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WINCH AND LIKE DYEING MACHINES

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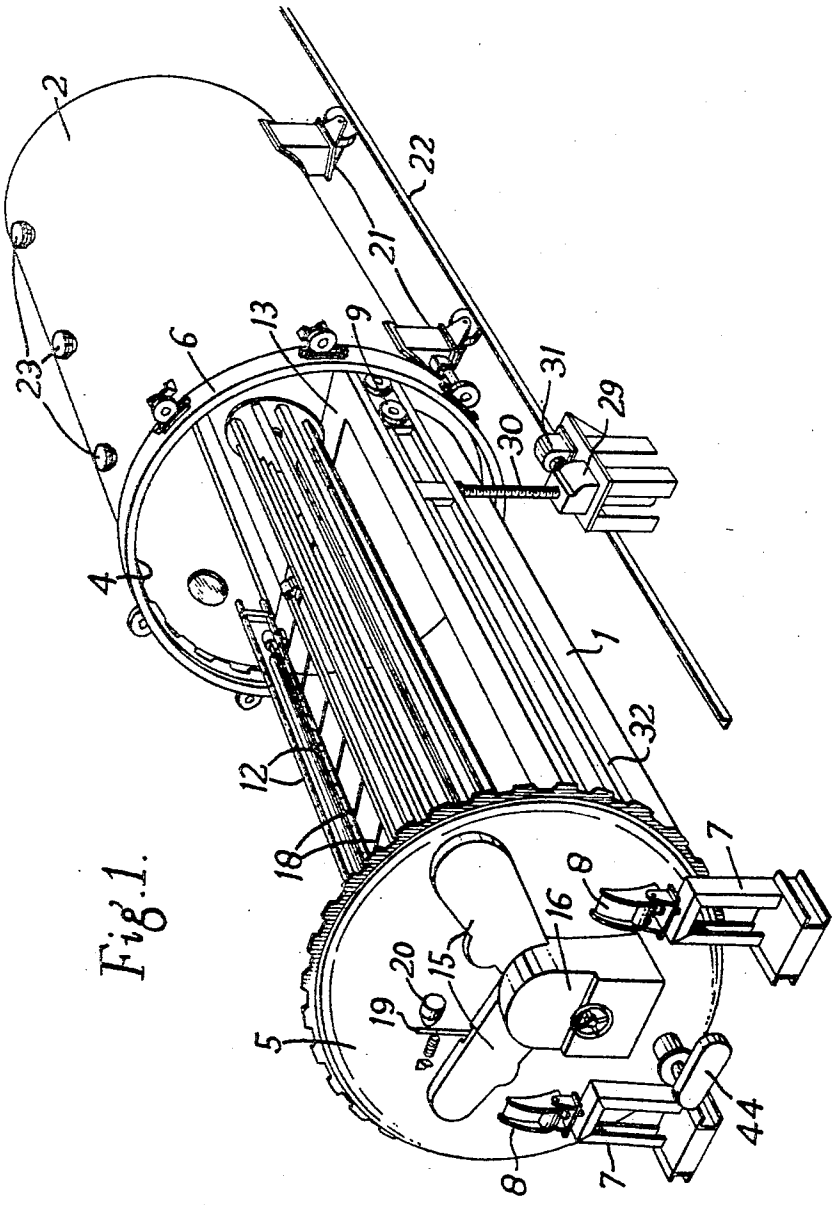


