

(No Model.)

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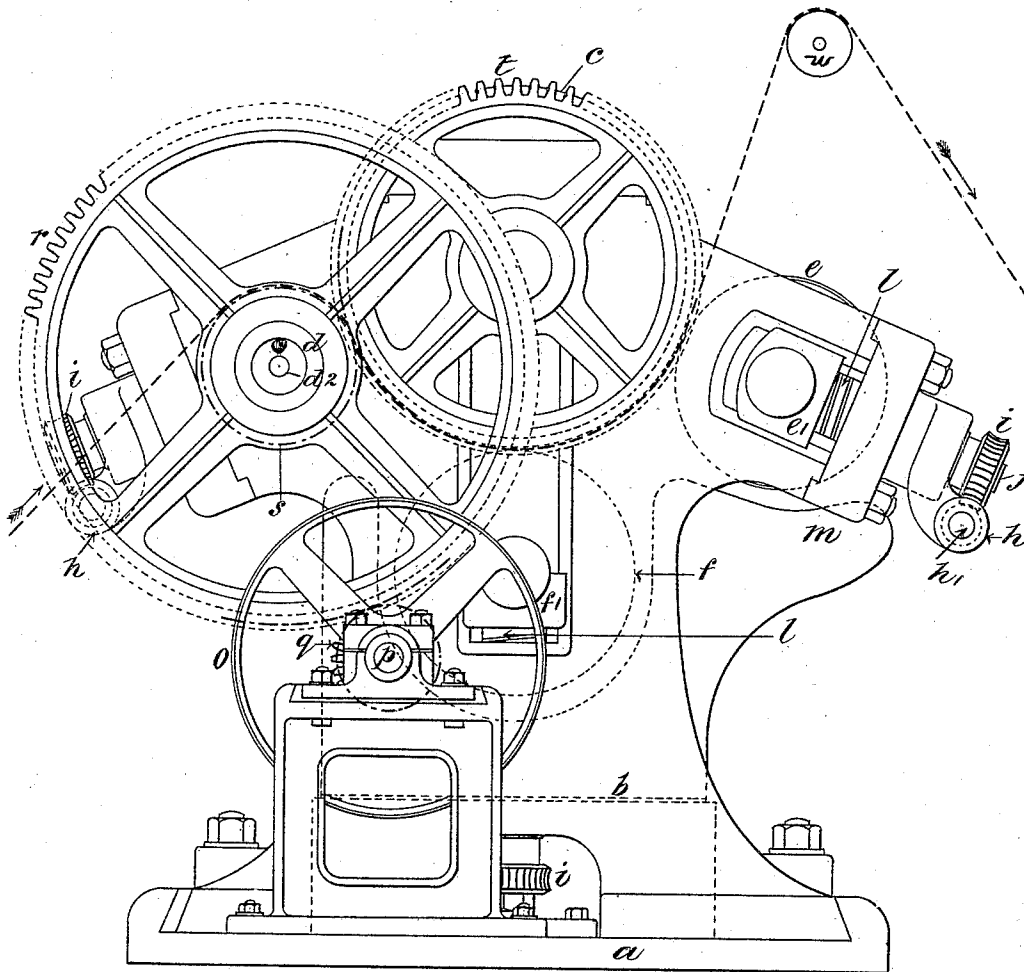
J. KIRK & B. LEE.

MACHINERY FOR FINISHING WORSTED AND WOOLEN FABRICS, &c.

No. 448,439.

Patented Mar. 17, 1891.

FIG. 1.



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4 Sheets—Sheet 2.

