Sept. 8, 1953 K. N. MOORE 2,651,275

APPARATUS FOR AUTOMATICALLY CONTROLLING THE OPERATION OF BAG SEWING MACHINES

Filed June 7, 1949

2 Sheets-Sheet 1

Fig 1

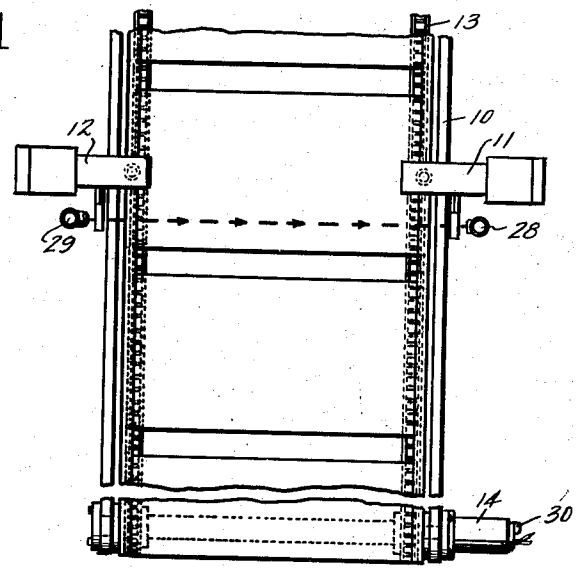


Fig 2

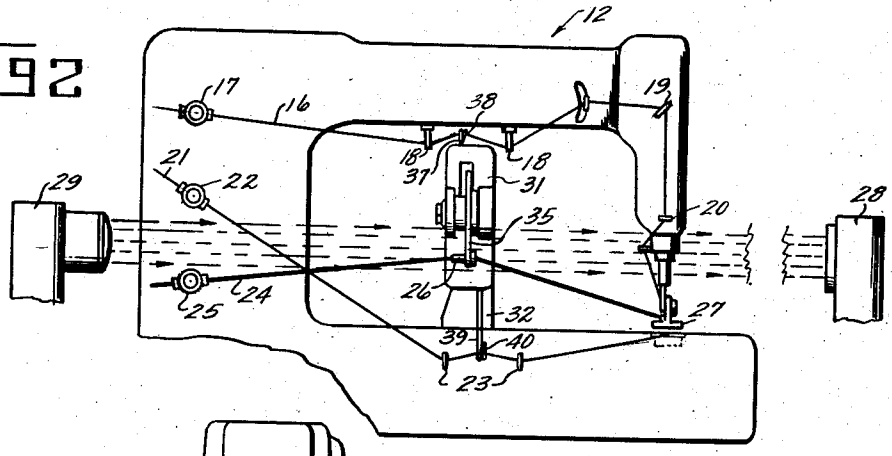
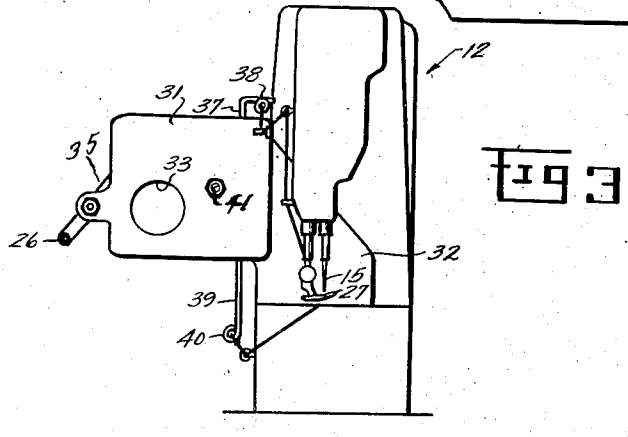