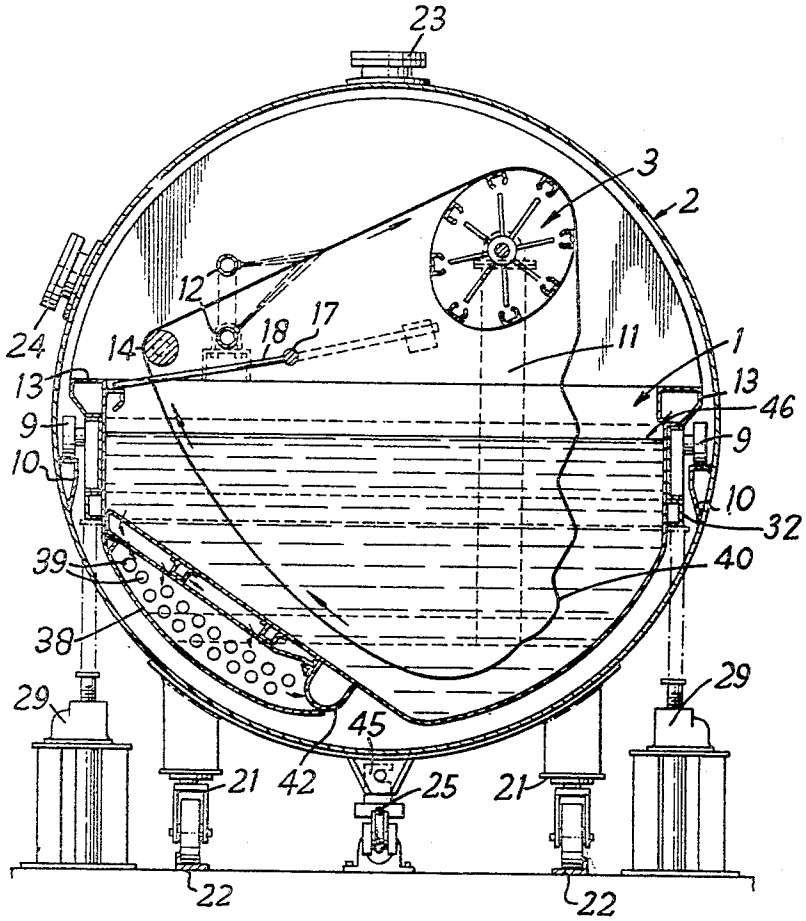
Fig. 1.

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Fig. 2.



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Fig. 3.

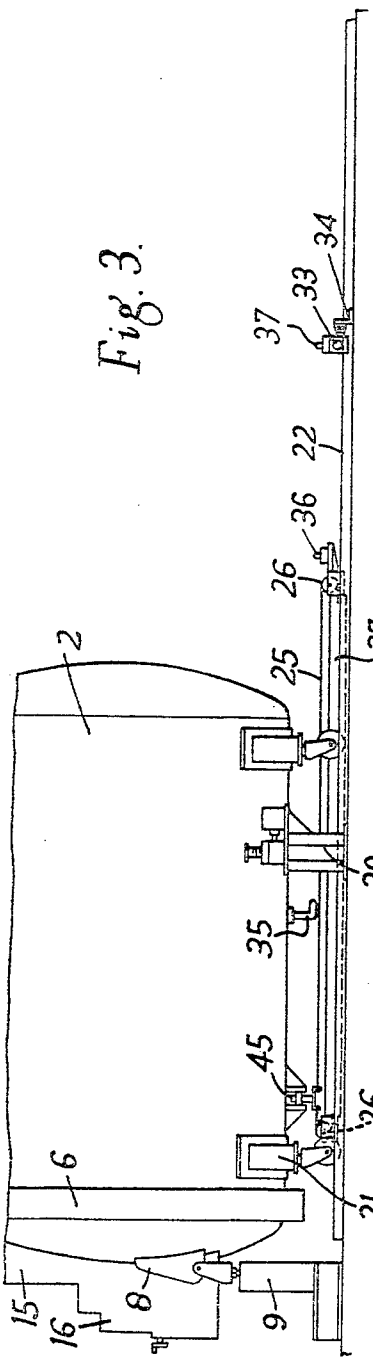
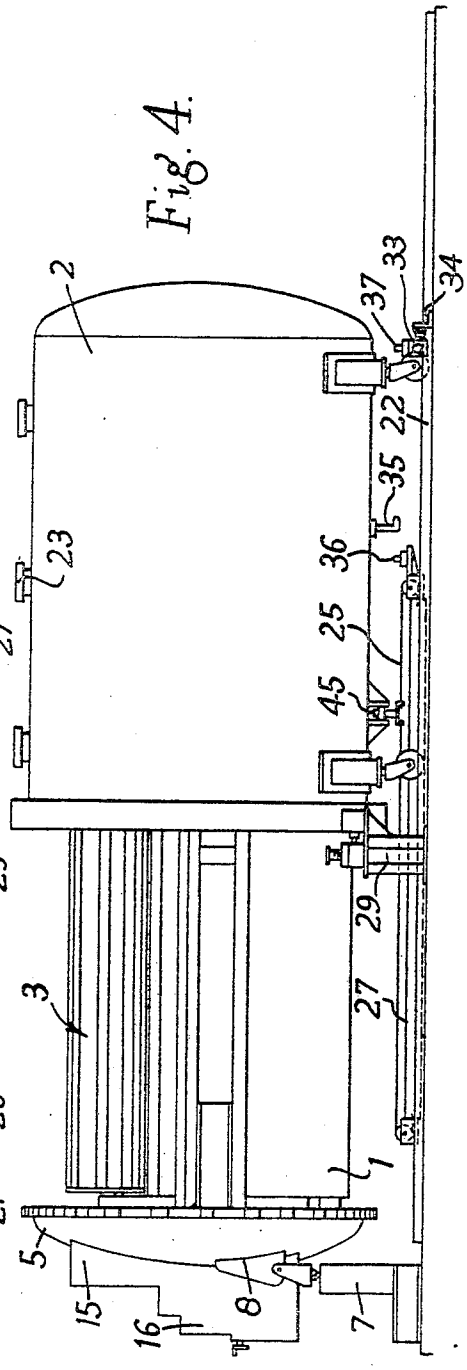


