

Oct. 16, 1934.

L. B. HASBROUCK

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METHOD OF DYEING LOOSE TEXTILE MATERIALS

Filed April 23, 1931

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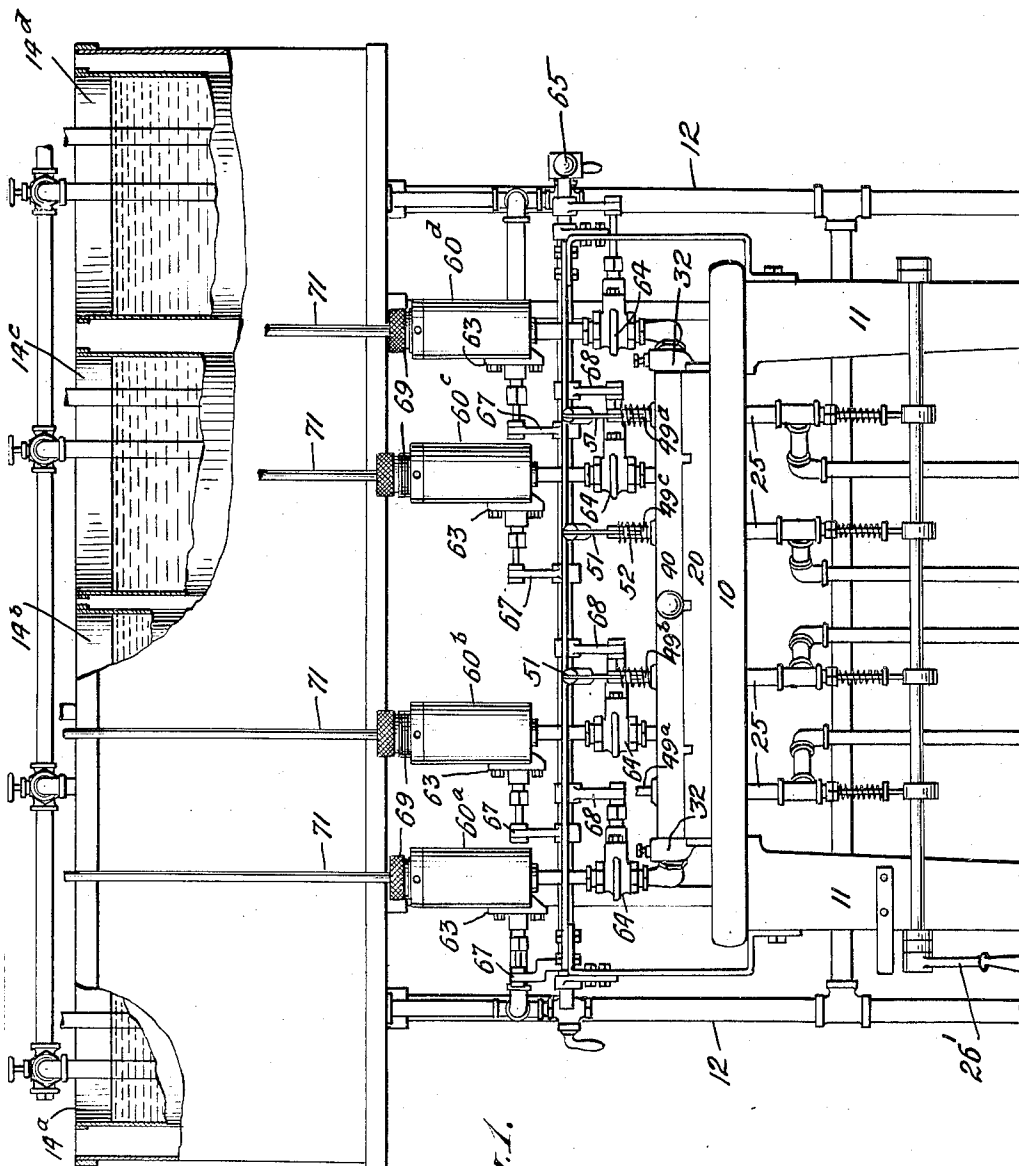


Fig. 1.