Fig 3



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Fig 4

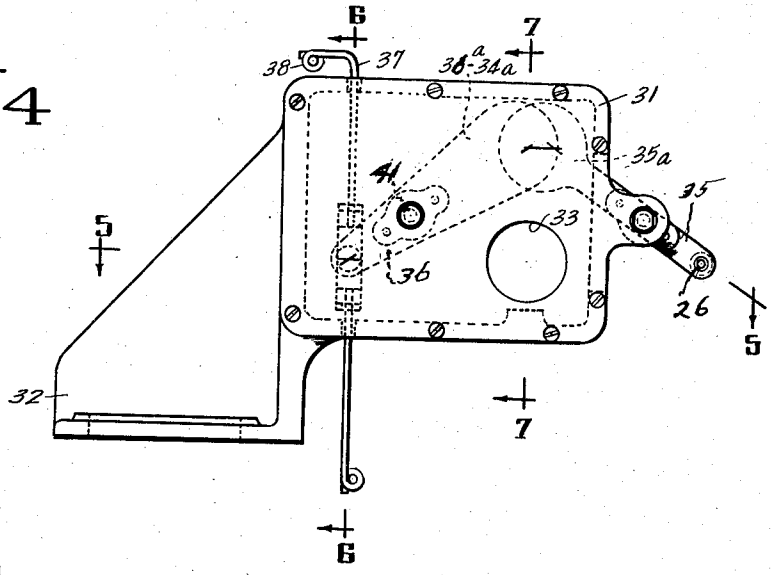


Fig 5

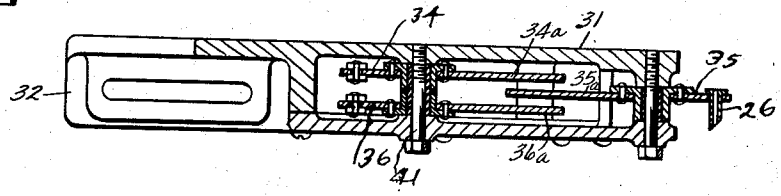


Fig 6

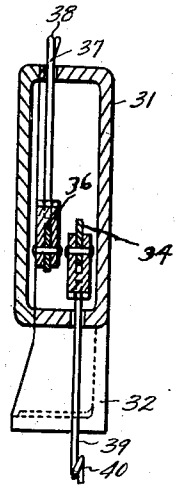
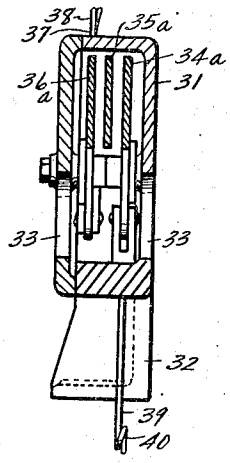


Fig 7



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APPARATUS FOR AUTOMATICALLY CONTROLLING THE OPERATION OF BAG SEWING MACHINES

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7 Claims. (Cl. 112—219)

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This invention relates to an apparatus for automatically controlling the operation of a bag sewing machine.

One object of the invention is to provide a simple positively operated apparatus which can be easily installed on a sewing machine to interrupt the operation thereof upon the breaking of one of the threads.

A common type of bag sewing machine comprises two sewing heads to simultaneously sew the two ends of a bag, and a plurality of threads lead to the needle of each sewing head, and it is a further object of the invention to provide such a machine with an apparatus which will interrupt the operation of the machine upon the breaking of any one of the threads of either sewing head.

A further object of the invention is to provide such an apparatus in which the operation of the machine is controlled by a light sensitive device.

A further object of the invention is to provide such an apparatus in which a single beam of light is projected across both sewing heads to a light sensitive device, and a plurality of shutters are associated with each sewing head and controlled by the respective threads of the sewing head with which they are associated to interrupt the beam of light upon the breaking of any one of said threads.

Other objects of the invention may appear as the apparatus is described in detail.

In the accompanying drawings Fig. 1 is a plan view of a portion of a bag sewing machine equipped with the invention; Fig. 2 is a rear elevation of one of the sewing heads and the associated light controlling device; Fig. 3 is an end elevation of one of the sewing heads and its associated light controlling device; Fig. 4 is a side elevation of one of the light controlling devices; Fig. 5 is a section taken through the light controlling device on the line 5—5 of Fig. 4; Fig. 6 is a section taken through the light controlling device on the line 6—6 of Fig. 4; and Fig. 7 is a section through the light controlling device taken on the line 7—7 of Fig. 4.

