

No. 740,778.

PATENTED OCT. 6, 1903.

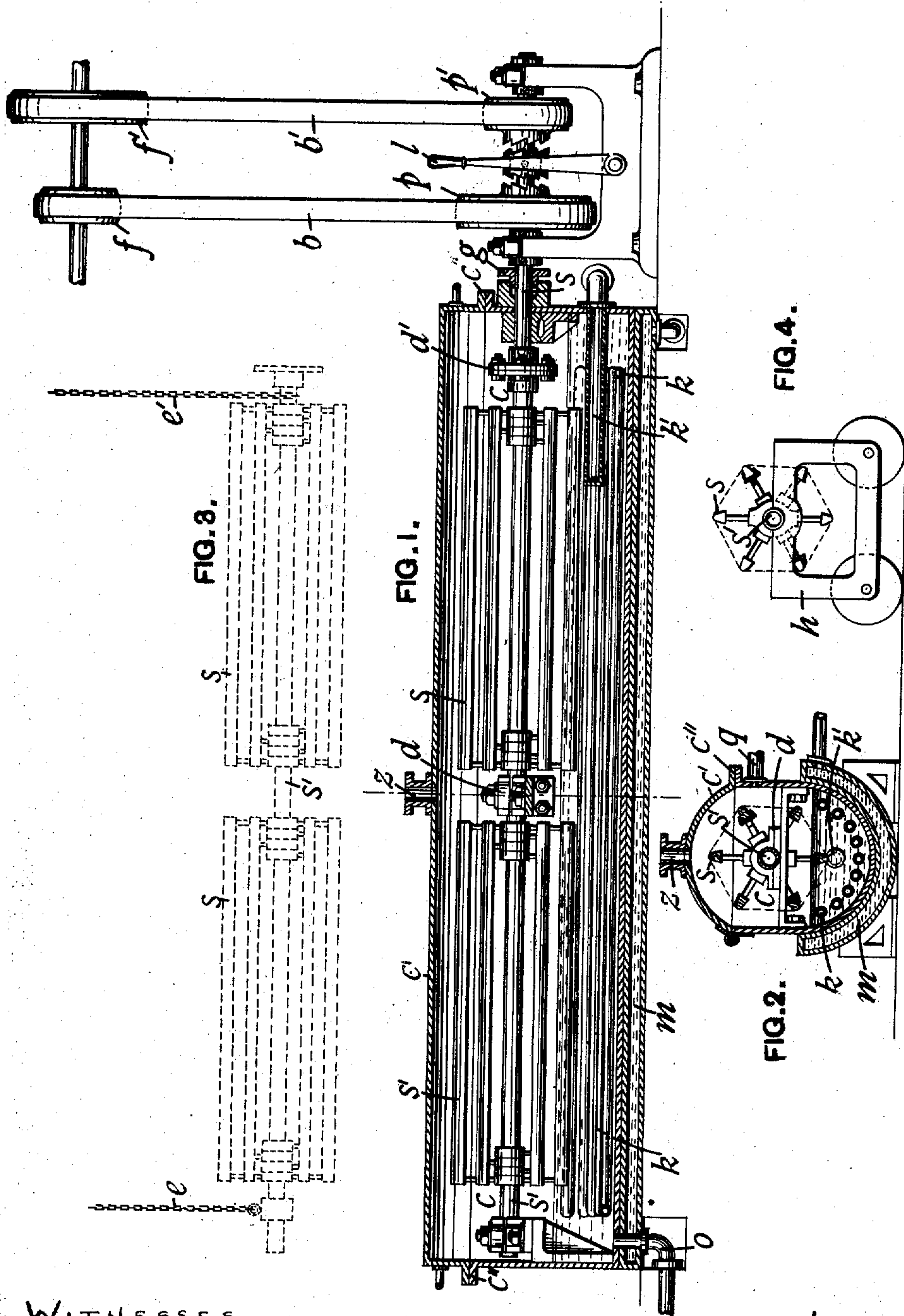
J. E. PRESTWICH.

