Jan. 7, 1969 M. WENGER 3,419,946

SIZING MACHINE

Filed Oct. 31, 1966 Sheet 1 of 2

FIG. 1

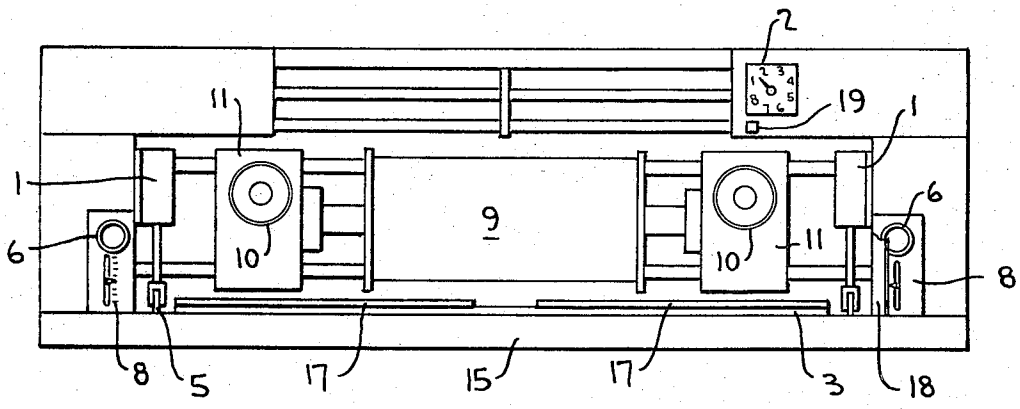


FIG. 2

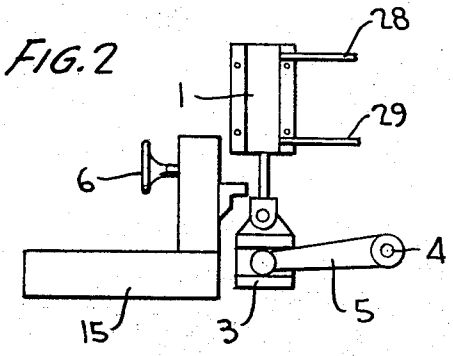


FIG. 3

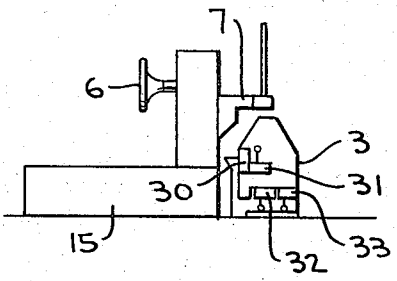


FIG. 4

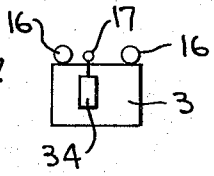


FIG. 5

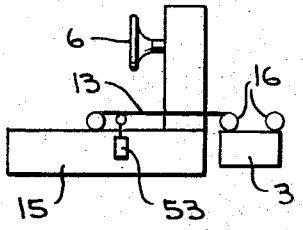
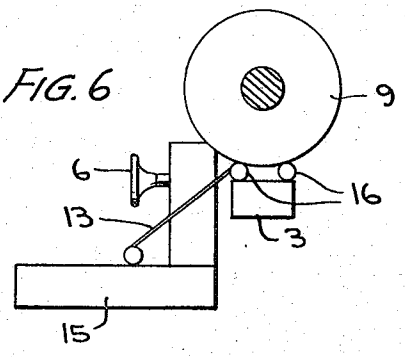


