Sept. 2, 1958 A. C. ADAMS 2,849,784

SLASHERS

Filed April 13, 1956 3 Sheets-Sheet 1

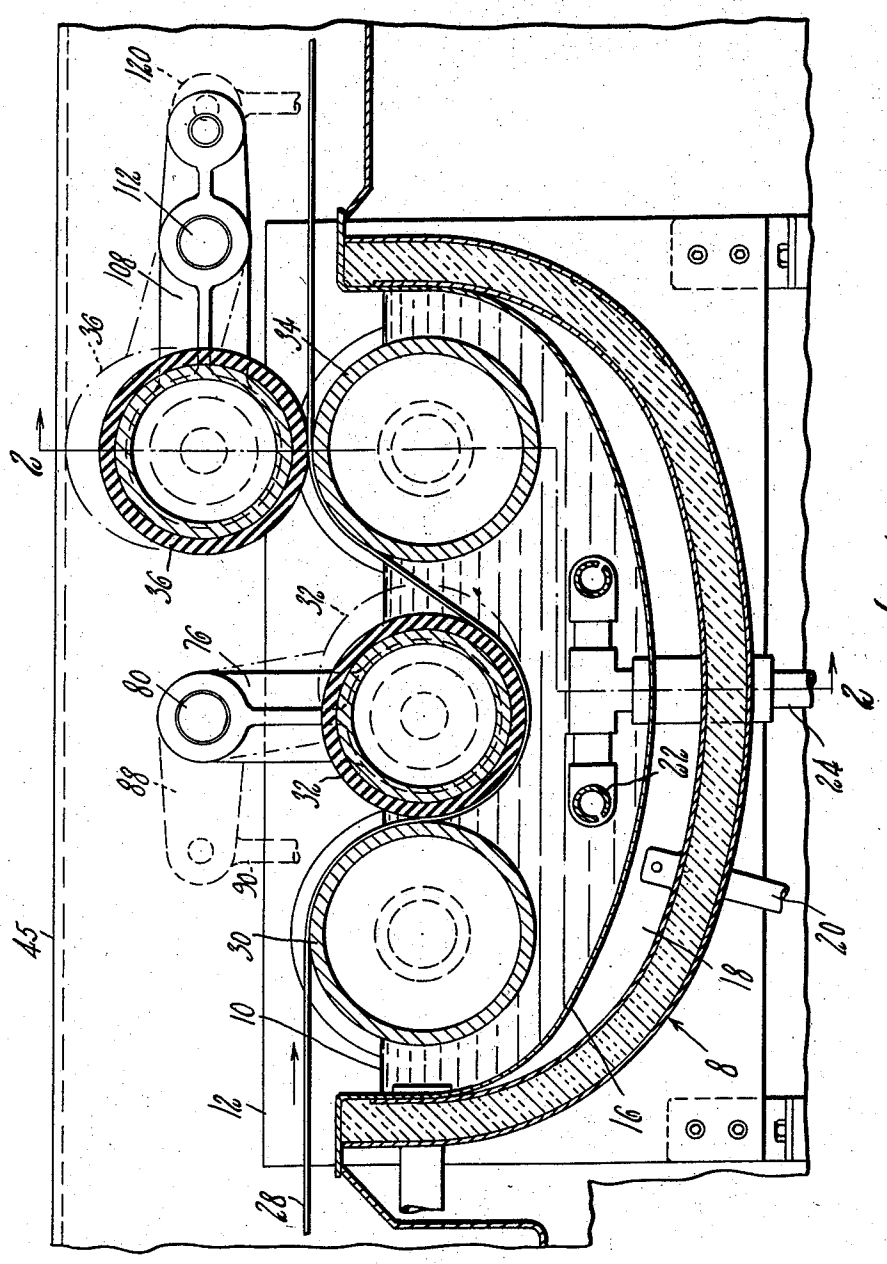

Fig. 1.

