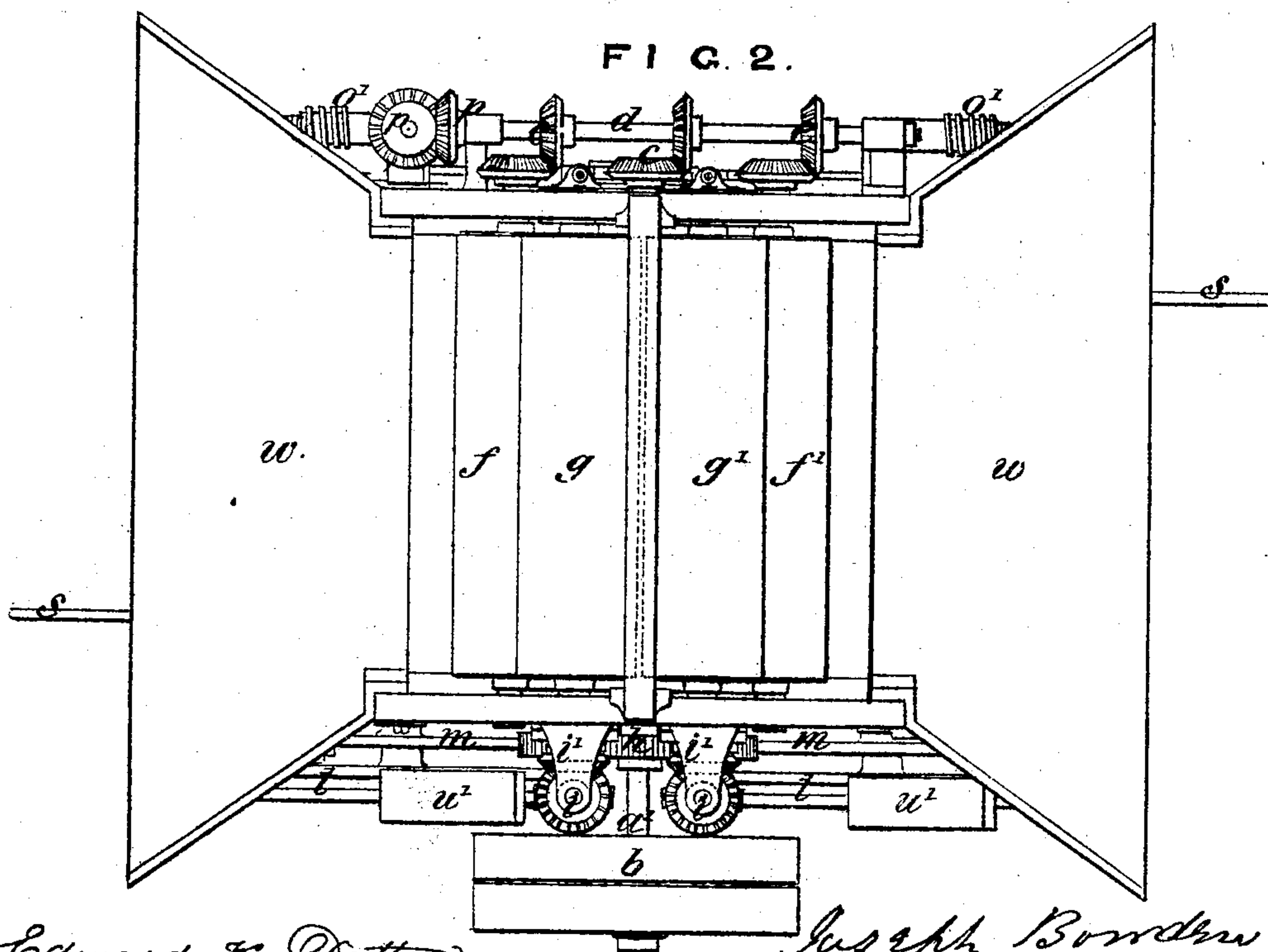