FIG. 6



INVENTOR,
MAX WENGER

BY Jacobi & Daerdson
ATTORNEYS

Jan. 7, 1969 M. WENGER 3,419,946

SIZING MACHINE

Filed Oct. 31, 1966 Sheet 2 of 2

FIG. 7

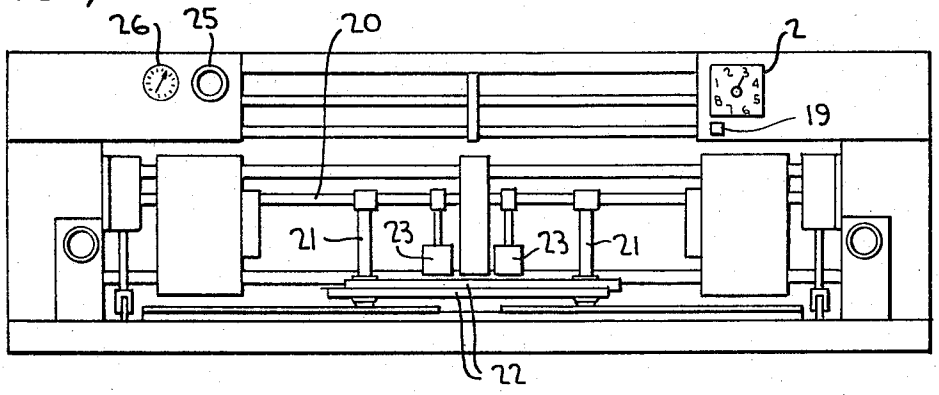
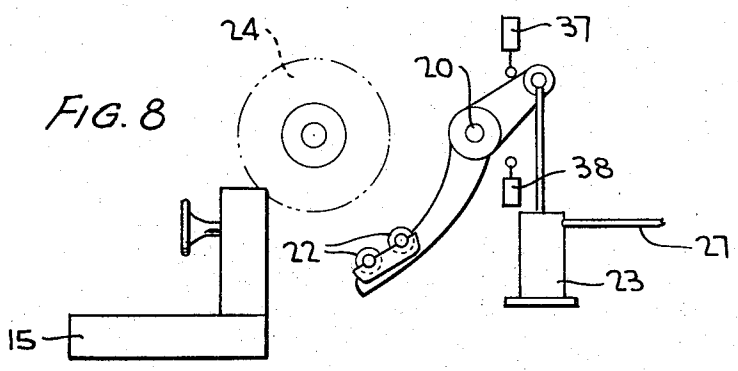


FIG. 8



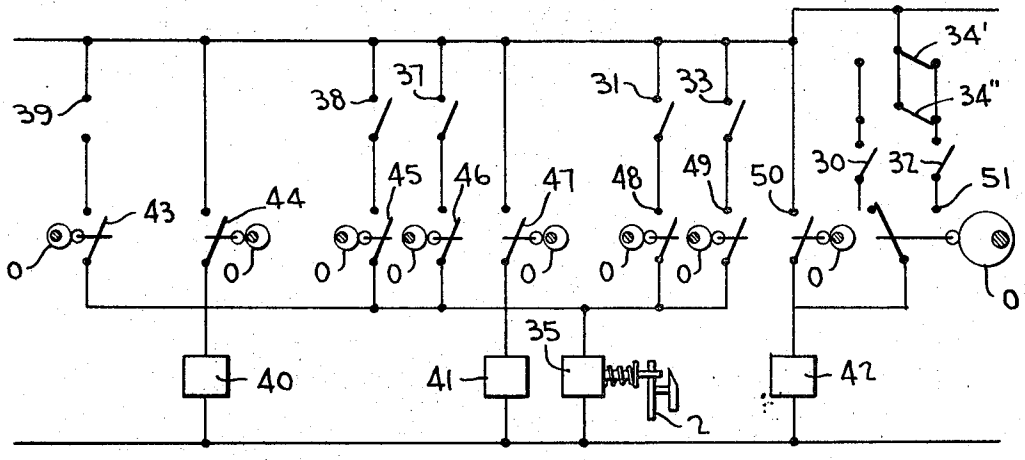


FIG. 9

INVENTOR,
MAX WENGER
BY Jacobi & Davidson
ATTORNEYS

United States Patent Office 3,419,946 Patented Jan. 7, 1969

3,419,946

SIZING MACHINE

Max Wenger, Niederuzwil, Switzerland, assignor to Maschinenfabrik Benninger A.G., Uzwil, Switzerland, a body corporation of Switzerland