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SLASHERS

Filed April 13, 1956 3 Sheets-Sheet 2

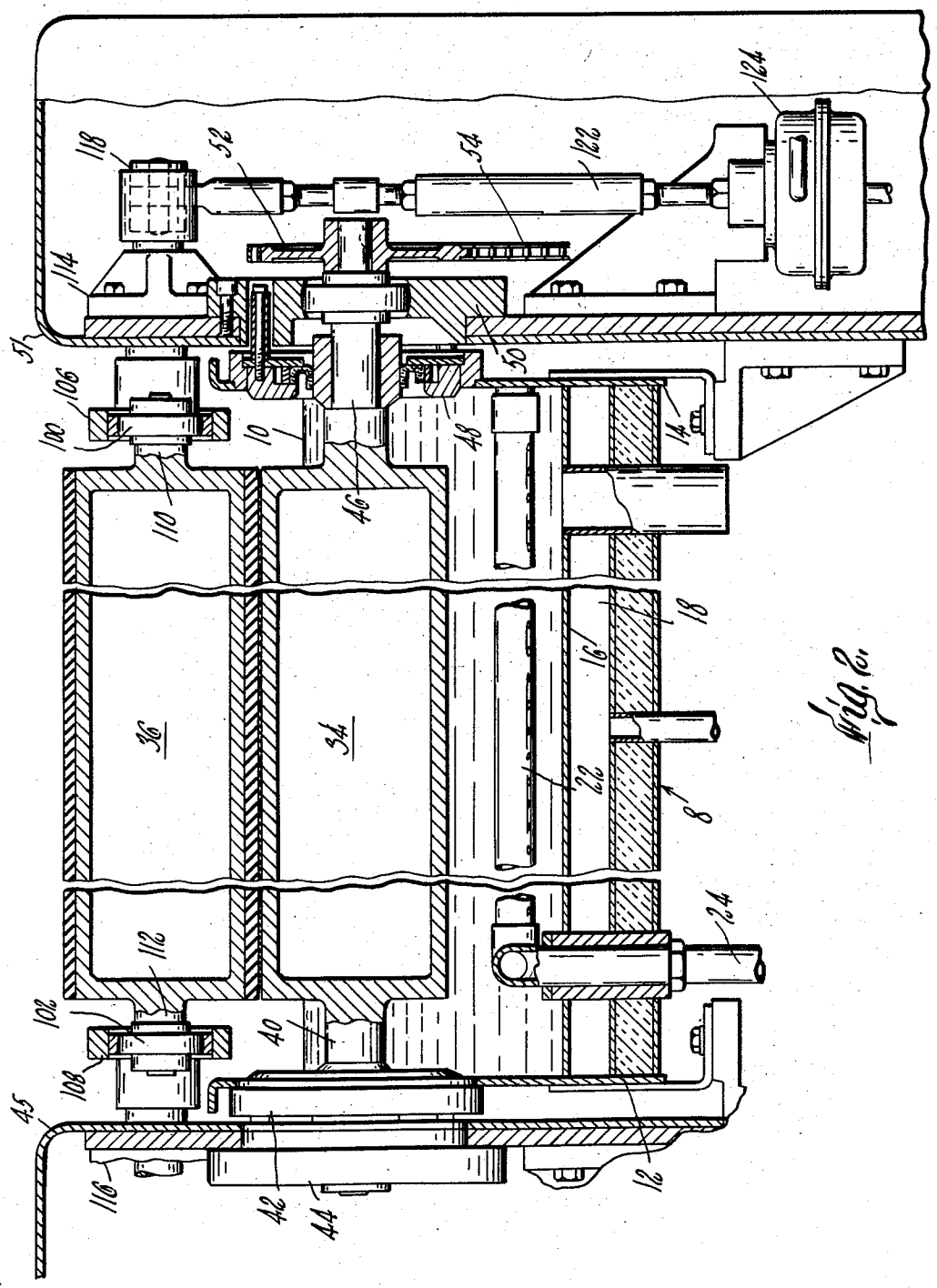

Fig. 2.