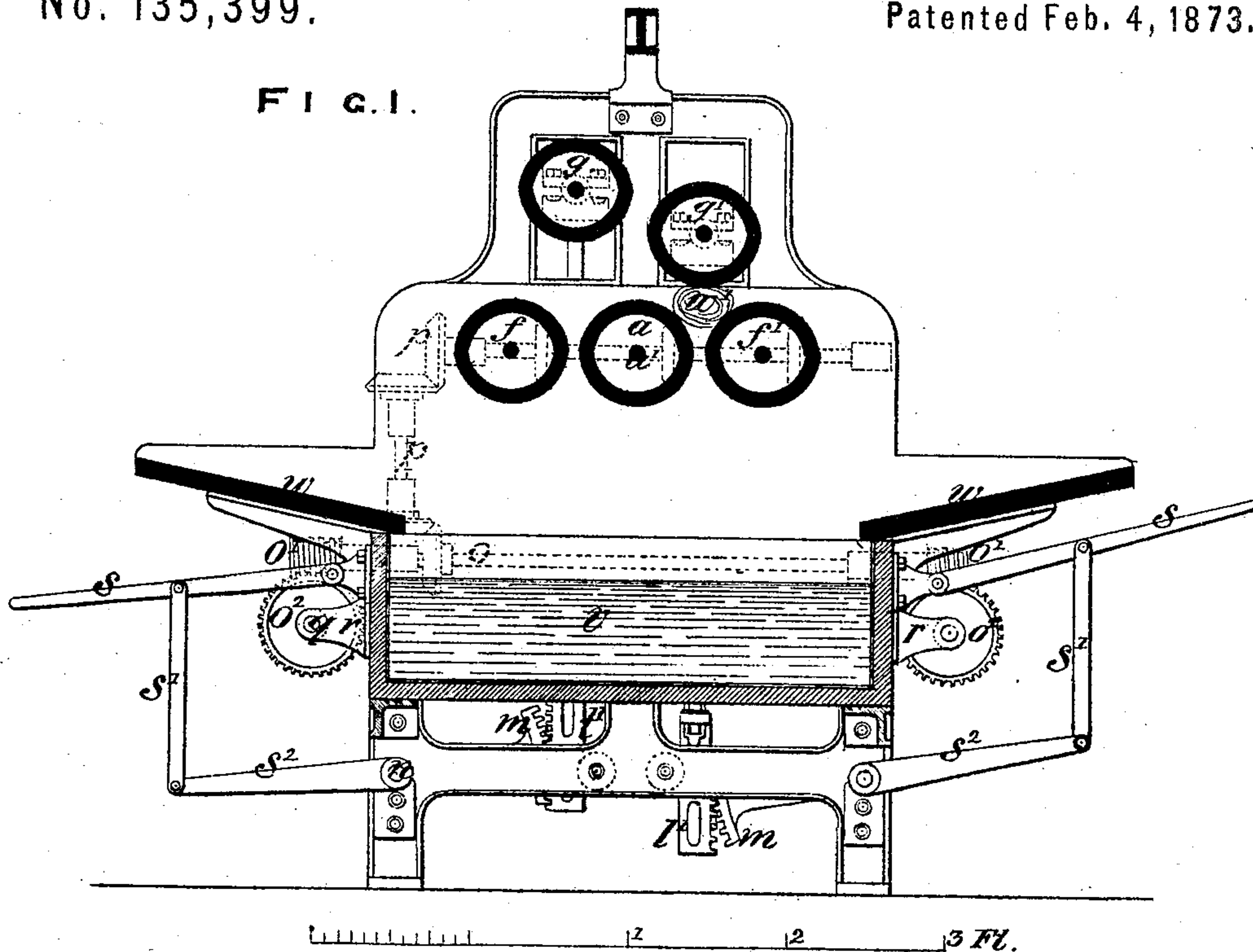