Fig. 4.

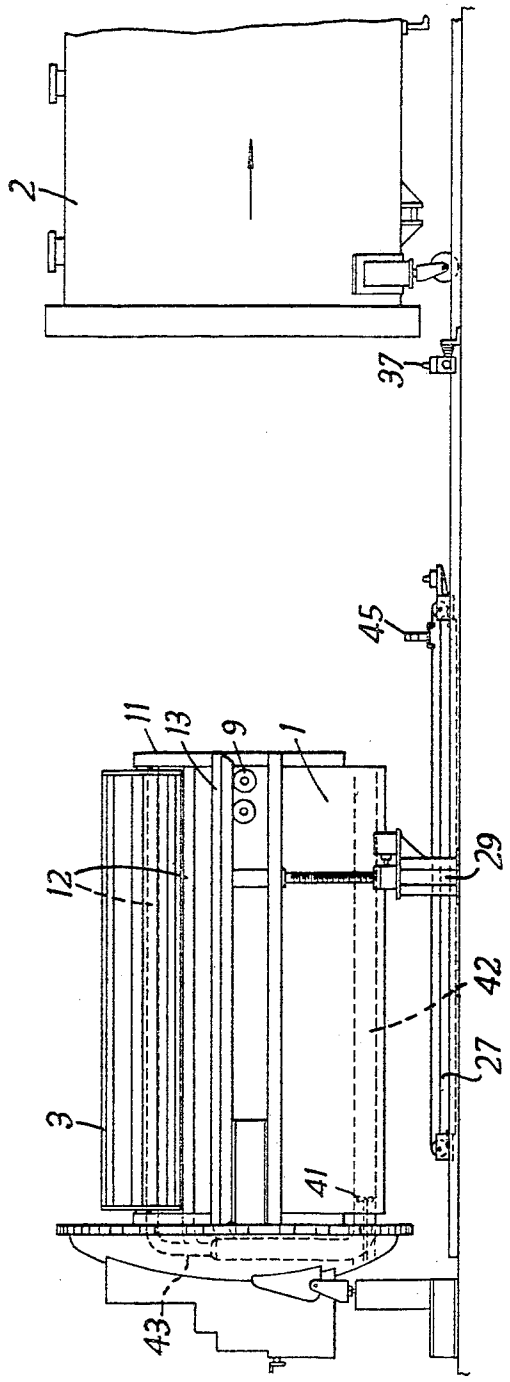


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Fig. 5.