In the accompanying drawings I have illustrated one embodiment of the invention and have shown the same as installed on a bag sewing machine of a well known type. It is to be understood, however, that the sewing machine may be of any suitable character and that the controlling apparatus as a whole, as well as the several parts thereof, may take various forms and may be installed on sewing machines of various kinds.

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The bag sewing machine here illustrated comprises a supporting structure, or main frame, 10. Two sewing heads 11 and 12 are mounted on the respective sides of the supporting structure and a conveyor 13 on the supporting structure serves to move the bags successively to and beyond the sewing heads. The machine as a whole, including both the sewing heads and the conveyor, is operated by an electric motor 14 which may be mounted on or adjacent to the supporting structure in any suitable position. The two sewing heads, and the devices associated therewith, are identical except that one is a right hand head and the other is a left hand head.

Each sewing head is provided with means for separately guiding a plurality of threads to the needle 15 of that sewing head. In the arrangement shown a thread 16 is led from a spool, not shown but usually supported in an elevated position with relation to the sewing head, through a tensioning device 17, which may be of a conventional or any suitable type, then through two guides 18 spaced relatively short distances one from the other, and then through additional guides 19 and 20 to the needle, above the bag which is being sewed. A second thread 21 is led from its spool through a similar tensioning device 22, through guides 23 to the needle, below said bag. It is customary in sewing bags to sew a relatively thick sealing thread to the upper side of the bag to seal the openings formed by the needle. Such a sealing thread is shown at 24 and is led from a spool, not shown but preferably located below the conveyor, through a tensioning device 25 and through a tubular guide, formed in the foot 27 of the sewing machine, to the needle, above the bag.

A light sensitive device 28 is mounted adjacent one side of the conveyor 13 and may be of any suitable character such as the well known photoelectric cell. Mounted adjacent the other side of the conveyor is a light source, such as a lamp 29, which is arranged to project a beam of light across the conveyor onto the light sensitive device. The light sensitive device controls the operation of the sewing machine, as by opening and closing a switch in the motor circuit, and for this purpose it is provided with the usual amplifying means and relay, not shown, but of conventional type, and the relay is connected with a motor switch 30. The arrangement may be such that the switch will be either opened or closed by the deenergization of the light sensitive device. In the present instance the energization of the light sensitive device maintains the switch

closed and the deenergization thereof causes the switch to be opened.