2 Sheets--Sheet 1.

J. BOWDEN & R. SHAW.
Machines for Felting Hat Bodies.
 No. 135,399. Patented Feb. 4, 1873.

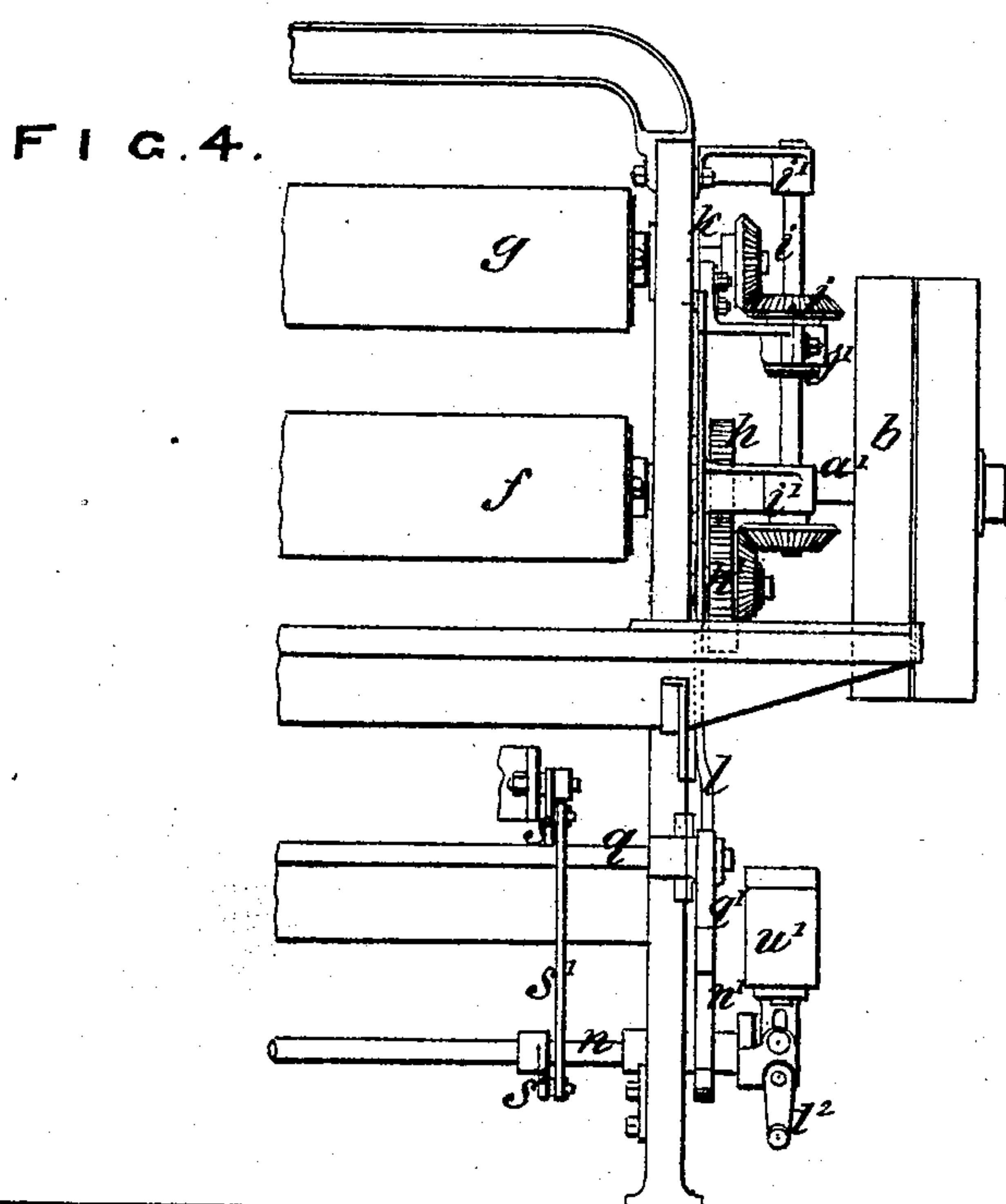
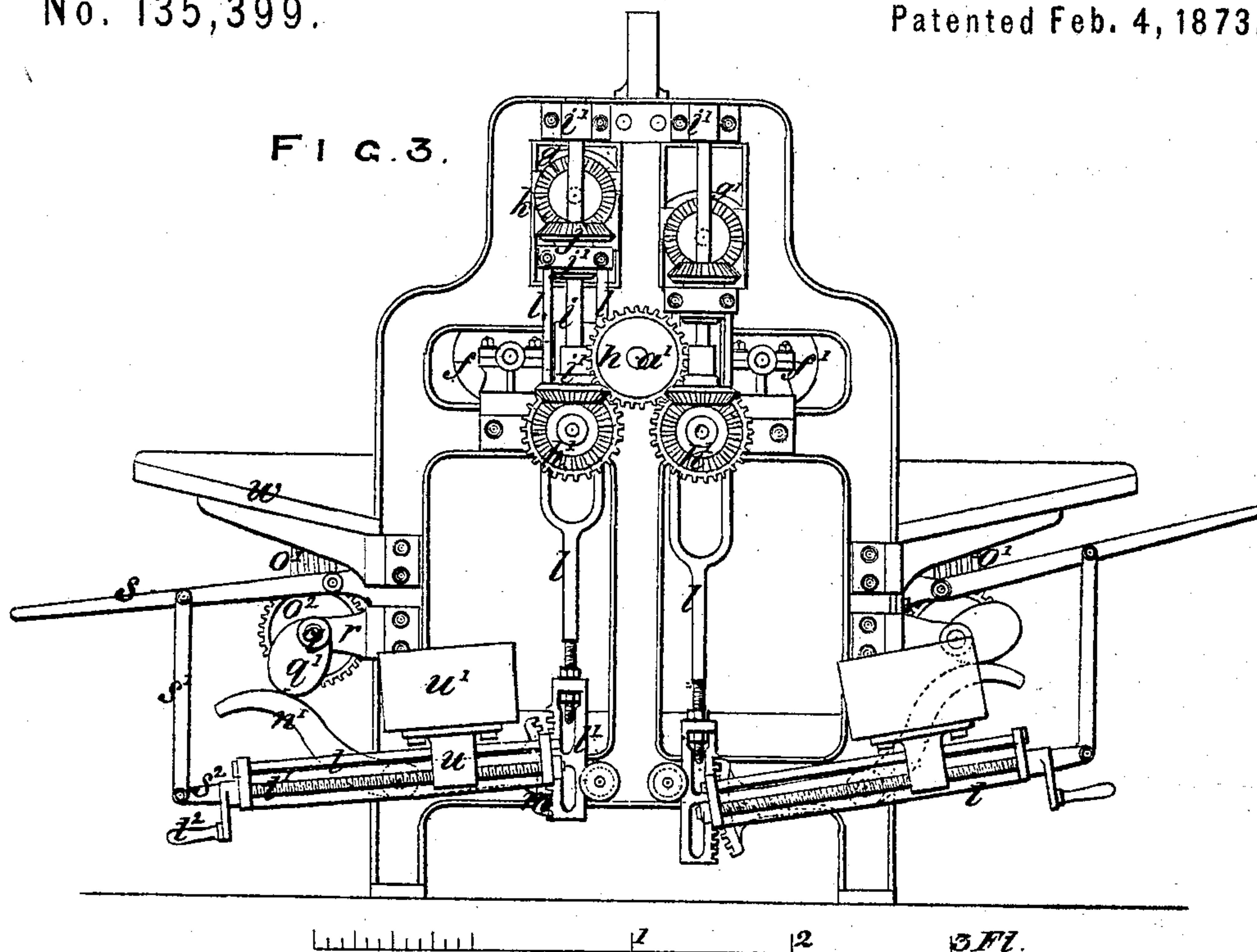


Edward H. Dutton
Hugh C. Grand } Witnesses.

