(No Model.) 3 Sheets—Sheet 1.

J. WORRALL & J. KERSHAW.

APPARATUS FOR SCOURING, DYEING, AND WASHING PIECE GOODS.

No. 266,248. Patented Oct. 17, 1882.

Fig. 1.

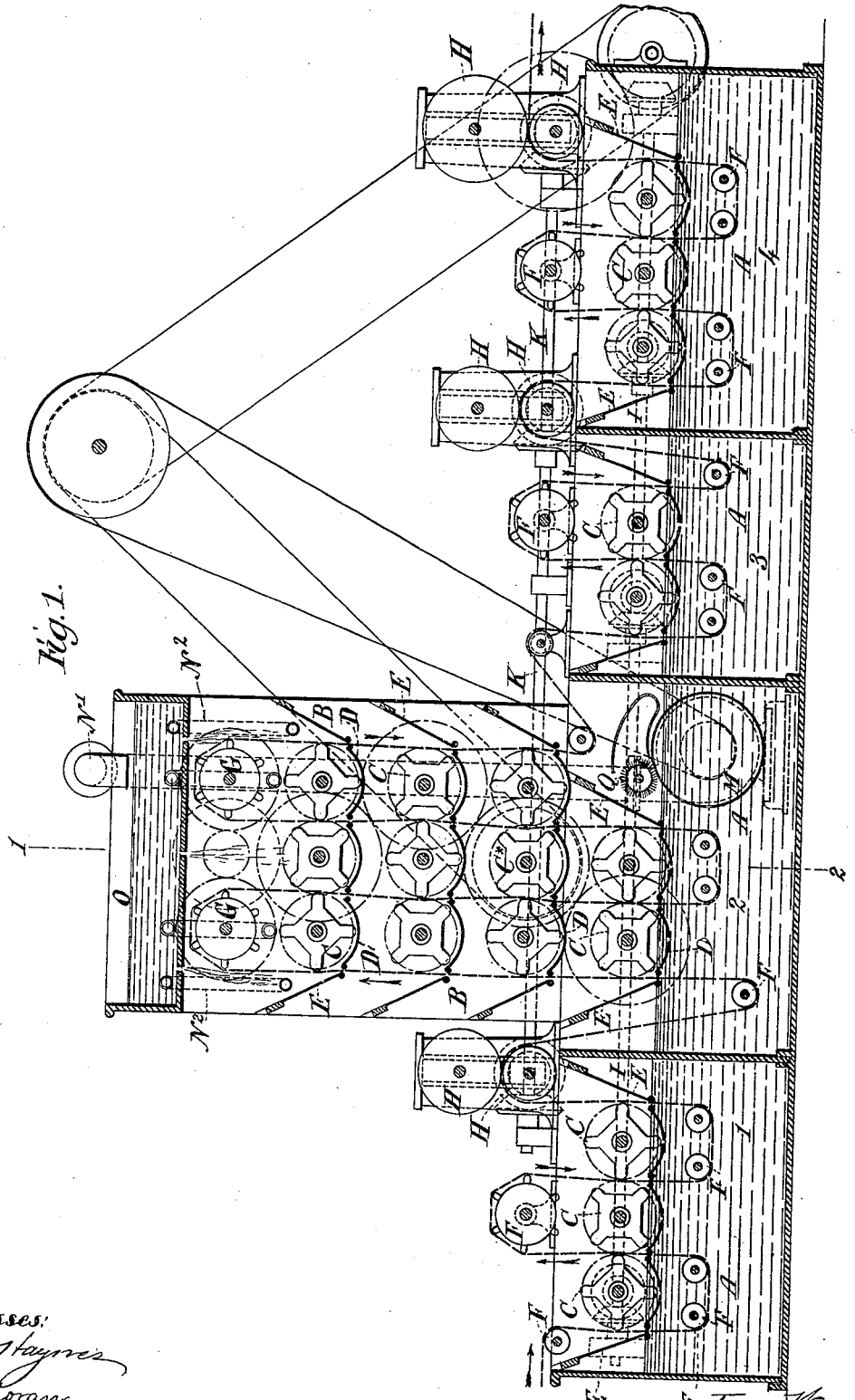