PROCESS OF TREATING YARNS, &c., WITH VOLATILE LIQUIDS.

APPLICATION FILED MAY 13, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES

James A. Clark.
M. H. Watkins

INVENTOR

John C. Brewster,
My good friend

No. 740,778.

PATENTED OCT. 6, 1903.

J. E. PRESTWICH.

PROCESS OF TREATING YARNS, &c., WITH VOLATILE LIQUIDS.

APPLICATION FILED MAY 13, 1901.

NO MODEL.

2 SHEETS—SHEET 2.

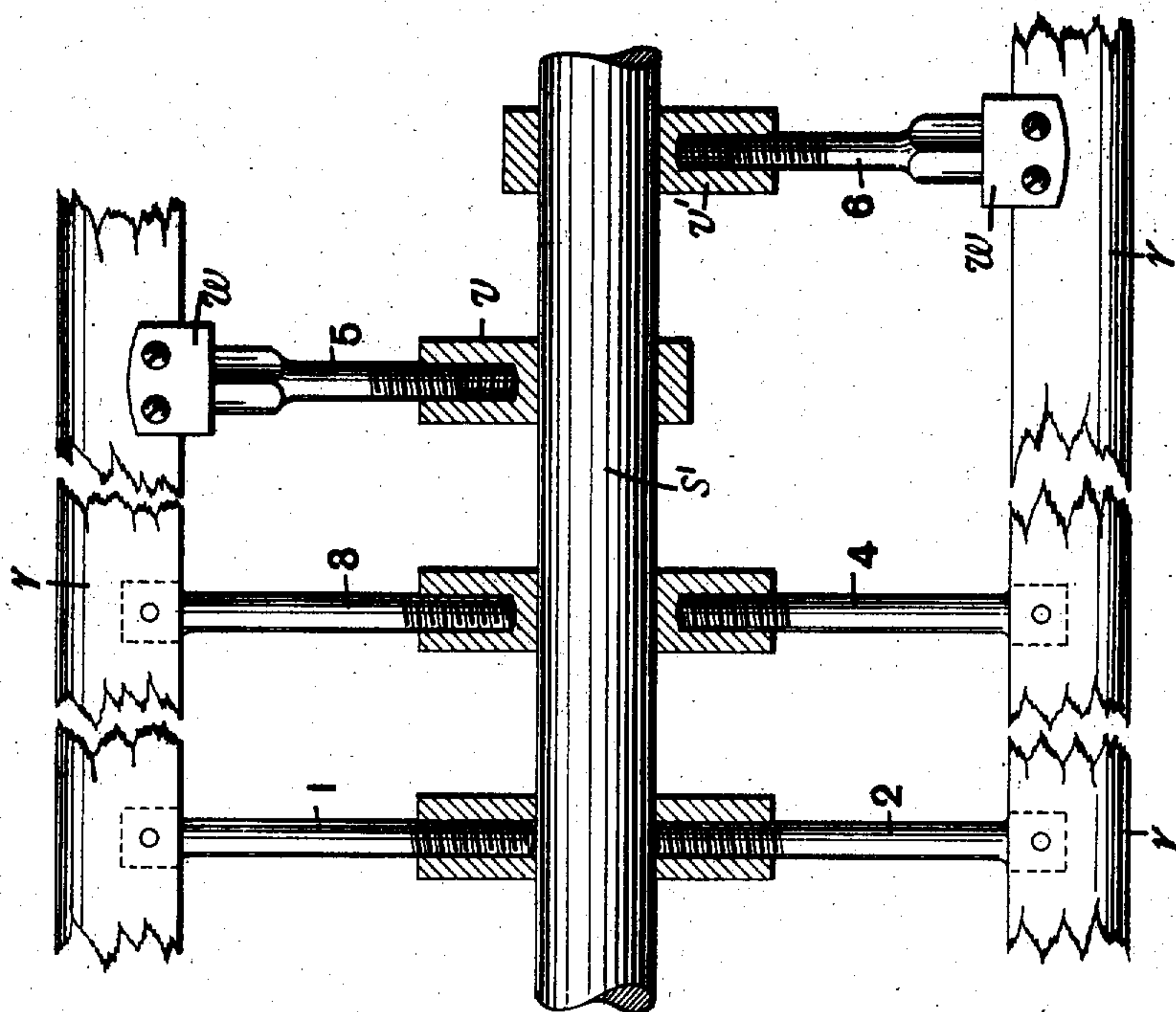


FIG. 6.