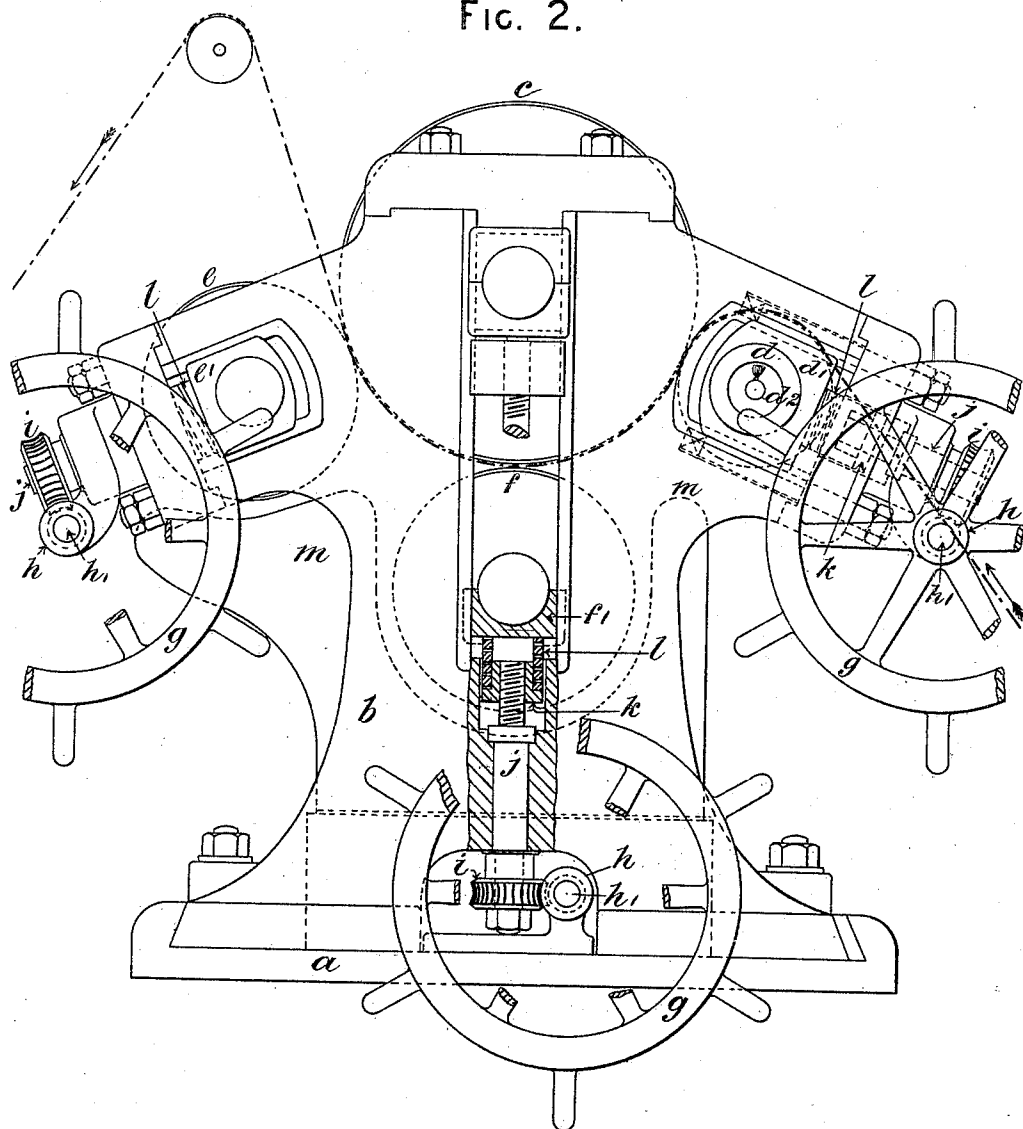
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Patented Mar. 17, 1891.

FIG. 2.