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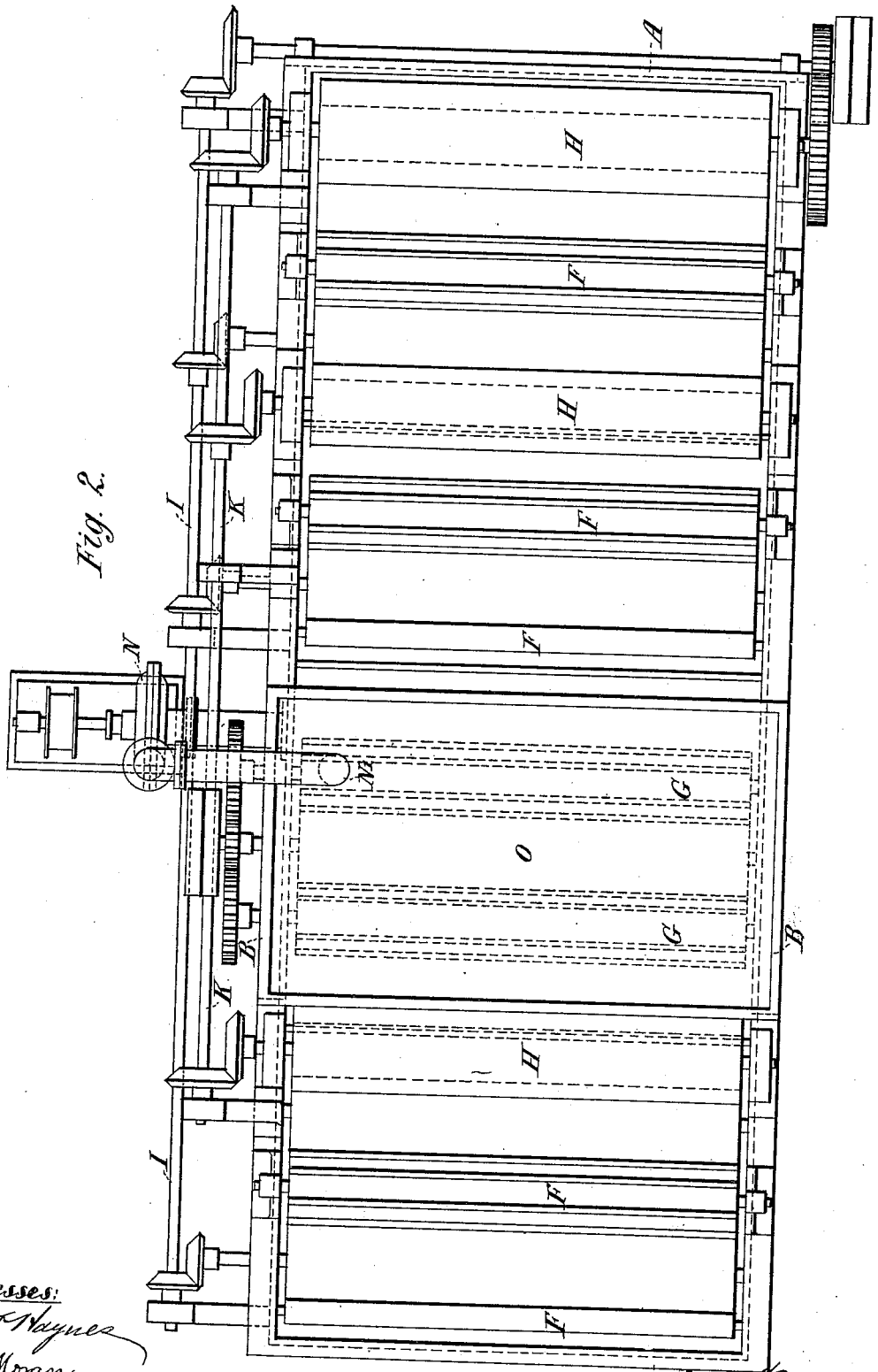
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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