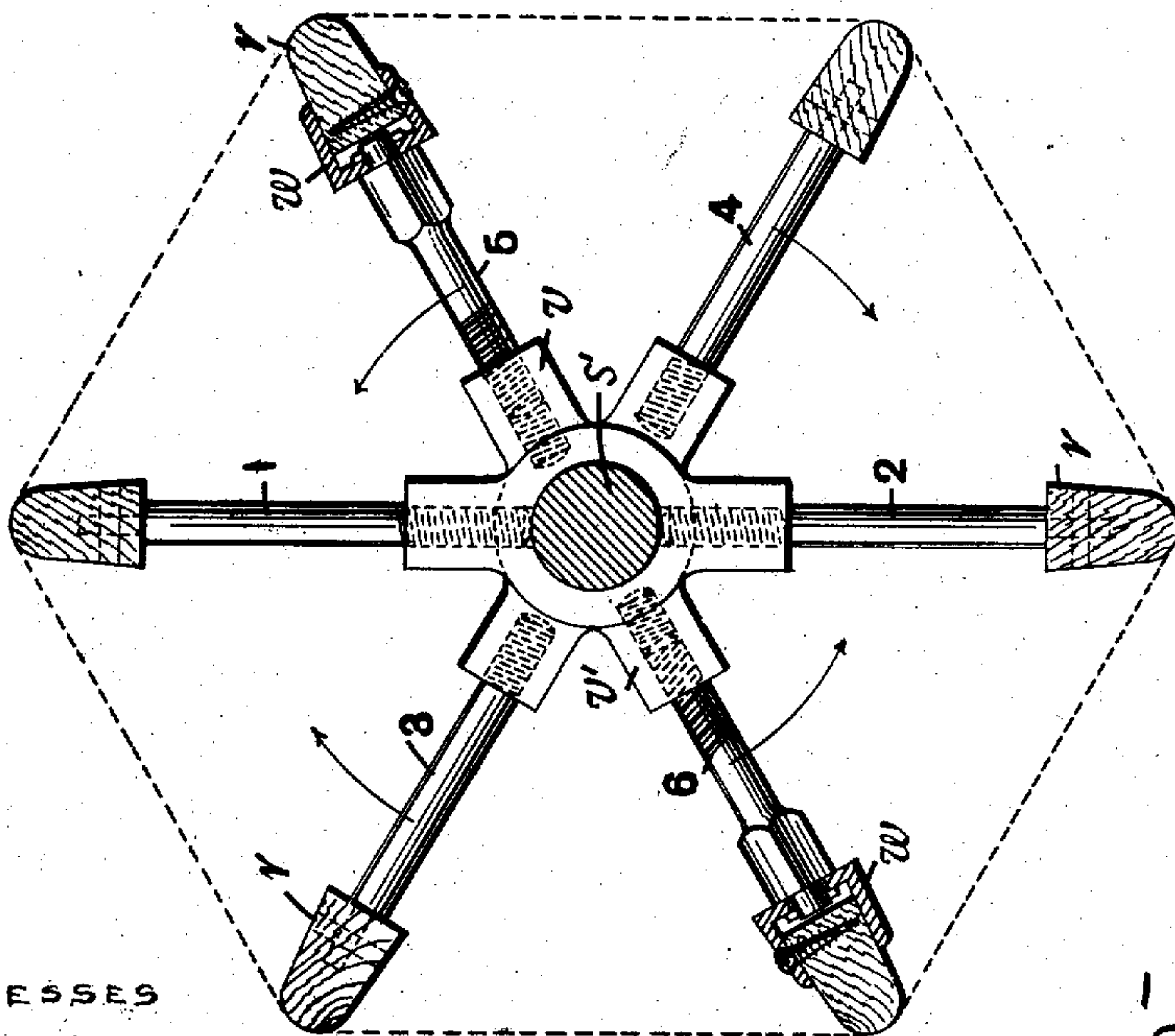


FIG. 5.