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Filed April 13, 1956 3 Sheets-Sheet 3

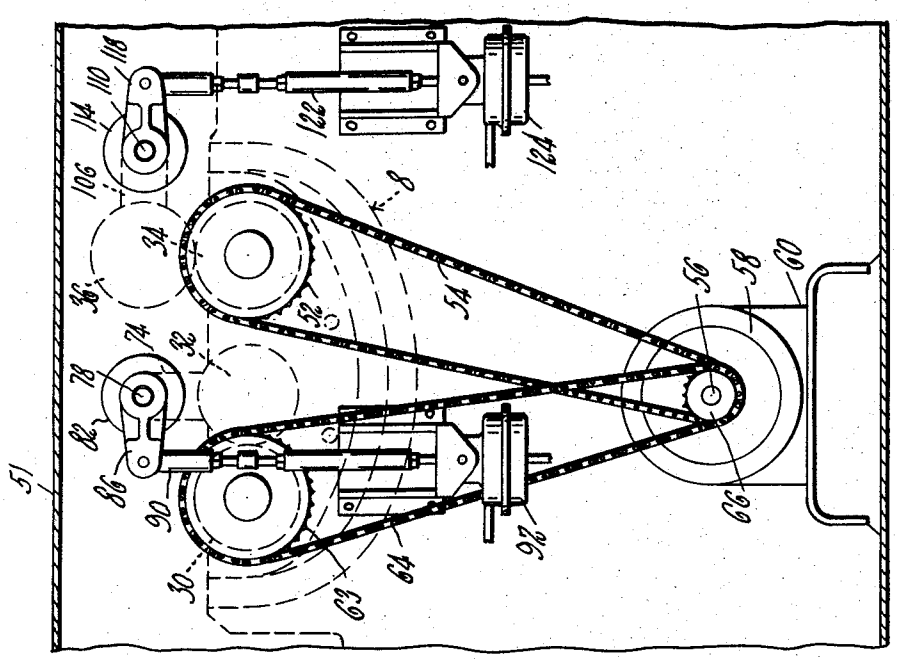

Fig. 4.