Filed Oct. 31, 1966, Ser. No. 590,819
Claims priority, application Switzerland, Nov. 2, 1962, 15,188/65
U.S. Cl. 28—28 5 Claims
Int. Cl. D03j 1/02

ABSTRACT OF THE DISCLOSURE

A sizing machine is disclosed which incorporates a weaver's beam loading and unloading device and which further incorporates a separate pressure applying device for the warp of the weaver's beam during operation of the machine. The novel sizing machine disclosed includes separate actuating devices, one for beam loading and unloading and one for beam pressurizing, and further makes provisions for assuring sequential operation thereof, and for preventing the simultaneous operation of both actuating devices. Additional provisions are made for locking the machine drive when the beam loading device is operating and for enabling both devices to be readily actuated.

Conventional sizing machines are customarily loaded with weaver's beams that are to be dressed and such machines operate to generate and maintain the necessary pressure on the warp on the beam during the process of dressing. Such conventional sizing machines are equipped with means which permit these operations to be performed in various ways.

Some sizing machines which are known in the art use the same hydraulic actuating means are used both for loading and unloading the weaver's beam and for generating and maintaining the pressure on the warp during the dressing operation.

However, such a combined actuating device has major drawbacks.

Firstly, hydraulic actuation of the warp presser is very sluggish and in the case of weaver's beams which do not run round during beaming, the presser tends to hammer the warp and may damage the yarn, particularly the fibrils of endless yarns. Moreover, the unloading gear for the beam carries the weight of the weaver's beam via the presser tubes that are in contact with the body of yarn on the beam and, according to the quality of the warp, undesirable impressions may thus be formed. In the event of faulty operation, as for instance, if only one of the driving heads for rotating the beam during dressing have been withdrawn before the beam is lifted out, the forcibly raised weaver's beam may be caught at one end thereby endangering the operator as well as the machine.

Moreover, the presence of the pressing tubes obstructs the lifting truck when this receives the beam carrying the body of yarn. For transportation the weaver's beam must therefore first be lowered to the ground. Lifting and handling the beam when it has been deposited on the ground requires accessory equipment, such as hoisting gear and overhead conveyor means, or if it is lifted by hand considerable effort on the part of the operator is required. Additionally, undesirable recesses must be provided in the floor in front of the sizing machine, since otherwise the beam could not be deposited on the ground.

Aside from these conventional forms of sizing machines which use a combined actuating device, other machines are known in the art which use hydraulic, mechanical or pneumatic operable devices for generating of the pressure

that must be applied to the warp, but the beam must still be manually lifted into and out of the machine. Naturally, such a manual lifting operation calls for considerable physical effort on the part of the operator and takes an undue amount of time to perform and increases the possibility of an accident occurring.

There have been proposals for sizing machines in which one separate actuating device is provided for lifting the beam into and out of the machine and another actuating device is provided for generating the necessary pressure on the warp.

The drawback with these proposed types of sizing machines is that they require a considerable amount of automation and that they have a large number of different controls, as a result of which, operating errors are often encountered. These errors often result in damage to the machine and injury to the attendant personnel. For instance, in such sizing machines faulty control may result in the weaver's beam being ejected out of the holders of the lifting device by the pressing means. Damage is generally due to the beam or other parts becoming jammed when the controls are operated in excessively rapid succession.

With the foregoing in mind, it is, therefore, an object of the present invention to overcome the difficulties and drawbacks associated with known forms of sizing machines and to provide in their stead, a new and improved sizing machine.