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3,479,846

WINCH AND LIKE DYEING MACHINES

Derek J. Walsom, Queniborough, England, assignor to Samuel Pegg & Son Limited, Leicester, England

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Int. Cl. D06p 5/00; D06f 39/00
U.S. Cl. 68—62 3 Claims

ABSTRACT OF THE DISCLOSURE

A high temperature winch dyeing machine in which the dye bath and winch assembly are separable from the outer casing to facilitate loading and unloading of the ropes of fabric.

In recent years winch dyeing machines have been developed for dyeing ropes of fabric under elevated temperature conditions by circulating the ropes, under impulsion of a winch, through hot dye liquor in a pressure-sealed vessel. This vessel, for example a tank or keir (which latter expression will hereinafter be exclusively used for brevity) comprises a horizontal casing with the winch, the dye bath, and means for heating the dye liquor housed therein, and it is to this particular form of machine, sometimes called a dye beck, that the present invention relates.

The merit of high-temperature winch dyeing in machines of the kind referred to is that the dye liquor will be taken up by the goods, particularly if they are of man-made fibres, at a higher rate than is the case at atmospheric temperatures and will tend to impart a more uniform overall tone to the goods. This, however, means that the dyeing vessel must be closed and pressure-sealed during the processing to avoid temperature losses and, indeed, to enable the liquor to be heated above its normal boiling point (i.e., its boiling point in open atmosphere) without boiling off, by virtue of the pressure which it has built up in the part of the closed vessel not occupied by the liquor.

Current forms of high temperature winch dyeing machine use a vessel which is equipped with small doors or portholes for access to the winch and other mechanism installed in the vessel, and for loading and unloading the fabric on and from the winch and other guide means usually employed. In practice the winch is usually mounted in end walls of the vessel with its axis horizontal and the ropes of fabric are disposed side-by-side along the length of the winch, each rope being in the form of a closed loop which runs around the winch, down on to and across a horizontal floor at the lower part of the vessel, up again to and around a guide shaft or roller, and back to the winch.

It will therefore be seen that the threading of the ropes around the winch and guide shaft as well as through separator fingers which are sometimes provided (see below), the attachment together of the ends of each rope, and the reverse procedures during unloading, can be awkward, laborious, and time-consuming when performed from the exterior through a relatively-constricted opening.

The machine of this invention has been devised to combat these difficulties. It is also designed to increase the range of potential use of the machine.

In pursuit of the first of these aims the winch and the casing of the machine according to the present invention are arranged for relative axial movement to open the keir and provide for unobstructed access to the winch. This enables the winch to be parted from the surrounding casing when it is to be loaded and unloaded, which greatly assists these operations and caters for rapid handling of the work.

In accordance with a feature of the invention, the casing may be entirely separable from the winch and dye bath assembly and wheeled for travel to another site, auxiliary means being provided to support said assembly on separation of the casing.

This provision for complete separation and travel of the casing enables it to be moved to another site where it may be closed over a second winch and bath assembly to implement a dyeing operation at this second site whilst the winch assembly at the first site is being unloaded and reloaded. This facility also caters for the use of the casing for other duties when not being used to house a winch dyeing assembly, for example to complete a drying chamber, or a washing or other vessel in which the dyed work, or other work, may be given other treatments.

A form of winch dyeing machine in accordance with the present invention is illustrated in the accompanying drawings:

FIGURE 1 is a perspective illustration of the machine with the casing on the point of separation from the remainder of the machine,

FIGURE 2 is a vertical cross section through the machine with the casing closed to encompass the winch and dye bath assembly, and

FIGURES 3, 4 and 5 are diagrammatic illustrations showing the machine in elevation and in three potential conditions of use.

The machine illustrated comprises, as its main components, a dye bath generally indicated at **1**, a cylindrical casing **2** which encloses this bath during normal dyeing operation, but can be retracted therefrom, and a winch **3** supported above the dye bath **1**.