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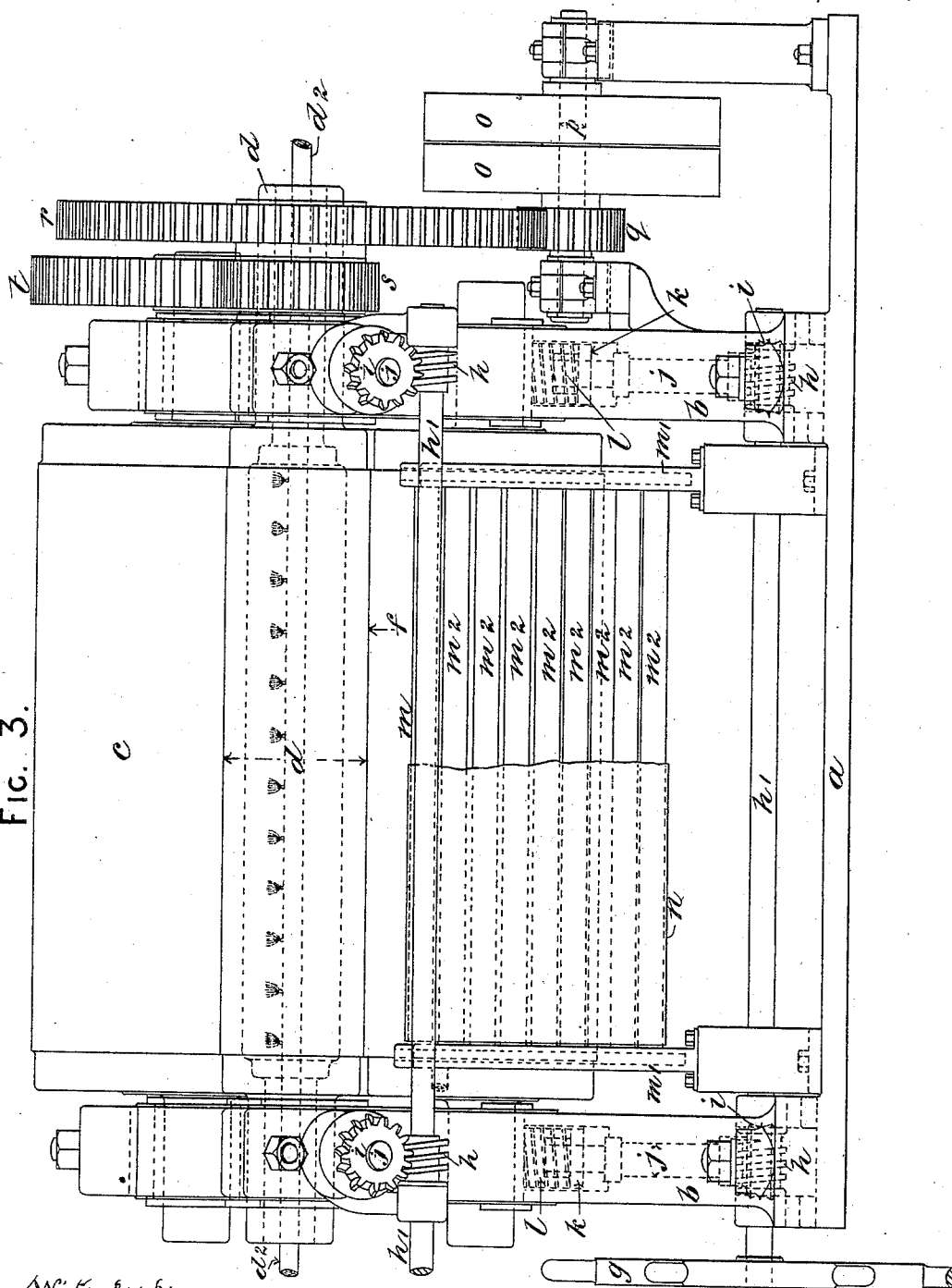
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FIG. 3.



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4 Sheets—Sheet 4.

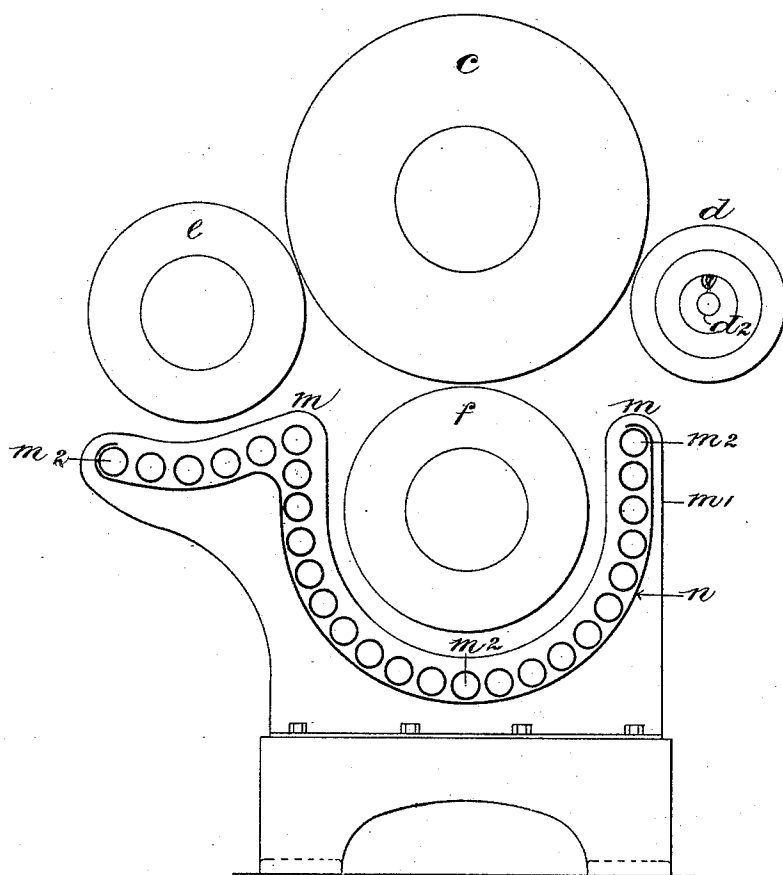
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FIG. 4.