Another object of the present invention is to provide a sizing machine which incorporates a weaver's beam loading and unloading device and which additionally incorporates a separate pressure applying device for the warp of the weaver's beam during operation of the machine, yet which does not encounter the shortcomings experienced in prior units of this general type.

Another object of the present invention is to provide a sizing machine having separate actuating devices, one for beam loading and unloading and one for beam pressurizing, and to provide satisfactory means for assuring sequential operation thereof, for preventing simultaneous operation of both actuating devices, for locking the machine drive when the beam loading device is operating, and for enabling both devices to be readily actuated.

Another object of the present invention is to provide a new and improved operating circuit and control system for a sizing machine which utilizes separate actuating devices.

Other objects, advantages and salient features of the present invention will be apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment thereof.

In the drawings:

FIG. 1 is a front elevation of the sizing machine ready for operation with a full weaver's beam in position, the pressing device being removed,

FIG. 2 is an end view of the elements located on one side of the machine for lifting the weaver's beam into and out of the machine,

FIG. 3 is an end view similar to that of FIG. 2, showing the switch and control elements for the lifting device,

FIG. 4 is a view of an individual element of the lifting device illustrating control and locking of the lifting device,

FIG. 5 is an end view of the lifting device when fully lowered, the weaver's beam being supported by the presser device.

FIG. 6 is an end view similar to that of FIG. 5, showing parts of the lifting device having fully lifted the weaver's beam,

FIG. 7 is a front elevation of the sizing machine ac-

cording to FIG. 1, specially showing the parts of the presser device,

FIG. 8 is a view similar to that of FIG. 6, omitting the lifting device and instead showing the presser device in its retracted inoperative position which it occupies as the weaver's beam is being lifted or lowered, and

FIG. 9 is a central circuit diagram illustrating the switching and controlling actions of a sequence switch.

In accordance with the principles of the present invention, the lifting and lowering device, hereinafter briefly referred to as the "lifting gear" substantially comprises a carrier bar **3**, a shaft **4** (FIG. 2) with two levers **5** and a compressed air cylinder **1** at each end of the bar. The carrier bar **3** has ways at each end thereof to prevent it from tilting. Abutments **7** which are adjustable by a handwheel **6** (FIG. 2) are located at each end of the carrier bar **3** in overlying relationship to limit the degree of upward lift thereof. The position of the abutments **7** can be read on a scale **8**.

For supporting the weaver's beam **9**, the carrier bar **3** is provided with two guide rails **16** (FIGS. 4 to 6). Two sensing flaps **17** (FIG. 4) monitor the lifting operation.

A pedal **13** is hingeably attached to the carrier bar **3** and during operation of the machine (FIGS. 2 to 5) this serves for stopping the machine by the actuation of a switch **53** and, when the lifting device is raised (FIG. 6), it serves as a protective device.

The lifting movement proceeds under the control of a stepping device in the form of a sequence stepping switch means **2** and micro-switches **30–34** (FIGS. 3 and 4) that will be later described in greater detail.

The sequence switch **2** cannot be rotated until the prescribed operating program at each position has been completed. To this end the lifting gear and the pressing device are provided with limit switches **31,33** and **37,38**. These cooperate with a solenoid coil **35** and plunger **52** which serves for locking the sequence switch.

The pressing device which is separate from the lifting gear substantially comprises a first shaft **20** and two carrier arms **21**, so arranged that compressed air cylinders **23** can urge presser tubes **22** against the body of yarn **24** on the weaver's beam (FIG. 8). The desired pressure is preselectable by adjustment of a reducing valve **25** and can be read on a pressure gauge **26**.

When the presser is lowered, as in FIG. 8, the presser tubes **22** are out of range of the lifting gear.

The correct sequence of the working operations is governed by the sequence switch which controls the presser, the lifting gear and the machine drive, the latter being locked when the lifting gear operates and the simultaneous operation of the lifting gear and of the presser being prevented. This will be understood from the following description of a full working cycle.

The sequence switch **2** comprises eight mechanically and electromagnetically locked switching positions which in emergencies can be released by pressing a push button **19**. The eight positions of the sequence switch **2** correspond to the following functions:

Position **1**—machine ready for dressing
Position **2**—lift presser and effect sizing
Position **3**—lower presser
Position **4**—machine drive off and locked,
Position **5**—raise lifting gear empty,
Position **6**—lower lifting gear with full weaver's beam,
Position **7**—raise lifting gear with empty weaver's beam,
Position **8**—lower empty lifting gear.

The manner in which these operations are controlled will be described by reference to FIG. 9.

In position **1** of the sequence switch the contacts **44, 45, 46, 47, 48, 49** and **50** are all held open by the switching cams O. The two-way switch **51** has closed the circuit controlled by switch **30**, switches **30** and **32** being open, switches **43** and **39** closed and locking solenoid **35** having withdrawn its plunger **52** and thereby permitting the sequence switch to be rotated to the next position.

In position **1**, relay **40** is deenergized and has released the electrical lock of the machine drive (not shown). The machine is ready for the sizing operation.

In position **2** the cams O hold contacts **43, 44, 46, 48, 49** and **50** open, the two-way switch **51** remaining in the circuit of switch **30**. Switches **30** and **32** are open and contacts **45** and **47** are closed.

The coil **41** of an electro-pneumatic valve (not shown) controlling the air admission pipe **27** to the cylinder **23** is thus energized and the admission pipe **27** is opened.

The presser therefore swings upwards and presses the presser tubes **22** against the beamed warp **24**. When this movement has been completed, the switch **38** closes and unlocks the sequence switch **2**. Now the sizing can be carried out, i.e., the machine drive is set into operation and, at the same time, from then on the switch **2** can at any moment be rotated into position **3**.

In position **3** the cams O hold the contacts **43, 44, 45, 47, 48, 49, 50** open, the two-way switch **51** remaining in circuit with switch **30** (switches **30** and **32** being open) but contact **46** being closed.

The coil **41** of the above-mentioned electro-pneumatic valve (not shown) is deenergized and closes the air admission pipe **27**, simultaneously exhausing the cylinder **23**.

The presser therefore swings down. When this downward swing has been completed, switch **37**, closes, the sequence switch **2** being unlocked in conventional manner and released for rotation into the next position.

In position **4** the cams **9** hold contacts **45, 46, 47, 48, 49, 50** open, the to-way switch **51** remaining in its former position in circuit with switch **30** (switches **30** and **32** being open) but contacts **43** and **44** being closed.

The locking relay **40** is energized, locks the machine drive and simultaneously restores the winding gear (not shown) to the initial speed.

When the winding gear has thus been completely set back, switch **39** closes, the sequence switch **2** being unlocked in conventional manner and released for further rotation into the next position.

In position **5** the cams O hold contacts **43, 45, 46, 47, 49** open, change the two-way switch **51** into circuit with switch **32** and close the contacts **44, 48, 50**. The locking relay **40** remains energized, and thus the machine drive continues to be locked.

The coil **42** of an electro-pneumatic fourway valve (not shown) is energised and the compressed air admission pipe **29** of the cylinder **1** is opened (pipe **28** being simultaneously exhaused).

The lifting gear moves towards the beam **9**, the follower roller of switch **30** leaves its operating cam and contact **30** closes. The follower rollers of switches **32** and **33** are likewise released, contact **32** closing, whereas contact **33** opens but has no effect because contact **49** is open.

As the lifting gear moves towards the beam **9**, the flaps **17** which are movably mounted on each side of the carrier bar **3** are deflected downwards. The two-way switches **34'** and **34''** close the circuit through switch **30** and the follower roller of switch **30** is operated (by the cam) and opens switch **30**. The latter has no effect because the two-way switch **51** is in line with switch **32**.

Contact **32** remains in closed position, whereas the follower roller of switch **31** is depressed by abutment **7** and contact **31** is closed.