Joseph Bowden
Robert Shaw

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 Robert Shaw

UNITED STATES PATENT OFFICE.

JOSEPH BOWDEN AND ROBERT SHAW, OF MARPLE, ASSIGNORS OF ONE-HALF OF THEIR RIGHT TO WILLIAM WILSON, OF NEWCASTLE-ON-TYNE, GREAT BRITAIN.

IMPROVEMENT IN MACHINES FOR FELTING HAT-BODIES.

Specification forming part of Letters Patent No. 135,399, dated February 4, 1873.

To all whom it may concern:

Be it known that we, JOSEPH BOWDEN and ROBERT SHAW, of Marple, in the county of Chester, in the Kingdom of Great Britain, have invented certain Improvements in Felting-Machines, of which the following is a specification:

According to the first part of our invention, we employ revolving rollers which are of an elliptical or oval shape in cross-section. Three or more of the said rollers are combined in one apparatus, and the hat body or bodies, or article or articles to be felted, is or are introduced into the space between the said rollers, and the felting is effected by the combined action of the said rollers. A further portion of our invention consists in causing one or more of the felting-rollers to be raised or withdrawn at intervals from the remaining roller or rollers of a set acting in concert by means of apparatus actuated by the same motive power as the said rollers. A remaining portion of our invention relates to means for regulating the pressure of the rollers upon the article or articles during the process of felting; and consists in mounting the weight which determines the amount of the said pressure upon a lever, and in fitting the said lever with a screw working in a nut fixed to or formed in the said weight, so that the said weight may be shifted on the said lever by turning the said screw.

Figure 1 represents a vertical section of a planking or felting machine constructed in manner according with our invention. Fig. 2 is a plan thereof. Fig. 3 is a side view of the same. Fig. 4 is a front view of a portion of the machine, the same being more particularly another view of most of the parts represented in Fig. 3.

In this machine five elliptical or oval rollers are employed, and the said rollers are arranged to work in two sets, the roller *a* being common to both sets. The said roller *a* is mounted on a shaft, *a'*, which is fitted to revolve in bearings fixed to the framing of the machine, and is provided with the fast and loose pulleys *b*, through which the machine is set in motion. A bevel or miter wheel, *c*, fixed on the said

shaft, gears with a corresponding wheel on the shaft *d*, a rotatory motion being thereby imparted to the said shaft. Bevel or miter wheels *e e* gear with corresponding wheels fixed to the journals of the two rollers *f f'*, whereby a rotatory motion is communicated to the said rollers.

As the parts for giving motion to and controlling the action of each of the upper rollers *g g'* are alike, to avoid repetition we will, in our description of the said parts, refer to those parts which are in connection with the roller *g*.

A spur-wheel, *h*, shown most clearly in Fig. 3, is fixed on the shaft *a'*, and gears with the intermediate wheels *h'*, and on each of the last-named wheels is mounted a bevel or miter wheel, which gears with a corresponding wheel fixed on the upright shaft *i*, which shaft is fitted to revolve in the brackets *i' i'* fixed to the framing. A miter or bevel wheel, *j*, is fitted to slide on the said shaft, and is provided with a fast-key, which enters a groove in the said shaft, and the said wheel gears with a corresponding wheel fixed on the journal of the roller *g*, the arrangement permitting an upward and downward movement of the said roller without effecting its rotation, the wheel *j* being maintained in gear with its fellow wheel by means of the bracket *j'*, which is fixed to the plummer block or bearing *k*, the said bearing being one of two in which the journals of the said roller revolve, and which are fitted to slide up and down in the framing of the machine. To each of the said bearings is fixed a forked rod, *l*, which is attached by its lower end to a rack, *l'*, working in a toothed quadrant, *m*. A rocking shaft, *n*, is mounted in bearings formed in or fixed to the framing of the machine, and on each end of the said shaft is fixed a toothed quadrant, so that by causing the said shaft to rock in its bearings the roller *g* may be raised or lowered, as may be required. A shaft, *o*, is arranged to revolve in bearings, and receives motion through the shaft and gearing *p*, and on each end of the shaft *o* is fixed a worm, *o¹*, and each worm gears with a worm-wheel, *o²*, fixed on a shaft, *q*, which is fitted to revolve in bearings formed in the brackets *r* fixed to