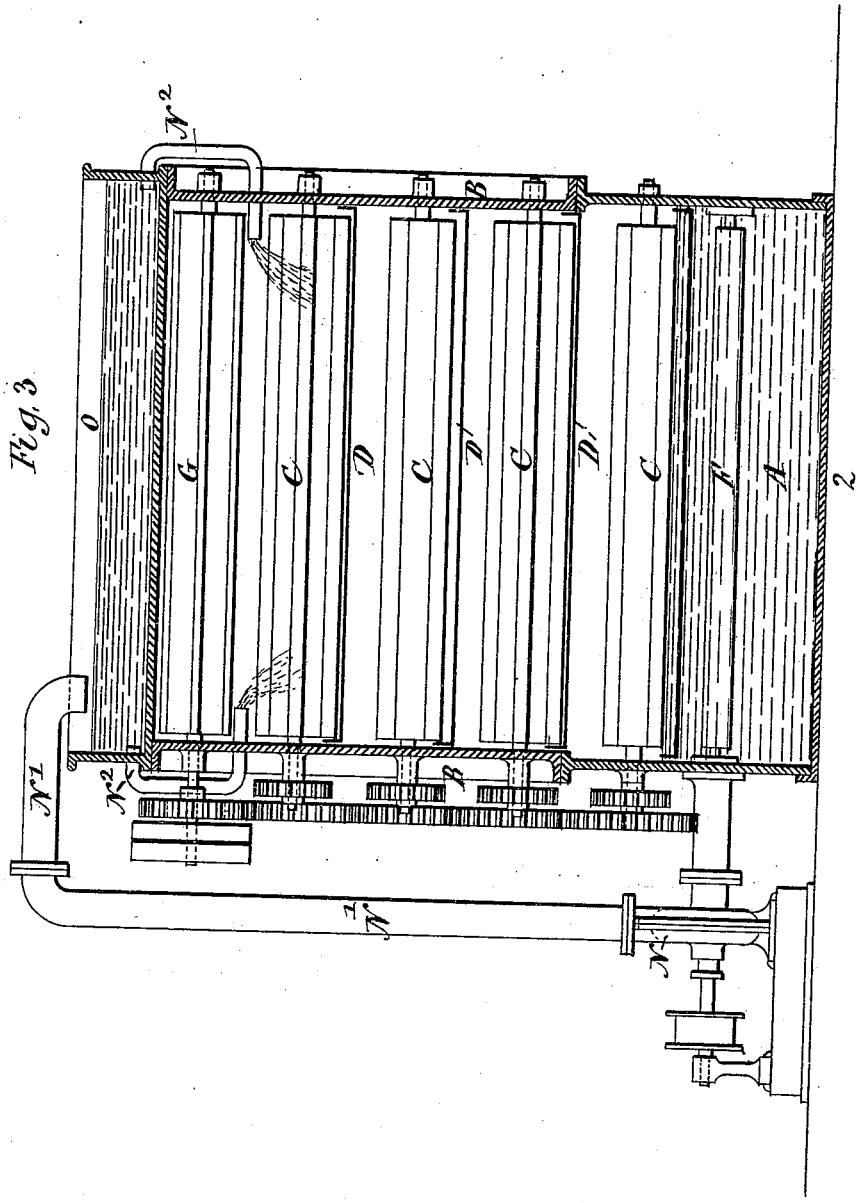
Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES WORRALL, OF ORDSALL, SALFORD, COUNTY OF LANCASTER, AND JOHN KERSHAW, OF WADSWORTH, HALIFAX, COUNTY OF YORK, ENGLAND.