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UNITED STATES PATENT OFFICE.

JOHN KIRK AND BENJAMIN LEE, OF LEEDS, ENGLAND.

MACHINERY FOR FINISHING WORSTED AND WOOLEN FABRICS, &c.

SPECIFICATION forming part of Letters Patent No. 448,439, dated March 17, 1891.

Application filed February 2, 1889. Serial No. 298,521. (No model.) Patented in England April 23, 1888, No. 5,999; in France February 1, 1889, No. 195,910, and in Belgium February 2, 1889, No. 84,860.

To all whom it may concern:

Be it known that we, JOHN KIRK and BENJAMIN LEE, subjects of the Queen of Great Britain and Ireland, residing at Leeds, in the county of York, Kingdom of Great Britain and Ireland, have invented new and useful Improved Machinery for Finishing Worsted and Woolen Fabrics, &c., (for which patents have been obtained in England, No. 5,999, dated April 23, 1888; in Belgium, No. 84,860, dated February 2, 1889, and in France, No. 195,910, dated February 1, 1889,) of which the following is a specification.

This invention relates to machinery for finishing worsted, woolen, and other woven fabrics in a more economical, expeditious, and superior manner than usual heretofore. Instead of finishing such goods as above referred to by the usual method of cutting with press papers and hot pressing them in a hydraulic machine, we pass the fabric under treatment through or between a series of rollers. The rollers are so arranged that one of them is in a fixed position while the others are placed around it, and are so mounted as to be capable of being moved toward or from the first-named roller, means being provided by which pressure may be applied to each of the said movable rollers separately in approaching the first-named roller. One of the said movable rollers has a smooth metallic surface, (silver or nickel plated or otherwise,) and is heated internally by any suitable means, such as gas-jets, steam, hot air, or otherwise. The other rollers may have their peripheries of any suitable material, such as metal, compressed cotton, or paper. We prefer to heat some of them externally by such means as closed steam-vessels placed in proximity thereto. Some or all of the rollers may be driven mechanically or some mechanically and others by frictional contact only, but with the fabric under treatment between them. Guide-rollers or other guides are or may be used for conducting the fabric into and through and out of the machine during finishing.

By means of machinery or apparatus such as above referred to, woven fabrics are capable of receiving in a short space of time a finish of such excellence and delicacy as is

unattainable in either hydraulic pressing or calendering-machines, in the latter of which the rollers are placed one above the other, the pressure applied to each roller being the same as that applied to the top roller, with the addition of the weight of all the rollers above it. One or more of the rollers is or are provided with a heated envelope external thereto for retaining the heat around it or them, in order that the fabric under treatment may not only be subjected to hot pressing between the rollers or bowls, but also to a desiccating process, so that it leaves the machine in a dry state, thus avoiding the necessity of undergoing a separate drying process in a machine provided therefor.

In the annexed four sheets of drawings, Figure 1 is an elevation at the driving end of the machine according to our invention. Fig. 2 is a sectional elevation at the opposite end. Fig. 3 is a front elevation. Fig. 4 is a transverse section of the rollers or bowls and the external heating apparatus and the metallic envelope outside the same.

Similar letters refer to similar parts throughout the several views.

a is the foundation or harness plate of the machine upon which the superstructure is mounted.

b b are the housings; *c*, a roller or bowl of compressed cotton or other suitable material and located at the upper part of the housings in a fixed position.

d is a hollow metallic roller carried in bearings *d'*, that have a sliding movement to or from the first-named roller or bowl. The metallic roller *d* is heated by gas by means of the pipe *d²* passing through it and having a series of gas-burners thereon, or it may be heated by any other suitable means. *e* is a roller or bowl of compressed cotton or other suitable material, and is similarly mounted in movable bearings *e'*. *f* is a roller or bowl of compressed cotton or other suitable material, and is mounted in movable bearings *f'*. The said rollers or bowls *d e f* are caused to approach the roller or bowl *c* by means of the tiller-wheels *g g g*, worms *h* on shafts *h'*, worm-wheels *i*, and screws *j*, taking into nuts *k*, one to each bearing of the respective movable rollers or bowls.