the framing. On the said shaft is fixed a cam or tappet, q' , which, at each revolution of the said shaft, depresses the lever n' fixed to the shaft n , and thereby causes the said shaft to rock in its bearings and the toothed quadrants to act upon the racks l' , and thereby upon the rods l , so as to raise the roller g , as represented in the drawing.

The continued rotation of the cam q' , by permitting the lever n' to rise to its previous position, allows the said roller to be lowered, the form of the said cam and the relative speed of the shaft q being so suitably arranged as that the said roller shall be permitted to act upon a charge—that is to say, upon a hat-body or article, or upon a roll of hat-bodies or articles—for a suitable time before being raised therefrom; and that during the raising and lowering of the said roller there shall be sufficient time to permit the said charge to be withdrawn and a fresh charge to be substituted in its place. In order that the said roller may be raised at any time independently of the action of the aforesaid cam, a hand-lever, s , is connected by a link, s^1 , with a lever, s^2 , fixed to the shaft n . On one end of the shaft n a lever, t , is fixed, and in or on the said lever is mounted a screw, t^1 , which works in a nut, u , that is fitted to slide upon the said lever, and on the said nut is fixed a weight, u' . The arrangement is such as that the said weight may be moved on the said lever by turning the handle t^2 , so that when the said weight is at about the center of the lever the said weight will not effect the action of the roller g ; but on moving the said weight in one direction from the said central position, the said weight, acting through the said lever upon the rocking shaft n , and thereby upon the bearings of the roller g , will partly sustain the weight of the said roller; but on moving the weight in the contrary direction, the said weight will act to draw down the said roller, and will thereby increase the pressure thereof upon the charge. The pressure of the said roller upon the charge may thus be readily and quickly adjusted at any time during the working of the machine.

In the positions of the weights in Fig. 3, the weight to the left hand would add to the gravitating tendency of the roller g' , and the weight to the right hand would lessen the said tendency, the pressure of the roller upon

the charge being greater in the former case than in the latter.

The machine is fitted with a cistern, v , to contain the usual heated acidulated water, and is provided with two planks or working-tables, $w w$, one at each side or front of the machine, so that two operators may use the machine at the same time, the machine being capable of operating upon two charges simultaneously, as will be understood.

In Fig. 1 the roller g is represented as when elevated, and when in this position a charge may be readily placed beneath the said roller. The roller g' is represented in position as when operating on a charge, w' , in co-operation with the rollers a and f' . We have found the peculiar action of such rollers, arising principally from the relative variations in their surface speeds, to be very effective for the purposes of our invention.

The method of making up the charges and of otherwise manipulating the same may be such as has been found suitable in other machines of a like nature.

Although the machine illustrated is fitted with five rollers, we may employ any suitable number of rollers other than five; as, for example, when constructing a single machine, we should prefer to provide the said machine with three rollers only. A single machine may, however, have four rollers, and a double machine six rollers, if desired.

We claim as our invention—

1. The combination, in a felting-machine, of a series of oval or elliptical rollers, arranged and acting substantially as and for the purposes hereinbefore set forth.

2. The lever t fitted with a screw, t^1 , and a sliding weight, u' , and connected with the bearings of the upper roller, to which a vertical reciprocating motion is imparted, substantially as and for the purpose hereinbefore set forth.

3. The combination, with the roller g , of the lever n' and cam q' , or equivalent self-acting mechanism for effecting the periodical separation of the rollers, substantially as and for the purpose hereinbefore set forth.

JOSEPH BOWDEN.
ROBERT SHAW.

Witnesses:

EDWARD K. DUTTON,
HUGH G. GRANT.