The casing **2** is open at its inner end **4** wherein it is provided with a peripheral set of projections for co-operation with corresponding projections on a fixed end wall **5**. Casing **2** can be closed against wall **5** and fastened thereto by a locking ring **6** in known fashion. The end wall **5** is mounted in a vertical position on supports **7** through brackets **8** which permit a certain amount of hinging to allow for slight lifting and lowering of the outer end of the bath when the casing **2** is removed therefrom (see below).

At its outer end the dye bath is provided at each side with a pair of rollers **9** which run on internal rails **10** on the wall of the casing **2**. The bath is also provided at its outer end with an upstanding support **11** for one end of the shaft of the winch **3**. The other end of the shaft is journalled in bearing (not shown) on the inside face of the end wall **5**. Further, the bath has a mounting at this outer end for two apertured spray pipes **12** which are arranged one above the other and extend longitudinally along the length of the bath to be supported at the inner end from the rim **13** of this bath. In addition, the rim **13** of bath **1**, at the outer end of the latter, supports a guide roller **14**, which, again, extends over the complete length of the bath. At its inner end it is rotatably mounted in the end wall **5** and passes through the latter. The projecting end of the guide roller **14** and the shaft of winch **3** are rotated by belt and pulley drives, housed beneath covers **15**, from a driving motor at **16**. The details of this drive has not been illustrated since it is commonplace in winch dyeing machines.

Mounted on the rim of dye bath **1**, and extending parallel to the winch and the guide roller **14**, is a peg rail **17** of known type with spaced fingers **18** to segregate the ropes of fabric looped over winch **3** and guide roller **14**. The rail **17**, at its inner end, carries a contact **19** to operate a micro switch **20** and arrest the winch, in known fashion, in the event that entangled ropes operate any finger **18**.

It will be observed that that the cylindrical casing or shell **2** is provided at its underside with castors **21**, preferably of the swivelling type. When the casing is encompassing the bath **1** the castors **21** are adapted to run on fixed rails **22** beneath the machine, but when withdrawn from the latter (see below) can be orientated to allow the casing **2** to be steered to any required site. This casing **2** is further provided with inspection windows **23** and with windows **24**.

The means for propelling the casing relatively to the dye bath and winch assembly comprises an endless cable **25** running over fixed pulleys **26** and joined at its ends to a piston in an air cylinder **27** arranged horizontally between the tracks **22**. This cable **25** is arranged to be coupled by a pivotable catch **45** with a piece **28** at the underside of casing **2**.

This casing is, as will already be clear from the foregoing, capable of being retracted to and from the end wall **5**, the rails **10** serving, during this movement, to support the outer end of bath **1**. In implementation of the invention, however, provision may also be made for entire removal of the casing **2** to another site in which event other means will be needed to support the outer end of the bath. For this purpose, use will be made of motor-driven jacks **29** which are fixed alongside the track **22**. The screw **30** of each jack is operated by the individual motor **31** of each jack and is arranged to bear against the underside of a stiffener **32** running along the exterior of the bath.

The potential opening and closing operations of the keir will now be described with reference to FIGURES 3, 4 and 5. In the first of these figures the keir is shown closed, i.e. in the condition it would normally find itself when dyeing is taking place. In FIGURE 4 the keir is shown in the process of being opened to disclose the bath and winch assembly, but the casing is still connected to this assembly. In FIGURE 5 the casing has been removed entirely from the remainder of the machine.

The movements and manipulations of the machine are governed from a panel (not shown) which includes a control knob which is rotatable to select the positions "Lock" (denoting the operation of the ring **6** to fasten and seal the casing to the end cover **3**), "Unlock" (to reverse this procedure), "Move Out" (governing the outward movement of the casing **2**) and "Move IN" (dictating the reverse movement of casing **2**). In addition there is a two-position switch controlling alternative conditions "Move Out—Not Separate" and "Move Out—Separate."

When it is only required to open the keir without separation, a buffer pin **33** is inserted between brackets **34** so as to straddle the rail **22** at each side of the machine. The result is to close a micro switch (not shown) to prepare solenoid controls for the admission of air to cylinder **27** to move the cable **25** and propel the keir casing **2** in the outward direction when the aforesaid control knob is turned to the "Move Out" position.

When this is implemented and the keir casing **2** moves outwards to the position shown in FIGURE 4, a depending striker **35** at the underside of the casing **2** will contact and operate a micro switch **36** during its travel. The result of this is to cut off the air supply to the cylinder unit **27**, but the casing will continue its outward motion, under its own momentum, until it strikes pins **33** and is stopped. In this position (see FIGURE 4) the

casing rail **10** continues to support the bath **1**. The winch and dye bath are completely exposed and the dyed textile ropes can be removed and replaced by fresh ropes to be delt with in the next dyeing operation. Any other adjustments or additions to the bath, etc. which are required can also be done at this time.

Since actual separation is not required the operating knob can then be turned to "Move In," when the air supply to cylinder **27** will be applied in the reverse direction and the casing **2** consequently returned and applied against end wall **5**. The control knob is then turned to "Lock" and the machine is ready for dyeing operation.

In the alternative event that the casing **2** is separated entirely from the winch and bath assembly, the aforementioned control switch will be moved to "Separate" this preparing the circuit for the lifting jacks **29**. The stop pins **33** are again inserted and the control knob turned to "Unlock" and "Move Out" as before. When the withdrawing casing reaches pins **33**, on this occasion the striker **35**, abutting a further micro switch **37** at this location, causes the jacks **29** to be raised. When the latter are fully lifted they close a switch (not shown) to allow air to flow again to air cylinder **27** to further retract the casing wheels **21** beyond pins **33** (now removed) and the casing beyond the bath, which is left supported on jacks **29**. The casing can then be uncoupled from the propelling cable **25** and moved elsewhere.

Referring now to FIGURE 2, it will be observed that the bath **1** is provided at its lower part, and to one side, with a blister chamber **38** housing a bank of steam pipes **39**. It will also be observed that the rim **13** of the bath is hollow and is provided along one side with a series of apertures **46** for directing dye liquor, flowing through this conduit **13**, in an inclined downward direction (as shown by the arrow in FIGURE 2) so as to provide a surge of liquor towards the ropes **40** descending from the winch **3**. It will also be observed that the nozzles **12** are directed to spray liquor against the ropes **40** between the guide roller **14** and winch **3**.

The circulation of liquor to produce these results is performed by an impeller **41** arranged in a further conduit **42** at the bottom of the bath and receiving heated liquor from chamber **38**. With impeller **41** running, liquor is drawn through chamber **38** from the body of the bath, and the heated liquor is propelled by this pump up a conduit **43** at the inner end of the bath, whence it is directed to the rim of conduit **13**, or to this conduit and the nozzles **12**, via a control cock (not shown). The impeller **41** is operated through a drive **44** at the exterior of the machine.

I claim:

1. In a high temperature winch dyeing machine including a kier comprising a horizontal casing with a winch, a dye bath, and means for heating dye liquor housed therein, the improvements wherein the winch and the dye bath constitute a fixed assembly relatively to which the keir casing is axially movable and from which it is entirely separable, said casing being wheeled for travel to another site, and auxiliary means being provided to support said assembly on separation of the casing.

2. A winch dyeing machine according to claim **1**, characterised by the fact that the keir has vertical end walls, one of which is a fixture and serves to mount the inner end of the winch and dye bath assembly, and the other of which forms part of the aforesaid movable casing, said fixed end wall serving also to mount a work guide roller spaced opposite said winch and disposed, as is said winch, above the dye bath, and to mount means for rotating said winch.

3. A winch dyeing machine according to claim **1**, characterised by the fact that the dye bath incorporates a dye liquor circulation system comprising a rim conduit apertured to direct liquor towards work descending from the winch, jet nozzles for spraying liquor against work passing from said work guide roller to the winch, a heat-

exchange chamber including the liquor-heating means, and a circulating impeller.

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