In conventional manner the sequence switch is thus unlocked and can be further rotated after the withdrawal of the driving heads **11** (by means of handwheel **10**) into the next position.

In position **6** the cams O hold the contacts **43, 45, 46, 47, 48, 50** open, two-way switch **51** remaining in line with switch **32**, whereas contacts **44, 49** are closed.

The locking relay **40** remains energised, or thus the machine drive is locked.

The coil **42** of the above mentioned electro-magnetic four-way valve, (not shown) is deenergised and the com-

pressed air admission pipe 28 of the cylinder 1 is opened (line 29 being simultaneously exhausted).

As will be understood from the diagram in FIG. 9 the lifting gear cannot be lowered so long as the warp beam is still in engagement with either one or both of the driving heads 11, i.e., so long as both or only one of the contacts 34 have not changed over to the circuit controlled by switch 30. In such a case coil 42 would not be deenergised and the electro-pneumatic fourway valve would not operate. The locking of the lifting gear is therefore fool-proof and the operator as well as the machine are protected from accidental injury or damage.

When the lifting gear has been fully lowered, the contacts 30 and 32 open, whereas contact 33 is closed.

The sequence switch 2 is thus unlocked in conventional manner and can be rotated into the next position after the full beam 9 has been removed (rolled over the service platform on a beam trolley) and a fresh empty beam has been inserted.

As will be understood from FIG. 9 the lowered lifting gear cannot be raised otherwise than by operation of the sequence switch 2, i.e., by the closure of contact 50, and the beam can therefore be readily removed from the lifting gear.

In position 7 the cams O hold the contcats 43, 45, 46, 47, 49 open, reset the two-way switch 51 into circuit with switch 30, and close contacts 44, 48, 50.

The locking relay 40 continues to be energised and locks the machine drive.

The coil 42 of the electro-pneumatic fourway valve (not shown) is energised and the compressed air supply line 29 of the cylinder 1 is opened (line 28 being simultaneously exhausted).

The inserted empty beam depresses the two flaps 17 on each side of the carrier beam 3 and the two switches 34' and 34'' are reset to the line controlled by switch 30.

The lifting gear advances towards the driving heads 11, the follower roller of switch 30 leaves its cam and contact 30 closes. The follower rollers of switches 32 and 33 are likewise released and contact 32 closes, whereas contact 33 opens.

As soon as the lifting gear has been fully raised, the contact 30 opens, whereas contact 32 remains closed as before, and contact 31 is closed.

The sequence switch 2 is thus unlocked in conventional manner and can be rotated into the next position as soon as the driving heads 11 have been advanced (for the reception of the beam).

In position 8 the cams O hold contacts 43, 45, 46, 47, 48, 50 open, two-way switch 51 being left in its former position in circuit with switch 30, whereas contacts 44 and 49 are closed.

The locking relay 40 continues to be energised, and thus the machine drive is locked.

The coil 42 of the electro-pneumatic fourway valve (not shown) is deenergised and the compressed air supply 28 of the cylinder 1 is opened (line 20 being simultaneously exhausted).

The lifting gear moves towards the service platform 15, whereas contact 30 closes and contact 51 opens (contact 32 remains closed for the time being).

It will be understood from FIG. 9 that the lifting gear could not now descend if the beam had not been properly received into the driving heads 11, since if the beam 9 was in neither of the driving heads or in only one thereof, the flaps 17 would still be depressed and this would prevent both or only one of the two contacts 34 from closing the circuit through switch 32 in which case coil 42 would not be deenergised and the electro-pneumatic valve would not operate. The locking of the lifting gear in position 8 is therefore fool-proof and the operator as well as the machine are protected from injury or damage.

When the lifting gear has been fully lowered, the contacts 30 and 32 open, whereas contact 33 is closed.

The sequence switch 2 is therefore unlocked in conventional manner and can be rotated into position 1.