Between each nut *k* and each movable bearing is a spring *l*, so that pressure brought to bear upon the material under treatment as it passes between the above-named movable rollers or bowls *d e f*, and the roller or bowl *c* may be of an elastic nature and also such that the degree of pressure from end to end of each respective roller may be equalized by means of the said springs *l*. It will be evident that the pressures of the rollers *d e f* upon the material under treatment and upon the roller or bowl *c* being capable of separate application may either be equal or different, as may be necessary to effect the required finish of the material under treatment. These frictionally-driven rollers *f* and *e* are pressure-rollers, their function being to impart an improved finish to the fabric after treatment by the first-named rollers *c* and *d*, whose surface speeds may vary so that the fabric may receive a rubbing as well as a pressing action.

m is the external heating apparatus for the rollers or bowls and comprises a hollow vessel *m'* at each end of the rollers. These vessels are connected together by a series of pipes *m²*, and steam, hot air, or hot water circulates through them, causing heat to radiate from them and heat the rollers or bowls; or the vessels *m'* may be dispensed with and the pipes *m²* be so connected to each other as to form for the heating medium a continuous passage through them. The said pipes are partially inclosed by a metallic envelope *N* to prevent radiation in a direction from the rollers or bowls.

o are the driving-pulleys (fast and loose) on the shaft *p*, on which shaft also is the pinion *q*, that takes into and drives the wheel *r* and the hollow metallic roller *d* upon which it is fixed, and upon which also is a pinion *s*, the pitch-line of which represents the circumference of such roller. This pinion takes into and imparts motion to the wheel *t* on the roller or bowl *c*. The pitch-line of *t* represents the circumference of *c*. Thus the roller *d* and the bowl *c* have the same relative speed of their peripheries, between which the hot pressing of the fabric under treatment first takes place. When it is desired that these relative speeds shall vary in order that the fabric under treatment shall receive a slight rubbing as well as a pressing action, wheels having the relative proportions to the required speeds are substituted for the wheels *s* and *t*.

Other modes of driving may be used, such as worm and worm-wheel gearing or frictional gearing, instead of the spur-gearing just described, so that the proper or required relative speeds of the roller *d* and the roller or bowl *c* are maintained.

u is a guide-roller, which may be carried in any suitable manner, over which the fabric under treatment passes on leaving the machine.

What is claimed is—

1. In machinery for finishing worsted, woolen, and other woven fabrics, the combination, with a positively-driven bowl or roller *c* and a positively-driven and internally-heated metallic roller *d*, of two other bowls or rollers *f* and *e* frictionally driven by the first-named roller *c*, and adjustable bearings in which rollers *d e f* are mounted, so as to be separately adjustable toward roller *c*, substantially as set forth.

2. In machinery for finishing worsted, woolen, and other woven fabrics, the combination, with a central bowl or roller *c*, carried in fixed bearings, and two or more bowls or rollers, each carried in movable bearings adjustable by screws and gearing so arranged that the bearings of each roller can be moved simultaneously on applying such roller independently to the central roller *c* with more or less required pressure, of an external heating apparatus partially surrounding one or more of the movable bowls or rollers, substantially as described.

3. The combination of the bowl or roller *c*, the heated roller *d*, the bowls or rollers *e* and *f*, and the external heating appliance *m m'*, all substantially as described.

4. In machinery for the purposes set forth, the combination, with a positively-driven roller *c* and an internally-heated roller *d*, of one or more rollers having an external heating apparatus, said roller *d* and externally-heated rollers being arranged around roller *c*, substantially as described.

5. In machinery for the purpose set forth, the combination, with a central roller and two or more rollers, and means, substantially as described, for adjusting said rollers toward or from the central roller, of an external heating apparatus partially surrounding one or more of said last-mentioned rollers, substantially as described.

6. In a machine for the purpose mentioned, the combination, with a positively-driven central roller *c* and a positively-driven internally-heated metal roller *d*, of one or more pressure-rollers engaging and driven by said roller *c* and having an external heating apparatus, substantially as described.

7. In machinery for the purpose described, the combination of the central roller *c*, the roller *d*, gearing for positively driving said rollers *d c*, one or more pressure-rollers yielding bearing on said roller *c* and driven by friction therewith, screws for adjusting said roller *d*, and means, substantially as described, for heating the fabric while passing between the rollers, substantially as described.

Leeds, January 16, 1889.

JOHN KIRK.
BENJAMIN LEE.

In presence of—

THOS. E. CRAVEN, F. J. P. A.,
24 Victoria Chambers.
WILLIAM SADLER.