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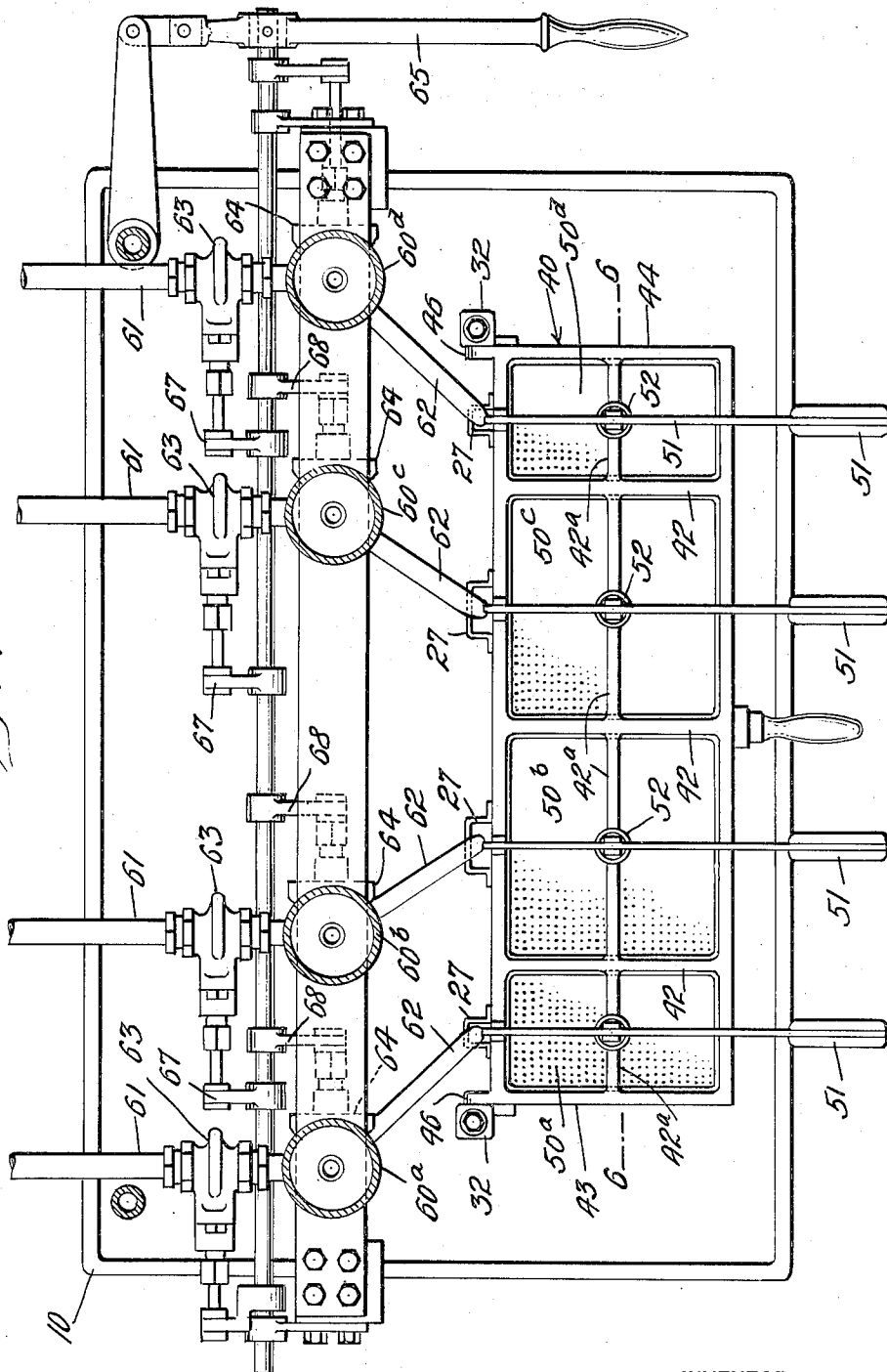
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Fig. 2.



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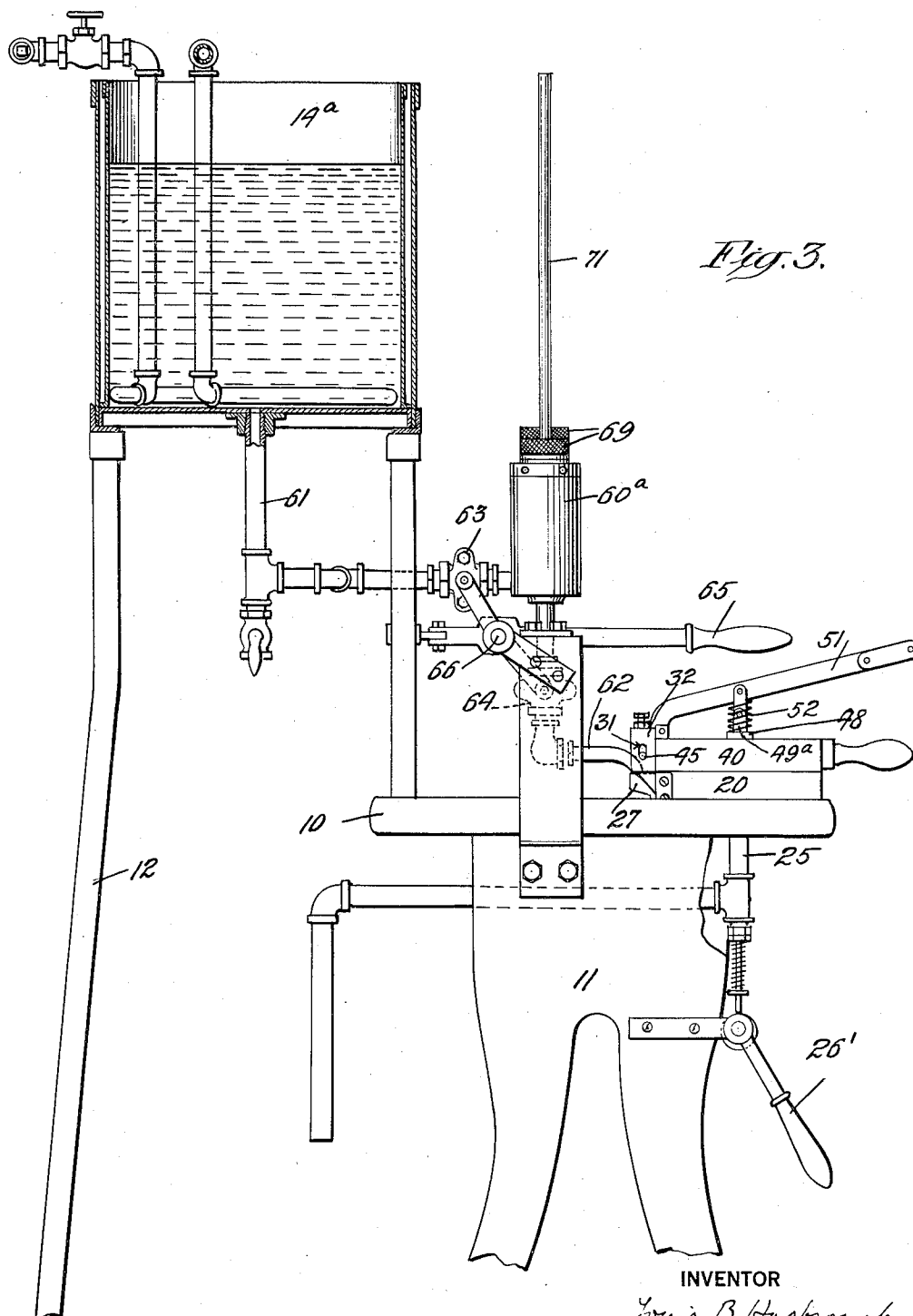
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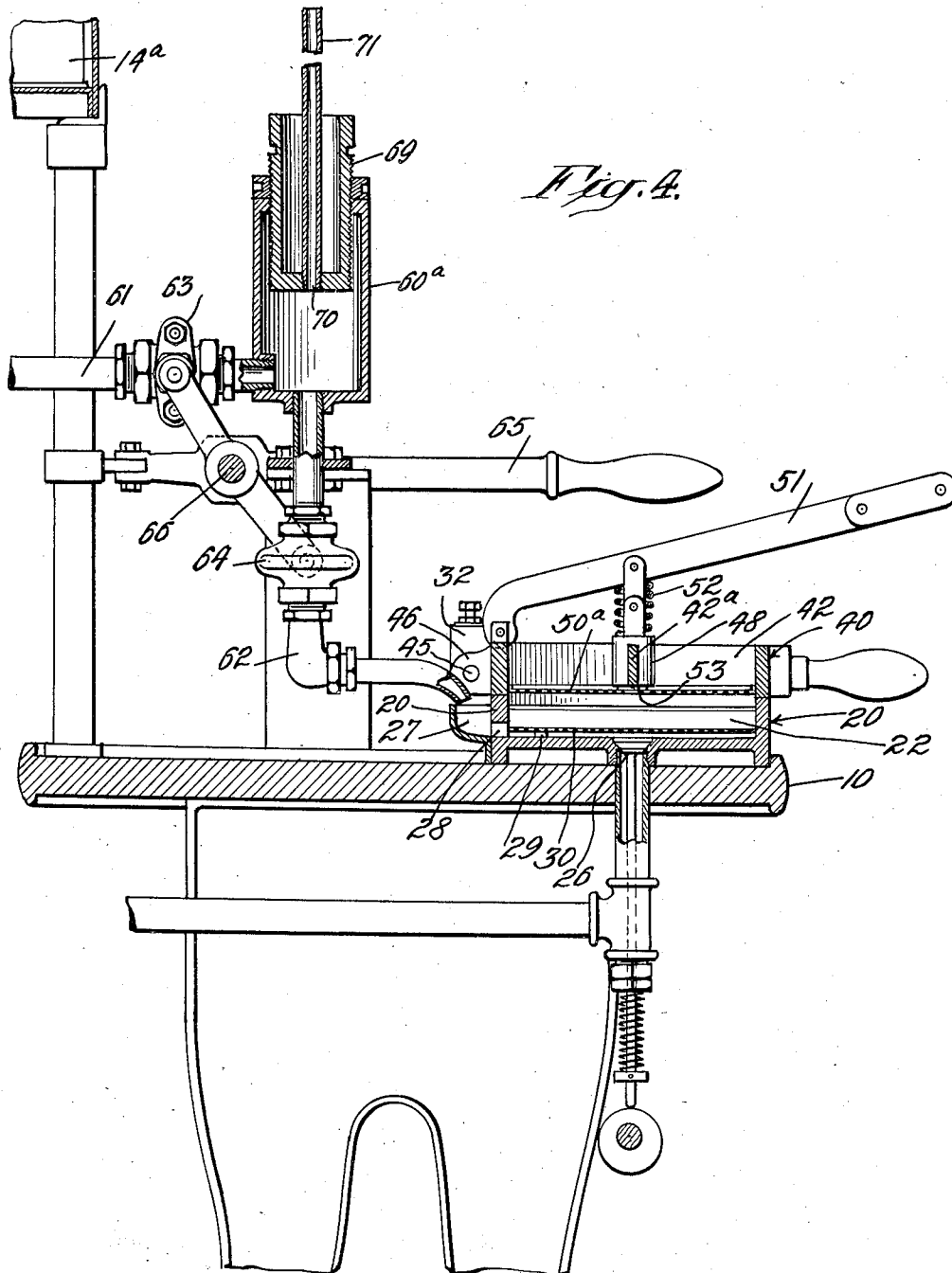
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METHOD OF DYEING LOOSE TEXTILE MATERIALS

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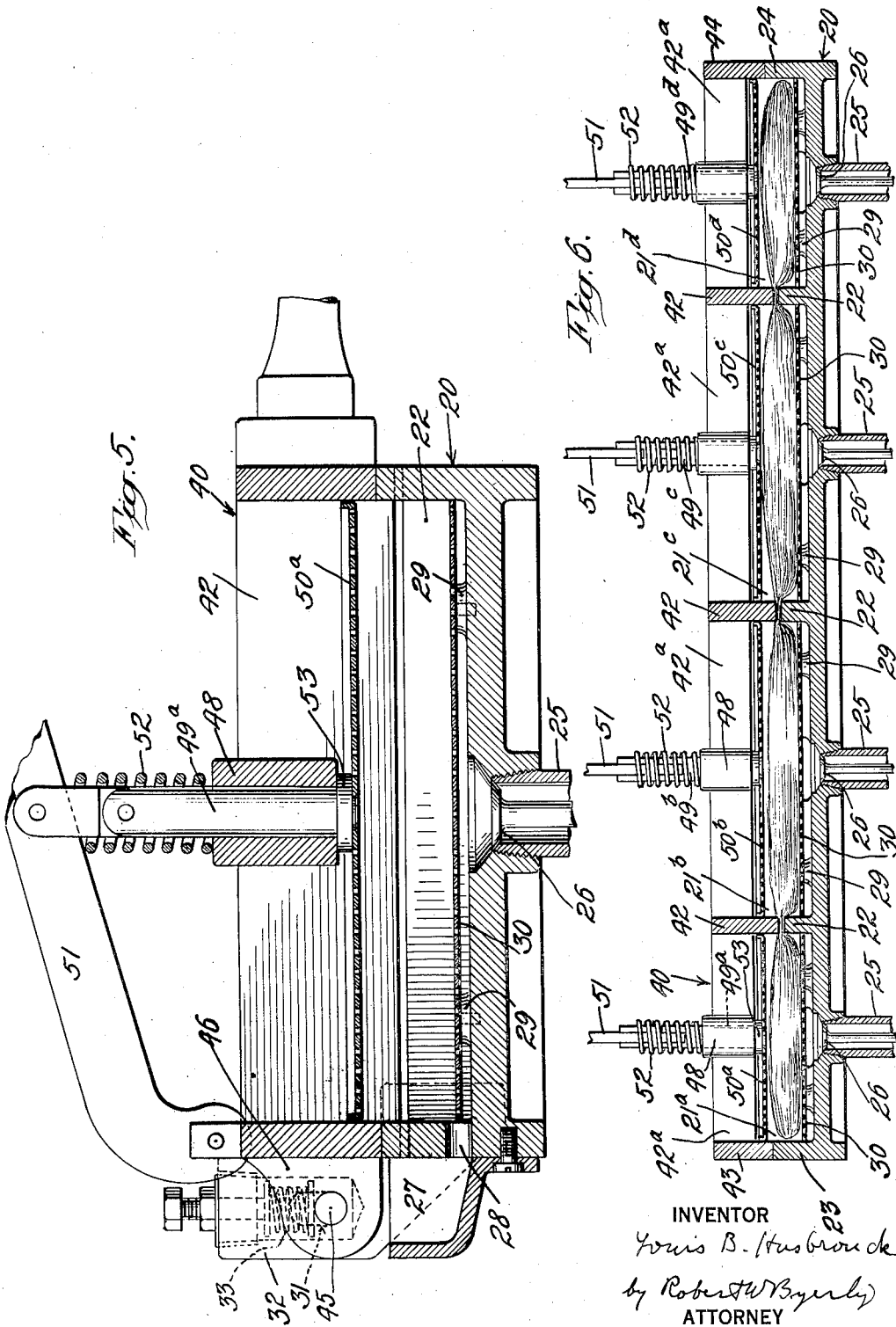
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METHOD OF DYEING LOOSE TEXTILE MATERIALS

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UNITED STATES PATENT OFFICE

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METHOD OF DYEING LOOSE TEXTILE MATERIALS

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Application April 23, 1931, Serial No. 532,184

6 Claims. (Cl. 8—5)

This invention relates to a new method of dyeing loose textile materials, which I have termed "puddling", and there is shown therein an apparatus to assist in carrying out the new method and to apply it to the multi-color dyeing of skeins of yarn.

The new method is of especial value when applied to the dyeing of artificial silk yarn which cannot easily be dyed by the methods commonly applied to cotton yarn.

My new method of dyeing is carried out by wholly or partly immersing the loose textile mass to be dyed in a quantity of liquid dye which need not be much greater than that necessary to permeate the material. The absorption of the dye in the material is caused by repeatedly compressing and releasing the material while immersed in the liquid. The pressing is accomplished without confining the dye, and is preferably done by squeezing the submerged mass between perforated plates or screens. This process, which I term "puddling", has proved very successful in causing a rapid and even absorption of the dyeing liquid by loose masses of artificial silk yarn. The method has especial advantage when applied to multi-color dyeing, owing to the fact that it is carried out without placing the dye liquid under pressure and, for this reason, does not tend to force the dye into the parts of the mass between the parts which are to be colored.

The apparatus which I have devised for assisting the carrying out of the puddling method of dyeing and for applying it to multi-color dyeing of skeins of yarn includes means for tightly clamping short intermediate portions of skeins of yarn, for submerging the parts of the skeins between the clamped portions in measured quantities of different colored dyes, and causing the absorption of the dyes in the different parts of the skein by the puddling method.

In order that my invention may be clearly understood, I will describe in detail the construction of a specific multi-color dyeing machine embodying the invention and the use of the machine in carrying out the puddling method of dyeing. Such a machine is illustrated in the accompanying drawings, in which:

Fig. 1 is a front elevation of the machine with parts broken away;

Fig. 2 is a plan view of the machine, omitting the dye reservoirs, and showing the measuring cups in horizontal section;

Fig. 3 is an end elevation of the machine on

a larger scale than Figs. 1 and 2, showing one of the dye reservoirs in section;

Fig. 4 is a partial end elevation on a still larger scale showing one of the measuring cups and one of the puddling devices in vertical section;

Fig. 5 is an enlarged detailed view of one of the puddling devices in vertical section; and

Fig. 6 is a vertical section on the line 6—6 of Fig. 2 showing the puddling devices and clamps.

The multi-color dyeing machine shown in the drawings has a table 10, supported on legs 11, and standards 12 supporting a number of dye reservoirs 14a, 14b, 14c, 14d behind and above the table.

On the table is a shallow trough or box 20 divided into compartments 21a, 21b, 21c, 21d by transverse ridges 22 which are a little lower than the walls 23, 24 of the box. Each compartment has at its bottom an outlet opening 25 controlled by a valve 26. On the back wall of the box 20 are a plurality of inlet spouts 27 communicating with the compartments through holes 28 in the back wall. The floor of each compartment 21a, 21b, 21c, 21d, is provided with short spaced projections 29 for supporting a perforated plate 30 a short distance above the floor.

To the back wall of the box 20 is hinged a clamping member 40 having the form of an open frame with side and end walls, 43, 44, adapted to rest on the side and end walls 23, 24 of the box. The clamping member has intermediate cross-pieces 42 extending below its side and end walls and adapted to lie close to the ribs 22 of the box, so that intermediate parts of skeins of yarn spread out in the box may be clamped between them. To insure an even fitting of the clamping member 40 on the box 20, a play is allowed in the hinges connecting the two. The hinge pivots 45 are fixed in flanges 46 on the back wall of the clamping member 40, and pass through slots 31 in flanges 32 on the back wall of the box 20. Adjustable compression springs 33 carried by the flanges 32 react against the pivots 45 to prevent them from moving in the slots 31, except when the clamping member is brought down against the box, in which case such slight movement of the pivots as may be necessary to insure a perfect fit is permitted by the springs.

The clamping member 40 also has a longitudinal cross piece 42a in which are provided bearings 48 for the slide rods 49a, 49b, 49c, 49d to whose lower ends are fixed perforated plates 50a, 50b, 50c, 50d, one of which is opposed to the

perforated plate 30 in each compartment. Pivoted handles 51 are provided for reciprocating the slide rods 49a. The handles, rods and the plates 50 are normally held in the raised position shown in the drawings by compression springs 52 reacting between the upper sides of the bearings 48 and the handles to draw abutments 53 at the lower ends of the rods against the lower sides of the bearings 48.

Means are provided for introducing measured quantities of dye from the reservoirs 14a, 14b, 14c, 14d into the compartments 21a, 21b, 21c, 21d of the box 20 through the spouts 27. Such means include measuring cups 60a, 60b, 60c, 60d connected with the reservoirs by conduits 61 and with the spouts by conduits 62. The conduits 61 and 62 contain valves 63, 64 which are operated by a handle 65 on a control shaft 66 so connected with the valves by arms 67, 68 that turning the handle in one direction opens all the valves 63 while the valves 64 are closed, while turning the handle in the other direction opens the valves 64 while the valves 63 are closed. The capacity of each measuring cup may be varied by means of an adjustable closure 69 screwed into the upper end of the cup and provided with an air-vent opening 70 to which is connected a small pipe 71 extending above the liquid level in the dye reservoirs.

In the use of the apparatus which has been described, the clamping member 40 is first swung up about its hinge, and, while it is thus out of the way, skeins of yarn to be dyed are spread out in the shallow box 20 so that intermediate parts of all the skeins extend across the ribs 22, while the remaining portions of the skeins rest on the perforated plates 30 in the compartments 21a, 21b, 21c, 21d. The clamping member 40 is then closed so that its side and end walls rest on the side and end walls of the box 20, and its intermediate transverse cross-pieces 42 clamp parts of the skeins against the ribs 22 of the box. For reasons hereinafter explained, only a moderate clamping pressure is necessary. The weight of the clamping member is ordinarily sufficient to supply this pressure.

The next step is to turn the handle 65, which has previously been positioned to open the valves 63, to close these valves, and open the valves 64 so as to admit measured quantities of different colored dyes from the measuring cups to the compartments 21a, 21b, 21c, 21d. These quantities are not sufficient to fill the compartments up to the top of the walls 23, 24, so that no leakage occurs between these walls and the side and end walls of the clamping member. The compartments are filled to a level either below or only slightly above the top of the ribs 22, so that there is substantially no hydrostatic pressure tending to force the dye into the portions of the skeins overlying these ribs. It is for this reason that a very tight clamping of these portions of the skeins is not required.

The next step is to depress each handle 51 a considerable number of times so as to cause the perforated plates 50 to depress the unclamped portions of the skeins into the dye, and to re-

peatedly squeeze and release these portions. In this operation, the dye in each compartment is unconfined as it is free to flow up through the perforations of the plates 50 at each downstroke of the plates. After the above-described operation, which I have termed "puddling", has been continued for a sufficient length of time to completely saturate each unclamped portion of the skeins with dye, such excess dye as remains in the compartments is withdrawn by opening the valves 26 by means of a common operating lever 26', and depressing each plate 50 once more to squeeze out through the perforations of the plates 30 any excess dye held in the dyed portions on the skeins. The clamping member 40 is then swung up on its hinge to permit removal of the dyed skeins and the placing of undyed skeins in the box 20.

What is claimed is:

1. The method of spot dyeing masses of textile material which comprises clamping parts of the material to prevent dyeing thereof, immersing the remaining parts in the dye, and causing said immersed parts to become impregnated with said dye by causing repeated forcible expression and reabsorption of the dye therein.

2. The method of spot dyeing loose masses of textile material which comprises clamping parts of the material to prevent dyeing thereof, immersing the remaining parts in open dye baths, and causing said remaining parts to become impregnated with dye by repeated compression and release of said parts while in contact with the dye.

3. The method of spot dyeing skeins of textile material which comprises clamping short intermediate portions of the skeins, immersing the parts of the skeins between the clamped portions in the dye and causing said immersed parts to become impregnated with said dye by causing repeated forcible expression and reabsorption of the dye therein.

4. The method of spot dyeing skeins of textile material which comprises clamping short intermediate portions of the skeins to prevent dyeing thereof, partially submerging the parts of the skeins between the clamped portions in open dye baths, and causing said remaining parts to become impregnated with dye by repeated compression and release of said parts while in contact with the dye.

5. The method of multi-color dyeing skeins of yarn, which comprises clamping short intermediate portions of the skeins and immersing the parts of the skeins between the clamped portions in differently colored dyes, and causing said parts to absorb said dyes by causing repeated forcible expression and reabsorption of the dye.

6. The method of multi-color dyeing skeins of yarn, which comprises clamping intermediate parts of the skeins, partially submerging in dyes of different colors the unclamped portions of the skeins, and repeatedly depressing the unclamped portions below the clamped portions and into the dye.

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