It will be understood from the diagram that the lowered lifting gear cannot be raised again unless the sequence switch 2 is operated, i.e. until contact 50 closes. The inadvertent depression of the flaps 17 during the process of beaming cannot therefore cause the lifting gear to rise.

With the foregoing description in mind, the operation of the present invention can now be summarized. At the beginning of the position 1, the freshly inserted empty beam 9 is engaged by the driving heads 11 and is driven thereby. As a result, yarn 24 is wound onto the beam 9. When such winding is completed, the stepping switch means is moved to position 2 whereat the presser raises to contact the presser tubes 22 against the yarn 24 wound on the beam 9. When pressing has been completed, the stepping switch means moves to position 3 whereat the presser lowers out of contact with the yarn 24. Thereafter, the stepping switch means moves to position 4 wherein the machine drive is stopped and hence the driving heads 11 stop the winding of the beam 9. Thereafter, the stepping switch means moves to position 5 whereat the lifting gear raises the carrier bar 3 to its raised position whereat the switch 31 contacts the abutment 7. At this position, the full beam 9 rests upon the raised lifting gear and the hand wheels 10 are operated to withdraw the driving heads 11 therefrom. Then, the stepping switch means is moved to position 6 whereat the lifting gear lowers carrying the full beam thereupon. When the lifting gear has reached its lowermost position, the full beam is removed therefrom and an empty beam is placed thereupon. The stepping switch means then moves to position 7 whereat the lifting gear again raises until the switch 31 contacts the abutment 7 and at such time, the empty beam is in a raised position in alignment with the driving heads 11. The hand wheels 10 are then operated to advance the driving heads until the same engage and hold the empty beam 9. Finally, the stepping switch means moves to position 8 whereat the lifting gear again is lowered. It will be appreciated that at this time, a new empty beam 9 has been inserted into the machine and is engaged in proper relationship with the driving heads 11. Thus, when the stepping switch means is again moved to position 1, the heads 11 will wind the beam 9 to apply the yarn 24 thereto and the foregoing sequence or cycle will be repeated.

After reading the foregoing detailed description, it will be apparent that the objects set forth at the outset of the specification have been successfully achieved by the present invention.

I claim:

1. A sizing machine comprising a first means for lifting a weaver's beam of various sizes into a machine and lowering it out of the machine, a separated second means for applying pressure to the warp on the beam during operation of the machine, and stepping switch means for actuating both said first and said second means, said stepping switch means ensuring the correct sequential operations of said first and second means, said stepping switch means locking the machine drive when said first means is in operation and further preventing the simultaneous operation of said first and second means.

2. A sizing machine according to claim 1, wherein said stepping switch means is a sequence switch including electromagnetic locking means for locking said switch means in each of its several switching positions until the entire operating sequence at each position has been completed.

3. A sizing machine according to claim 2, further including a pair of beam receiving driving heads and electric contact locking means which, independently of beam size prevent said first means from being lowered until said driving heads are disposed in proper relationship to said weaver's beam.

4. A sizing machine according to claim 3, wherein when said weaver's beam is full, said first means cannot lower until said driving heads are disengaged therefrom and when said weaver's beam is empty, said first means cannot lower until said driving heads are engaged therewith.

5. A sizing machine according to claim 1, further including beam receiving driving heads and selectively adjustable limit switch means coupled with said first means in such manner that the position of the lifted beam in relation to the driving heads which grip the beam in working position can be selectably preset to accommodate different forms of weaver's beams.

References Cited

UNITED STATES PATENTS

2,450,431	10/1948	Lambach.	
2,485,382	10/1949	Howes	28—38
2,487,492	11/1949	Suggs.	
3,063,123	11/1962	Noe	28—38
3,165,808	1/1965	Browne et al.	
3,348,785	10/1967	Cocker.	

LOUIS K. RIMRODT, *Primary Examiner.*

U.S. Cl. X.R.

28—32