APPARATUS FOR SCOURING, DYEING, AND WASHING PIECE-GOODS.

SPECIFICATION forming part of Letters Patent No. 266,248, dated October 17, 1882.

Application filed May 9, 1882. (No model.) Patented in England July 23, 1881, No. 3,221.

To all whom it may concern:

Be it known that we, JAMES WORRALL, of Ordsall, Salford, in the county of Lancaster, England, and JOHN KERSHAW, of Wadsworth, Halifax, in the county of York, England, have invented certain Improved Apparatus Applicable to the Scouring, Dyeing, and Washing of Piece-Goods, of which the following is a specification.

This invention relates to improvements in machinery by the use of which the scouring, dyeing, or the washing of pile and other fabrics may be effected without creasing, and in an efficient and expeditious manner.

Hitherto in machines of this class the fabric has been drawn through tanks containing the scouring or other liquor; but it has been found that a more efficient action may be obtained, in place of immersing the fabric, by using the rotary beaters or winces to throw the liquor up in limited quantities onto the cloth as it passes under their action.

In the accompanying drawings we have shown an arrangement of apparatus suitable for scouring cotton and woolen fabrics generally according to our invention, Figure 1 being a longitudinal sectional elevation of the apparatus; Fig. 2, a plan view; and Fig. 3, a transverse section of the same, taken in the line 1 2 of Fig. 1.

In these figures A is a tank or "beck," divided into four compartments, 1 2 3 4, each of which is furnished with a series of rotary beaters mounted in troughs which are supplied with liquor that is to be dashed by the beaters onto the fabric to be cleansed as that fabric is passed slowly through the apparatus.

Compartment 1 is supplied with clean water. Compartment 2 takes the overflow of soapy water from the compartment 3, which is itself supplied from a suitable reservoir; and compartment 4 is also supplied with clean water.

Built up upon compartment 2 is a frame-work, B, which carries bearings for three vertically-arranged series of rotary beaters or winces, C C. The other compartments of the beck or tank are also provided with beaters C; but in these the beaters are arranged in horizontal sets, and the bearings for their axles are carried by the sides of the tank.

Below each beater is placed a shallow segment-shaped vessel or trough, D, formed of sheet-brass, into which the beater dips.

The troughs in which the horizontal series of beaters run, and also those of the lowest beaters of the vertical series, are pierced at bottom to receive liquor from the compartments in which they are partially immersed; but the other troughs of the vertical series receive their liquor from a downpour, and are not, like the other troughs, pierced at bottom.

The fabric to be operated upon is led in serpentine form through the apparatus, it being presented to the action of the rotary beaters by means of guide-rollers, some of which are driven as will be hereinafter explained. At the opposite ends of the several sets of horizontal beaters are pendent plates E, which form troughs or pockets for retaining the liquor in contact with the cloth while under the action of the end beaters; and a similar provision is made for the vertical series of beaters. These plates, which are made of thin sheet metal, so as to provide for their yielding elastically to the blow of the beaters, are made fast to transverse bars, which are dropped into notches in the side frame, B.

F F are guide-rollers situate for the most part in the tank or beck, and G are the driven guide-rollers for imparting a traveling motion to the fabric in the direction of the arrows.

H H are pairs of squeezing-rollers, between which the fabric is led as it passes from compartment 1 to compartment 2, from compartment 3 to compartment 4, and out of compartment 4 away from the apparatus, and the lower of these pairs of rollers, being driven, imparts a traveling motion to the cloth.

I and K are two longitudinal shafts, set one above the other, and driven by bands from an overhead shaft. The shaft I is fitted with mi-

ter-wheels which gear into miter-wheels on the axles of the horizontal sets of beaters C, and the shaft K is fitted with miter-wheels which gear into similar wheels keyed onto the axles of the lower squeezing-rollers H.