The means for controlling the beam of light may take various forms, and separate light controlling units are associated with the respective sewing heads. Each controlling unit comprises a plurality of light interrupting elements, herein referred to as shutters, which are individually biased into the path of the beam of light and are held normally out of that path by connection with the respective threads of the sewing head with which the controlling unit is associated. Preferably each light interrupting element, or shutter, comprises a plate, or other opaque element, which is pivotally supported for movement into and out of the path of the beam of light and is so connected with the corresponding thread that it will be held normally out of the path of the beam of light but will be released for movement into that path in the event the thread breaks. In the arrangement shown each light controlling unit includes a housing **31** mounted adjacent the corresponding sewing head and in the present instance mounted on that head by means of a bracket **32**. The housing extends across the path of the beam of light and is provided in its side walls with alined openings **33** through which the beam passes. Three supporting members, **34**, **35** and **36** are pivotally mounted, between their ends, in the housing and as shown are in the nature of levers. Light interrupting elements, or shutters, are supported by the respective supporting members for movement about the axes of the latter into and out of the path of the beam of light. The shutters may be connected with the supporting members in any suitable manner but are preferably rigid therewith and may be formed integral with the respective supporting members, as shown at **34***a*, **35***a* and **36***a*. As above stated, the several shutters are individually biased toward the beam of light and are so connected with the respective threads that they are normally held out of that path, but when a thread breaks the shutter controlled by that thread is released and moves into the path of the beam, thereby opening the motor circuit and interrupting the operation of the sewing heads. In the present construction the supporting members, of which the shutters form parts, are pivotally supported in the housing on axes so spaced from the ends of the respective supporting members that that end of each supporting member which constitutes the shutter tends to move downwardly by gravity, this movement being normally prevented by the respective threads. Each supporting member is provided with a part adapted to engage the corresponding thread and retain the shutter carried by that supporting member out of the path of the beam. In the arrangement shown the supporting members or levers **34** and **36** are mounted on a common axis **41** and terminate within the housing. Pivotally connected with the supporting member **36**, on that side of its axis opposite the shutter, is a rod **37** which extends upwardly through an opening in the top wall of the housing **31** and is provided at its upper end with a looped portion **38** arranged between the guides **18** and through which the thread **16** extends, and the thread prevents the movement of the supporting member in shutter closing direction. The weight of the shutter on the supporting member causes the rod **37** to slightly deflect that portion of the thread which is between the guides but this deflection is not sufficient to permit the shutter **36***a* carried by that supporting member to move into the path of the beam, but in the event the thread breaks the supporting member is released for pivotal movement and the shutter moves quickly into the path of the beam, thereby deenergizing the light sensitive device and causing the operation of the machine to be interrupted. A similar rod **39** is pivotally connected with the supporting member **34**, extends through the bottom wall of the housing and is provided at its lower end with a looped portion **40** arranged between the guides **23** and through the thread **21** and thus retains the shutter **34***a* normally out of the path of the beam of light. The supporting member **35** which carries the shutter **35***a* extends through an opening in the front wall of the housing, is pivotally mounted thereon and is provided at its outer end with a guide **26**, here shown as tubular in form, through which the thread **24** extends. Thus it will be apparent that so long as all of the threads are continuous and taut the shutters associated with each sewing head will be retained in inoperative positions, that is, out of the path of the beam of light, but in the event any one of the threads of either sewing head breaks the corresponding shutter will be released and will move quickly into the path of the beam of light and interrupt the operation of the machine.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. An apparatus for controlling the operation of a bag sewing machine of the type comprising a supporting structure, a bag conveyor movable lengthwise of said structure, sewing heads supported by said structure on the respective sides of said conveyor, and means for separately guiding a plurality of threads to the needle of each sewing head, said apparatus including a light sensitive device supported adjacent one side of said conveyor, a light projecting device supported adjacent the other side of said conveyor and arranged to project a beam of light onto said light sensitive device, means controlled by said light sensitive device to interrupt the operation of said machine when said beam of light is interrupted, structures supported adjacent the respective sewing heads, extending across the path of said beam of light and each having an opening through which said beam passes, a plurality of levers pivotally mounted between their respective ends on each of the last mentioned structures, a shutter supported on one end of each lever and biased to a position in line with the opening in said structure, and a part connected with the other end of each lever and engaging one of the threads of the adjacent sewing head to normally prevent the movement of the shutter supported by said lever into line with said opening and to release said shutter for movement into line with said opening when said thread breaks.

2. An apparatus for controlling the operation of a sewing machine which comprises a sewing head, means for moving articles to be sewed to and beyond said sewing head and means for guiding a plurality of threads to the needle of said sewing head, said apparatus including a light sensitive device, a light source to project a beam of light in the general direction of the move-

ment of said threads onto said light sensitive device, means controlled by said light sensitive device to interrupt the operation of said machine, a supporting structure rigidly mounted adjacent said sewing head and in advance of the needle thereof and having an opening through which said beam of light passes, a plurality of levers pivotally mounted between their ends on said structure for movement about parallel axes extending lengthwise of said beam of light, a shutter carried by each lever on one side of its axis and movable by gravity into line with said opening, a device connected with the other end of each lever to engage one of said threads and support the shutter on said lever out of line with the opening in said structure, said levers corresponding in number to the number of threads leading to said needle, whereby the breaking of any one of said threads will release the corresponding shutter for movement into line with the opening in said structure.