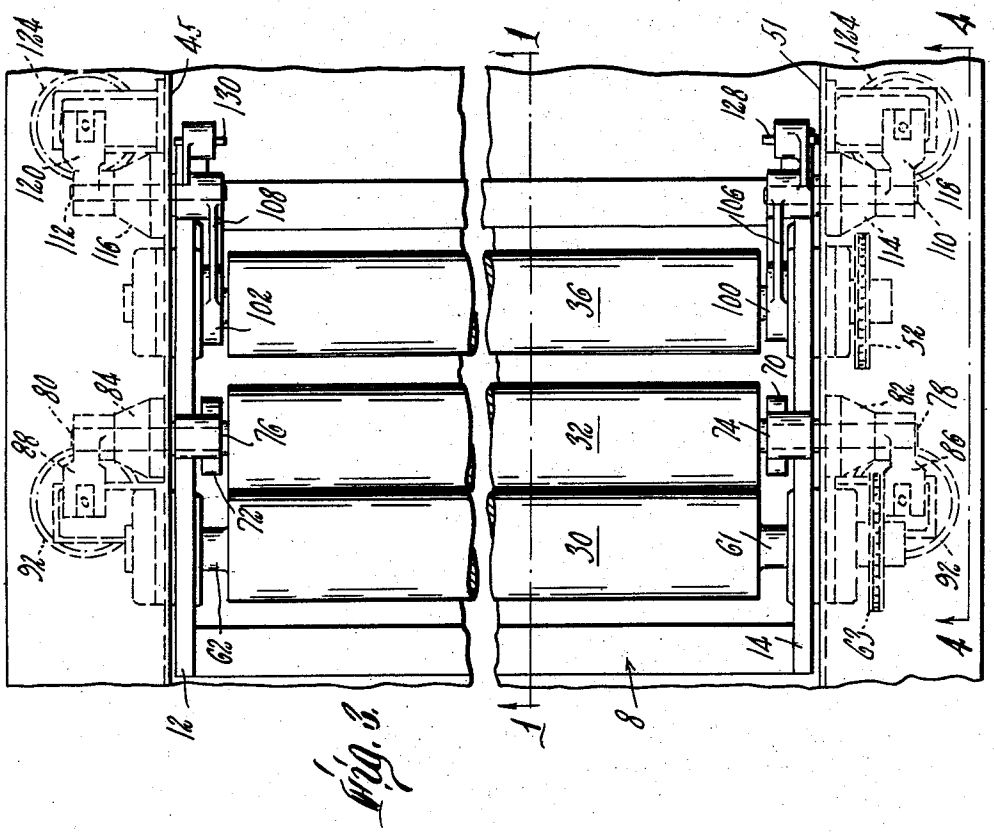

Fig. 5.

United States Patent Office 2,849,784 Patented Sept. 2, 1958

2,849,784

SLASHERS

Andrew C. Adams, Saco, Maine

Application April 13, 1956, Serial No. 578,075

4 Claims. (Cl. 28—28)

The present invention relates to improvements in slashers and to improved apparatus for applying size to the yarn sheet in a slasher.

It is a principal object of the invention to provide sizing apparatus, of the general type, including a vat in which the sizing composition is contained having two pairs of nip rollers for applying and thereafter for regulating the amount of size applied to the yarn sheet, in which there is provided a novel arrangement of the pairs of nip rollers and more particularly the rear sizing roll and its associated impregnating roll, to provide for the more uniform and efficient distribution of the size, and at the same time to permit a more effective supervision of the operation of the nip rollers for the detection and removal of yarn lap-ups.

In accordance with a principal feature of the invention, the rear size roll and its associated impregnating roll are mounted within the vat with their axes on a plane which is substantially parallel to and beneath the level of the sizing composition in the vat, so that the yarns entering the vat are carried over the rear size roll and downwardly to a beneath-the-size nip, passing thence around the underside of the impregnating roll and then upwardly over the second partially immersed size roll, finally passing through a nip above the level of the size composition between said second size roll and a finishing roll mounted vertically over the second size roll.

The several features of the invention, together with the advantages to be obtained thereby will be readily understood by one skilled in the art from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a sectional view of the sizing apparatus embodying therein features of the invention taken on a line 1—1 of Fig. 3, but on a somewhat larger scale to illustrate particularly the arrangement of the two pairs of nip rollers and the method by which the size is applied by these rollers to the yarn sheet;

Fig. 2 is a vertical sectional view taken on a line 2—2 of Fig. 1 illustrating particularly the arrangement of the second size roll and finishing roll together with the bearings and supporting mechanism for the finishing roll illustrated also in Figs. 3 and 4;

Fig. 3 is a plan view of the sizing apparatus; and

Fig. 4 is a view in side elevation taken on line 4—4 of Fig. 3, and demonstrating particularly the drive mechanism for the size rolls and the mechanism for supporting the impregnatiing roll and finishing roll under pressure against their respective size rolls.

Referring to the drawings the sizing apparatus disclosed as embodying in a preferred form the several features of the invention comprises a vat 8 which as shown in Fig. 1 is bowl shaped in cross section and is provided at its two ends with solid end plates 12 and 14 to contain therein a sizing composition 10. As further indicated in Fig. 1 the vat is formed with a double bottom including an inner shell 16 providing a steam jacket 18 which is

supplied by means of a steam inlet 20. For further controlling the temperature and density of the sizing composition a perforated steam coil 22 is immersed in the sizing compound and is supplied by means of a steam coil inlet 24. The yarn sheet which may be collected from a number of supply rollers, and which is to be impregnated with the size is drawn through the vat passing between two pairs of nip rollers, the first pair comprising a rear size roll 30 and an impregnating roll 32. The second pair of nip rollers comprises a front size roll 34 and a finishing roll 36.