WITNESSES

Lorris A. Clark
M. H. Mathews.

INVENTOR

John E. Prestwich
By J. E. Prestwich
att.

UNITED STATES PATENT OFFICE.

JOHN EDWARD PRESTWICH, OF FARNWORTH, ENGLAND.

PROCESS OF TREATING YARNS, &c., WITH VOLATILE LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 740,778, dated October 6, 1903.

Application filed May 13, 1901. Serial No. 60,039. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN EDWARD PRESTWICH, a citizen of the British Empire, residing at Farnworth, in the county of Lancaster, England, have invented certain new and useful Improvements in the Treatment of Textile Yarns and Threads with Volatile Liquids, of which the following is a full, clear, and exact description.

10 This invention relates to the treatment of textile yarns and threads by volatile liquids—as, for example, in spirit dyeing, in degreasing, in charging the yarn or thread with waterproofing compounds dissolved in benzine or naphtha, and in other similar operations.

15 In carrying out my invention I insure that the yarn or thread is fully and uniformly treated with the volatile mixture, that it is thereafter fully dried, and that practically all the volatile constituent of the mixture is recovered in a continuous series of operations, during which the yarn or thread is not once handled or removed. All the operations are conducted within a closed vessel, and it follows that they may be carried out under any reasonable pressure above or below that of the atmosphere or, as is more usual, at the atmospheric pressure.

20 According to my invention the yarn or thread is wound in hanks, which are arranged upon a collapsible reel or “swift” mounted in a closable chamber and capable of being rotated, first, at a comparatively low speed and afterward at a high speed. The various steps in the treatment may be modified according to the nature of the yarn or thread and its treatment and of the volatile liquid employed. In dyeing in a spirit-bath, for example, the dyeing liquor is run into the closed chamber until the lower segments of the hanks on the reel are immersed. The reel is then rotated at its lower speed until the hanks have been sufficiently treated. The liquid is then run off into a storage-tank and the reel is rotated at its high speed, whereby a large proportion of the liquid held in the hanks is centrifugally expelled. If heat is not applied during these two stages, it is applied after the whizzing of the hanks to facilitate their drying. Hot air may then be forced into the closed chamber to effect the evaporation of the liquid still held in the hanks, and their

drying is thus completed. During this final drying stage the hanks may be rotated at the low speed. Finally the contents of the chamber are cooled, whereupon the chamber may be reopened and the hanks may be removed and replaced by untreated hanks for a second operation.

55 The vapors arising during the whole of the process down to the cooling of the contents of the chamber are led away to a condenser, wherein the volatile liquid is recovered for reuse. The final cooling of the contents of the chamber causes the condensation of the vapors then existing therein, and the liquid thus produced may be returned to the storage-tank or be otherwise disposed of.

60 The condenser may form part of a closed system or circuit, which also includes the closed chamber, a fan, and a heating device for producing hot air when required. In this case the external atmosphere is excluded and the process may be conducted at or above or below the atmospheric pressure. The air may be heated when hot air is used by intercalating between a fan and the chamber a length of pipe inclosed within an outer pipe, into which latter exhaust or live steam may be admitted.

80 The accompanying drawings illustrate the essential parts of the apparatus which I employ for the purpose of my invention, subsidiary well-known parts—such as condensers, pumps, tanks, fans, air-heaters, and the like—being omitted for the sake of clearness.

85 In the drawings, Figure 1 represents the apparatus partly in longitudinal section and partly in side elevation. Fig. 2 shows a cross-section through Fig. 1. Fig. 3 illustrates in what manner the reel may be introduced to and removed from the chamber; and Fig. 4 the reel, with hanks thereon, upon a carriage preparatory or subsequent to treatment. Fig. 5 shows in end elevation one set of the reel spokes or arms; and Fig. 6, in side elevation, the same arms, of which some are supposed to be moved from their normal position to enable them to be more clearly illustrated.

100 In each of the figures where the parts are represented, *c* indicates the closable chamber in which the treatment is effected, and *c'* its removable cover, which may be secured in

place by clamps or bolts in connection with the flanges c'' , between which any suitable packing may be inserted.

The reel s is fixed upon the shaft s' , one end of which passes through the packed gland g in the end of the chamber, outside which there are mounted upon the shaft the large and small pulleys $p p'$. A clutch operated by the lever l is fixed on the shaft between the pulleys, so that either pulley may be put into connection with the shaft, according as to whether the high speed or the low speed is required for the hanks. The large pulley p is driven through the belt b from the small pulley f on a driving-shaft, and the small pulley p' through the belt b' from the large pulley f' . Other known means for driving the shaft s at the high and low speeds may be used.

It is convenient to have a number of reels in connection with each closed chamber, so that while one is in the chamber others may be having hanks placed upon or removed from them and still others may be in reserve. They may be lifted into and out of the chamber by hand or by means of any suitable lifting-tackle ee' . That part of the shaft s' on which the reel or reels is or are fixed is moved with them, the coupling d' serving for its connection and disconnection.

A chamber of considerable length—ten feet or three meters, for example—is more economical in working than a short chamber, but difficulties arise when the hanks are rotated at the high speed. To avoid these, I mount two half-length reels upon the shaft instead of a single full-length reel, with a bearing d between them.

When the reels are removed from the chamber, they can be arranged upon a wheeled carriage h , Fig. 4, for transportation.

For heating and cooling the chamber I employ the internal pipes k or the jacket m or both. For injecting hot air I use a perforated pipe k' , connected with a fan and heater. (Not shown in the drawings.)

The outlet and the inlet for the liquid are shown at o and q . These are connected with appropriate tanks, also not shown in the drawings.

Figs. 5 and 6 show a reel suitable for my use. It has six peripheral staves rr on arms numbered 1 2 3 4 5 6. The arms 1 2 are fixed on the shaft s' , while the arms 3 4 are loose thereon. The arms 5 6 are separately screwed into the bosses $v v'$, which are loose on the shaft. By screwing or unscrewing these arms their lengths are adjusted, and thereby the working circumference of the reel can be varied. The staves on these arms 5 6 are carried in the U-shaped brackets w , which are perforated for the outer ends of the arms. Just under the brackets the arms are squared or hexagonal to enable them to be turned by a spanner.

When the hanks have to be put on or removed from the reel, the arms 3 4 are folded against the arms 1 2, and the arms 5 6 are separately folded against the others, as indicated by the arrows.

The upper outlet z from the chamber communicates with the condensing apparatus, (not shown in the drawings,) whereby the vapors given off during the process may be liquefied and collected for reuse. If the chamber is of considerable length, there may be a plurality of such outlets connected together.

Having now particularly described my said invention, I declare that what I claim is—

The process for treating textile yarns and threads which consists in spreading the yarn or thread in an open condition so as to form a cylindrical sheet, upon an open revoluble reel contained in a closed vessel, in introducing into the closed vessel a volatile solvent and rotating the reel therein, in thereafter withdrawing the liquid solvent, then applying heat to the closed vessel, and rotating the reel at a high speed, and finally arresting the movement of the reel and applying a cooling agent to the still closed vessel so as to liquefy the solvent vapors before the vessel is reopened, substantially as set forth.

In witness whereof I have subscribed my signature in presence of two witnesses.

JOHN EDWARD PRESTWICH.

Witnesses:

WILLIAM E. HEYS,
ARTHUR MILLWARD.