The driving of the beaters and rollers belonging to compartment 2 is effected by the following means: The three sets of beaters are connected together by spur-gearing, as clearly shown at Figs. 1 and 3, the driving motion being taken from the axle of the beater C* of the central set, which for this purpose is fitted with a fast and loose belt-pulley. The band of these pulleys passes over a pulley on the overhead shaft before mentioned, and the gearing is so arranged that a uniform speed will be imparted to all the beaters in the apparatus. The guide-rollers G receive their motion from a second train of gearing, driven also from the overhead shaft, and the surface speed of these rollers will correspond with the surface speed of the squeezing-rollers H. The fabric on entering the washing apparatus passes over a guide-roller F. It is then led down into the tank between the first pendent plate E and first beater C, then under guide-rollers F, and up past the second beater, and over the first large guide-roller F, which is carried by bearings on the sides of the tanks. The fabric then passes down between the second and third beaters and under guide-rollers F, whence it passes up to and between the first pair of squeezing-rollers H, which wring out the liquor brought up by the fabric. The fabric on passing between these squeezing-rollers is led under a guide-roller F in compartment 2 of the tank containing soapy water. It is then led up between the outer row of beaters and the series of pendent plates E to a driven guide-roller G. From this roller the fabric passes down between the first and second line of beaters C to guide-rollers F in the tank. Passing under these rollers it is led up between the second and third lines of beaters to a second driven guide-roller G, and thence it passes down again to the compartment 2 of the tank to another guide-roller F. From this roller it is led up to a guide-roller F above the tank, and passes down into the third compartment between a pendent plate E and rotary beater. After passing under guide-rollers in this compartment it is led up between the first and second beaters to another large guide-roller F, and thence again into the compartment between the second beater and its pendent plate, after which it is led under a guide-roller F and up to a second pair of squeezing-rollers H, which discharge the soapy liquor therefrom and deliver the fabric to compartment 4. The passage of the fabric through this compartment is precisely similar to that described with reference to compartment 1, and on leaving this compartment the fabric will be ready to enter the drying apparatus.

Mounted in the compartment 2 of the tank A is a drum, M, which is intended to collect the particles of lint or fluff given off by the fabric during the scouring operation. This drum is provided with a periphery of pierced sheet-brass, or it may be of woven wire, and it is made of such a length that its open ends are practically closed by the sides of the tank. In line with this drum the tank is fitted with a suction-pipe leading to a pump, N, which takes the liquor from the tank and forces it up a pipe, N′, to a tank, O, situated immediately above the rollers G. In the bottom of this tank is a long slit for discharging the liquor onto the uppermost of the middle line of beaters. This tank is also fitted with pairs of pipes N^2, which discharge liquor into the troughs formed by the uppermost plates E and onto the beaters immediately below the rollers G. The cloth in its passage through the apparatus is always kept at tension, and has no tendency therefore to crease, and it forms with the inclined plates E trough-shaped receptacles for the scouring-liquor, which receptacles either receive liquor from the compartments to which they respectively belong or from the elevated tank O. The liquor from the uppermost of the elevated segment-shaped troughs D falls into the troughs immediately below them, and so on through the series, and thus a constant supply of liquor is maintained in all the troughs, the compartment 2 of the tank A acting as a receiver for the downpour. As the liquor is retained in contact with the fabric by the plates, the beaters or winces, by their rapid rotation, will dash the liquor in which they are rotating out of the troughs D onto the traveling cloth. At the same time they will force the liquor which lies between the plates E and the traveling cloth to percolate through the cloth, and thus drive out by an efficient mechanical action the size and other ingredients used in the manufacture of the cloth.

The pump N, it will be understood, will, by continuing to raise the soapy liquor from the compartment 2, cause it to be delivered again and again to the cloth until it has become spent, and in doing this, as it draws the liquor from the interior of the drum M, which receives a slow rotary motion, any lint or fluff contained in the liquor will be drawn to the periphery of the drum, from whence it will be removed by a brush, Q, provided for the purpose.

Having now explained the nature of our invention, we claim as our improved apparatus for scouring, dyeing, and washing piece-goods—

1. The arrangement of rotating winces or beaters mounted in shallow troughs provided with a constant supply of liquor, such winces or beaters serving to discharge a limited amount

of such liquor onto piece-goods traveling over or past such rotating winces or beaters, as and for the purpose described.

2. In combination with one or more series of rotary winces or beaters mounted in shallow troughs, whether arranged vertically or horizontally, the yielding plates E for retaining the liquor in contact with the traveling cloth or piece-goods, as and for the purpose above described.

3. In combination with apparatus for scouring, dyeing, or washing pile fabrics, in which rotary winces or beaters are employed, a perforated or reticulated cylinder or web adapted to revolve, and arranged to separate lint or fluff from the liquid in the vat by suction, substantially as herein described.

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