In accordance with a feature of the invention the first pair of nip rollers, comprising the rear size roll 30 and impregnating roll 32, are mounted within the vat with their respective axes in parallel relation below the level of the sizing composition 10 so that somewhat more than half of each roll is immersed in the sizing composition, and the line of contact which provides the nip is located under the surface of the sizing composition and at a point at which the yarn sheet entering the vat over the top of the rear size roll 30 is moving vertically downwardly between the two rolls 30 and 32. The second pair of nip rollers, including the front size roll 34 and finishing roll 36, are mounted in vertical relation to one another, the front size roll 34 being located in exactly parallel relation to the rear size roll 30 with its axis and somewhat more than half of the roll itself immersed in the coating composition. The finishing roll 36 is disposed vertically above the front size roll 34 so that the nip between these two rollers which function to remove excess size from the yarn sheet is disposed substantially above the level of the sizing composition.

A novel arrangement of the two pairs of nip rolls is thus provided which causes the yarn sheet to be more thoroughly and efficiently sized than has been possible with previous arrangements of the sizing apparatus employed in slashers. The yarn sheet 28 entering the vat passes over the rear size roll 30 and thence vertically downwardly through the nip provided by the roll 30 and associated impregnating roll 32. As the yarn first passes over the top surface of roll 30 it is soaked with size, which is carried upon the surface of the rear size roll 30. Just prior to entering the nip, the yarn received additional size on the other side. At the nip both size and air are squeezed from the yarn. Immediately after leaving the nip, the size moves in to take the place of the air and size removed from the other side of the nip. There is a size head pressure exerting itself on the under side of the nip which aids in the size penetration. The air expelled on the upper side of the nip passes into atmosphere above the size level. The rotation of the rear size roll 30 and the associated impregnation roll 32 is such that an accumulation of size is continually being made on the upper part of the nip. This accumulation is continually flowing from the ends of the rolls. As the yarn sheet passes from the underside of the impregnating roll up to the nip of the front size roll 34 and finishing roll 36 both sides of the yarn sheet are further exposed to the size. At the finishing roll nip the amount of size left on the outer surface of the yarn is determined by the finishing roll pressure which is applied and controlled in a manner to be hereinafter more fully set forth.

It will be understood that some changes may be made in the relative positions in the size rolls, the impregnating roll and the finishing roll within the scope of, and without departing from the spirit of, the present invention. For example, it is believed evident that the rear size roll and the impregnating roll may be located at somewhat different levels with relation to the surface of the size composition provided only that both of these rolls are partially immersed in the composition and that both the

rolls have their axes below the level of the size composition to provide a downward under-the-surface nip of the yarn sheet. Similarly, it will be understood that the front size roll may be located in a partially immersed position with its axis either above or beneath the surface of the size composition, and so long as the nip between the front size roll and the finish roll is above the level of said size composition.

In the preferred form of the invention shown the two size rolls are made from solid stainless steel tubing or piping. The impregnating and finishing rolls are made with a carbon steel tubing core and are covered with rubber of a varying durometer: namely; bone hard at the core to 40 to 50 durometer at the surface.

An important advantage of the illustrated construction in which both the rear size roll **30** and the impregnating roll **32** are mounted in a partially immersed position with their axes below the surface level of the size composition consists in the fact that the condition of the yarn sheet passing around each of these rollers may be kept under continuous observation so that any tendency of the yarn to get caught upon any of the rolls producing a yarn lap-up may be instantly detected and necessary correction made. The rear size roll **30** and the impregnating roll **32** being mounted in a side-by-side relation are readily accessible for repairs permitting the ready removal of any such lap-ups. In the starting up of new sets the knots tying together the old and the new ends may be readily passed between the rear size roll **30** and impregnating roll **32** by backing off the roll **32** from the rear size roll **30** a distance of about one inch, the finishing roll **36** being moved away from the front size roll **34** by the same amount.

