durable than any other involving the use of cords, straps, or bands to obtain the desired compound motion, and consequently free from the frequent stops and breakages incident to the use of such mechanism.

I am aware that reciprocating rubbers and yielding beds have been used before, and that a continuous rotary motion imparted to a roller carrying such an apron is not new; but my improvement consists in imparting the compound motion to the roller primarily, as to the drum *D* in Fig. 3, thus securing a similar motion in the apron, when one is used, without moving the rollers to and fro upon their supporting-frame, as has hitherto been done. This may be accomplished by mounting the drum or roller shaft *b* upon fixed bearings *e*, as shown in Figs. 1 and 2, and imparting the compound motion to it by the worm mechanism herein described, or by any mechanism adapted to produce the same effects. Several such devices are shown in my application for patent on mechanical motion filed in the United States Patent Office April 12, 1880.

The intricate nature of the mechanism employed for reciprocating aprons hitherto has interfered with their immersion in hot water, and my machine therefore does the felting with greater rapidity than others. As the compound motion is transmitted to the apron entirely through the roller the apron may be immersed in the desired degree without any interference with or from the operative mechanism.

In machines having the apron and its carrying-rollers moved unitedly back and forth the action of the rollers carrying the felting-apron necessitated the use of a level or straight bed to permit the reciprocation of the apron-carrying rollers to and fro over the frame and bed, while the rotation of my drum or apron roller upon an axle fixed in one position enables me to use a curved or concave bed, and thus secure a hopper form at *H* to automatically draw the hats into the machine and carry them downward into the water.

My construction thus enables the hats to be fed into the machine with much more facility and speed than in a machine where a roller is jerking back and forth at the point where the hats have to be pushed forward upon a level bed without the assistance of gravity, which alone suffices to feed them into my inclined bed.

Having thus described my invention, I claim the same as follows:

1. The combination, in a felting-machine, of a roller or drum mounted upon a shaft in fixed bearings, and having both rotary and oscillating motions imparted to it by suitable mech-



anism, with a stationary bed, substantially as and for the purpose set forth.

5 2. The combination of a hot-water tank with a curved bed, substantially as herein described, and a felting-apron carried by rollers mounted in fixed bearings and reciprocated and traversed by a compound motion imparted to one or both of the rollers, substantially as herein set forth.

10 3. The combination, in a hat-felting machine, of an apron, E, with rollers D' D'', mounted in fixed bearings upon a hot-water tank, A, carrying a curved bed, C, a driving-shaft, a, passing loosely through one of the rollers, a worm, 15 c, and worm-wheel W, for operating the other roller, and suitable mechanism for imparting a rotary and reciprocating motion to the worm from the driving-shaft a, substantially as herein shown and described.

20 4. The knobs k, applied to the surface of a

felting drum, apron, or bed, for the purpose set forth.

5. The inclined and zigzag ribs z z', applied to the surface of a felting apron or bed, for the purpose set forth. 25

6. The grooves v and y, arranged in a diagonal and zigzag manner in the surface of a curved bed.

7. An apron provided with the knobs k or inclined or zigzag ribs z z', and operated in 30 combination with a curved bed having inclined or zigzag grooves v y, for the purpose shown and described.

In testimony that I claim the foregoing I have hereto set my hand this 18th day of 35 March, 1880.

GEORGE YULE.

Attest:

T. S. CRANE,

C. T. ZIEGLER.