3. An apparatus for controlling the operation of a sewing machine which comprises a sewing head, means for moving articles to be sewed to and beyond said sewing head, and means for guiding a plurality of threads to the needle of said sewing head, said apparatus including a light sensitive device at one side of said sewing head, a light source at the opposite side of said sewing head arranged to project a beam of light onto said light sensitive device, means controlled by said light sensitive device to interrupt the operation of said machine, a housing mounted on a fixed support adjacent said sewing head and having alined openings through which said beam of light passes, a plurality of shutters supported in said housing for movement into line with said openings, and separate means for movably supporting said shutters, the supporting means for each shutter including a part engaging one of said threads to prevent said movement of said shutter and to release said shutter for said movement when said thread breaks.

4. An apparatus for controlling the operation of a sewing machine which comprises a sewing head, means for moving articles to be sewed to and beyond said sewing head, and means for guiding a plurality of threads to the needle of said sewing head, said apparatus including a light sensitive device at one side of said sewing head, a light source at the opposite side of said sewing head arranged to project a beam of light onto said light sensitive device, means controlled by said light sensitive device to interrupt the operation of said machine, a housing mounted on a fixed support adjacent said sewing head and having alined openings through which said beam of light passes, a plurality of levers pivotally mounted in said housing, shutters carried by the respective levers and biased toward said beam of light, a part connected with each lever, extending beyond said housing and engaging one of said threads to prevent the movement of the shutter carried thereby into line with said openings and to release said shutter for such movement when said thread breaks.

5. In a bag sewing machine having two sewing heads to simultaneously sew the respective ends of a bag and each having a needle, each sewing head having means for guiding a sewing thread to the needle thereof above the bag being sewed, means for guiding a second sewing thread to said needle below said bag, and means for guiding a sealing thread to said needle above said bag, a light sensitive device supported adjacent

one side of said machine, a light source arranged adjacent the other side of said machine to project a beam of light past both sewing heads onto said light sensitive device, means controlled by said light sensitive device to interrupt the operation of said machine, a structure supported adjacent each sewing head and having an opening through which said beam of light passes, three members pivotally mounted on said structure, shutters carried by the respective members and biased to positions in line with said opening and parts connected with the respective members and engaging the respective threads of the sewing head with which they are associated to normally prevent the movement of said pivotal members, whereby the breaking of any one of the threads of either sewing head will release the corresponding shutter for movement into the path of said beam of light and thus interrupt the operation of said machine.

6. An apparatus for controlling the operation of a sewing machine which comprises a sewing head, means for moving articles to be sewed to and beyond said sewing head, means for tensioning and guiding a plurality of threads to the needle of said sewing head in substantially the same direction, said apparatus including a light sensitive device, a light source to project a beam of light onto said light sensitive device in a path substantially parallel to and adjacent the direction of movement of said threads, means controlled by said light sensitive device to interrupt the operation of said machine, a plurality of levers pivotally mounted between their ends on separate axes, which axes are substantially parallel with said beam of light, said levers being mounted adjacent said beam of light and intermediate the light source and light sensitive device, a shutter supported by each lever on one side of its axis for movement into and away from the path of said beam of light, said shutters being biased for movement into the said path and of a size to interrupt said beam of light, means connected with the other end of each lever for engaging one of said threads to support said lever in a position to retain the shutter thereon against said bias and out of line with said beam of light, so long as said threads remain continuous and tensioned, whereby the breaking of any one of said threads will release the lever connected with that thread and permit the shutter thereon to move into the path of said beam of light.

7. An apparatus for controlling the operation of a sewing machine which comprises a sewing head, means for moving articles to be sewed to and beyond said sewing head, means on said sewing head for separately guiding a plurality of threads to the needle of said sewing head in substantially the same direction, said apparatus including a light sensitive device, a light source to project a beam of light onto said light sensitive device in a path substantially parallel to and adjacent the direction of movement of said threads, means controlled by said light sensitive device to interrupt the operation of said machine, a supporting structure mounted on said sewing head, located in the path of said beam of light between said light sensitive device and light source, and having an opening formed therein through which said beam of light passes, a plurality of levers pivotally mounted on said structure, shutters carried by the respective levers and biased toward said opening in the path of

said beam of light, and means for connecting said levers with the respective threads to support said shutters against said bias normally away from said opening and to release any one of said shutters for movement across said opening to interrupt said beam of light when the thread supporting the same breaks.

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