Each of the size rolls **30** and **34** is provided at each end with axles rotatably mounted in bearings, which are secured to the end frames **45** and **51** and are protected from the size composition by means of liquid seals. The axles and bearings for the front size roll **34** are particularly shown in Fig. 2 and comprise an axle **40** projecting from the left hand end of roll **34**, and a seal **42** and a bearing case **44** rigidly secured to an end frame **45**. At the other end of the roll there is an axle **46** which passes through a seal **48** and is supported to turn in a bearing **50** rigidly secured to the outer face of an end frame **51**. There is also secured to the axle **46** a sprocket **52** which is connected by means of a sprocket chain **54** with a sprocket on the armature shaft **56** of an electric motor **58** carried on a bracket **60** in the base of the sizing unit. The rear size roll **30** is provided with bearing spindles **61**, **62** which are rotatably mounted in bearings protected by seals in the same manner as the roll **34** above described. A sprocket **63** (see Fig. 4) mounted on the outer end of spindle **61** is connected by a sprocket chain **64** with a sprocket **66** on the armature shaft **56** of motor **58**.

The impregnating roll **32** is provided at each end thereof with short bearing spindles rotatably supported in bearings **70**, **72** mounted on the lower ends of arms **74**, **76** which project downwardly within the vat adjacent the respective end plates **14** and **12**, and at their upper ends are rigidly secured to rock shafts **78**, **80** respectively, which are in turn mounted to turn in bearings **82**, **84** secured to the end frames. Each of the rock shafts **78**, **80** has rigidly secured to its outer end a horizontally extending arm, said arms being indicated respectively at **86**, **88**. Each arm is connected by identical links with a diaphragm air motor, one such adjustable link **90** and its associated diaphragm air motor **92** being shown pivotally connected with arm **86**. As air under pressure is supplied to the diaphragm air motor, links **90** are raised causing arms **86**, **88** and shafts **78**, **80** to be rocked, thus swinging arms **74**, **76** and so bringing the impregnating roller **32** mounted thereon into pressure contact with the size roll **30**. Diaphragm air motors are extremely sensitive to pressure changes making it possible to apply an exactly equalized pressure to each end of the roll **32**. Alternatively, as air is reversed in the diaphragm air motor **92** the impregnating roll **32** is caused to move away from the driving roll **30** to release the pressure of the nip on the rolls. The finishing roll **36** is mounted in a somewhat similar manner for movement between press and release positions with relation to the front size roll **34**. The roll **36** is provided with axles which are carried in bearings **100**, **102** on corresponding ends of the two identical horizontally disposed levers **106**, **108** secured to rock shafts **110**, **112**, respectively. The shafts **110**, **112** are supported to turn in bearings **114**, **116** secured respectively to the end frames **51** and **45**, and are provided at their outer ends with laterally extending arms **118**, **120** which are connected by means of identical links with diaphragm air motors. One such link and its associated motor is shown at the right hand side of Fig. 2 comprising the adjustable link **122** connected at its upper end with the lever arm **118** and at its lower end to a diaphragm air motor **124**.

In order that the finishing roll **36** may be locked in a raised inoperative position in case of air pressure failure the horizontally disposed supporting lever arms **106**, **108** therefor are provided with forwardly extending arms in which are mounted locking pins **128** and **130** which are adapted to register with and engage in corresponding recesses in the wall of the end frame for the raised position of the finishing roll **36**.

In the operation of the slasher the yarn sheet first contacts the rear size roll **30** and is then drawn vertically downwardly into the bite of the roll **30** and the associated impregnating roll **32**. Since the size level is maintained at 1¼" to 1¾" above this bite an immersed nip is given the yarn. Both the rear size roll **30** and the front size roll **34** are positively driven. Pressure is applied to both ends of the impregnated roll by the diaphragm air motors above described. By varying the impregnating roll pressure a corresponding variation in size penetration or size pick-up is obtained. An impregnating roll pressure of from 0–1000 lbs. is contemplated. The position of the impregnating roll relative to the size roll permits having a roll pressure at any figure below the weight of the roll down to zero pressure. A lightness of size penetration is thus achieved which would not be possible with any known vat construction of the prior art in which the rear size roll and impregnating roll are conventionally placed in vertical relation to one another. It is also possible to operate the sheet with the impregnating roll **32** out of contact with the rear size roll **30** as, for example, when the slasher is operating upon certain types of rayon where minimum size impregnation is required. The yarn sheet passes from the underside of the impregnating roll up to the bite of the finishing roll **36** and front size roll **34**, being exposed to size on both sides of the yarn sheet. At the finishing roll bite the amount of size left on the yarn is determined by the finishing roll pressure. The minimum finishing roll pressure is the weight of the roll, and the maximum roll pressure is the weight of the roll plus 1000 lbs. Alternatively, the finishing roll may be locked in a raised inoperative position as previously set forth. Pressure is applied at both ends of the finishing roll by the diaphragm air motors above described.

The invention having been described what is claimed is:

1. A sizing apparatus for sizing the yarn sheet passing through a slasher which comprises a vat adapted to contain a sizing composition, a rear size roll and an associated impregnating roll mounted with relation to the vat, each partially immersed in said sizing composition and each having its axis beneath the level of the sizing composition in the vat, said rear size roll and impregnating roll providing a beneath-the-size nip upon said yarn sheet passing downwardly between the rolls, a second size roll and an associated finishing roll mounted with relation to the vat with the finishing roll vertically above the second

size roll, said second size roll being partially immersed in said size composition.

2. Sizing apparatus for sizing the yarn sheet passing through a slasher which comprises a vat adapted to contain a sizing composition, a rear size roll and an associated impregnating roll mounted with relation to the vat with each of said rolls more than one-half immersed in the sizing composition to provide a downward under-the-surface nip, fixed bearing supports for the rear size roll on the vat, supporting downwardly extending levers for the impregnating roll pivotally mounted on the vat above the surface level of said sizing composition, means for biasing said levers simultaneously to engage the impregnating roll against the size roll under pressure, a second size roll and as associated finishing roll mounted with relation to the vat with the finishing roll vertically above the second size roll, said second size roll being partially immersed in said sizing composition, fixed bearing supports for the second size roll, horizontal supporting lever arms for said finishing roll pivotally mounted on the vat, and means biasing said lever arms simultaneously to engage the finishing roll against the second size roll under pressure.

3. A sizing apparatus for sizing the yarn sheet passing through a slasher which comprises a vat adapted to contain a sizing composition, rear and front size rolls and an impregnating roll and a finishing roll associated with the respective size rolls in the vat, said rear size roll being mounted partially immersed in the vat with its axis below

the sizing composition surface level and arranged to receive and draw the yarn sheet over said roll, said impregnating roll being supported partially immersed in the vat for movement laterally against the rear size roll and with its axis below the sizing composition level providing a downward beneath-the-surface nip of the yarn sheet, said second size roll being mounted partially immersed in the vat with its axis in parallel relation to the sizing composition surface level to receive thereon the yarn sheet passing from under the impregnating roll, and said finishing roll being mounted from the vat for movement downwardly against said second size roll to provide an above-the-surface nip of the yarn sheet.

4. A sizing apparatus according to claim 3 in which rocker arms are provided having bearing supports for each of the impregnating and finishing rolls and arranged to turn on pivots fixed with relation to the vat, and fluid pressure actuating means are provided including diaphragm motors connected with said rocker arms for moving the respective impregnating and finishing rolls against their respective size rolls at a predetermined pressure.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,849,784 September 2, 1958

Andrew C. Adams

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 1 to 3, for "Andrew C. Adams, of Saco, Maine, read -- Andrew C. Adams, of Saco, Maine, assignor to Saco-Lowell Shops, of Boston, Massachusetts, a corporation of Maine, --; line 12, for "Andrew C. Adams, his heirs" read -- Saco-Lowell Shops, its successors --; in the heading to the printed specification, line 3, for "Andrew C. Adams, Saco, Maine" read -- Andrew C. Adams, Saco, Maine, assignor to Saco-Lowell Shops, Boston, Mass., a corporation of Maine --; column 2, line 43, for "upon" read -- up on --; line 44, for "received" read -- receives --; column 5, line 15, for "as" read -- an --.

Signed and sealed this 9th day of December 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents