E. J. LIPPS.
DOUBLING MACHINE.
APPLICATION FILED JAN. 7, 1921.

1,401,618.

Patented Dec. 27, 1921.

4 SHEETS—SHEET 1.

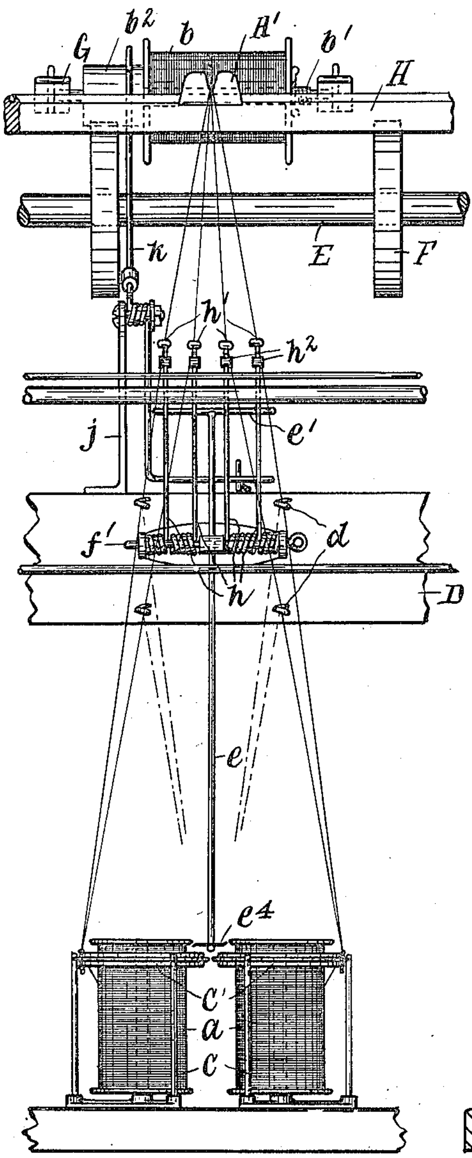

Fig. 1.

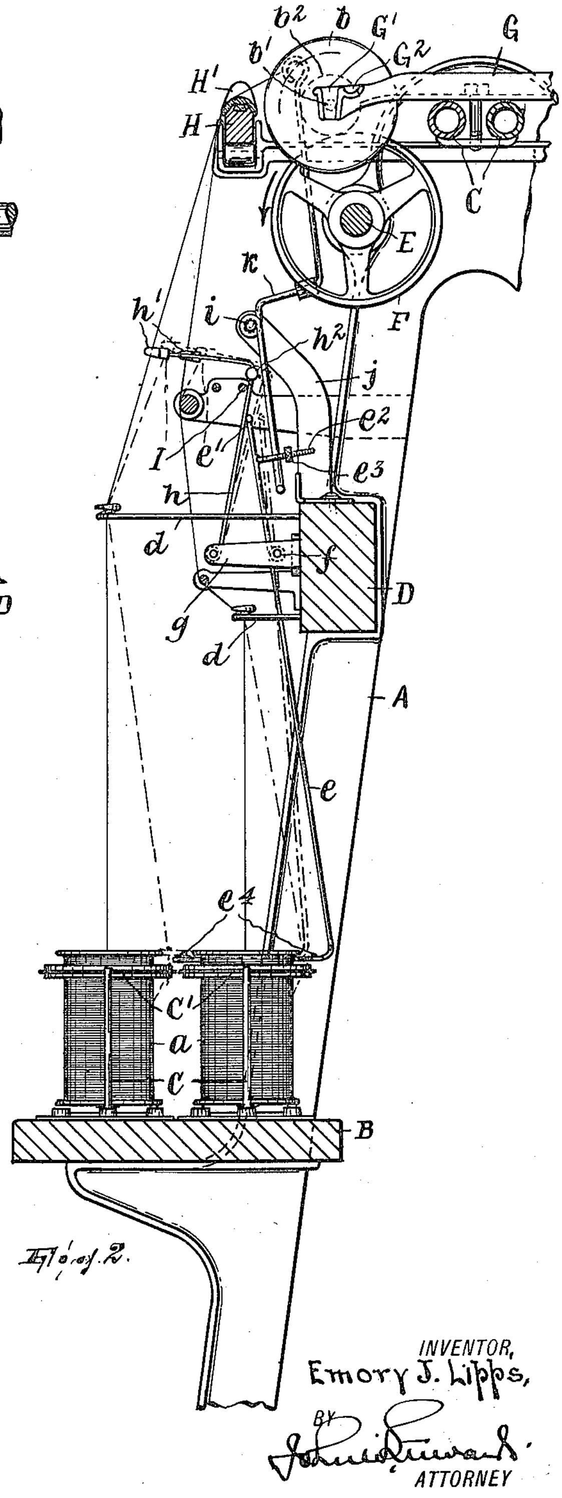

Fig. 2.

WITNESS:
Wm. L. Bell.

INVENTOR,
Emory J. Lipps,
BY
John Howard
ATTORNEY

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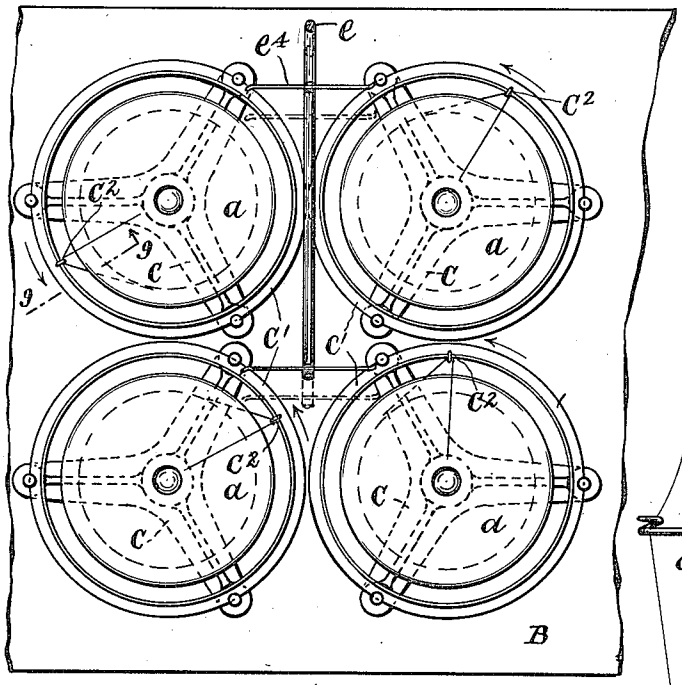

Fig. 4.

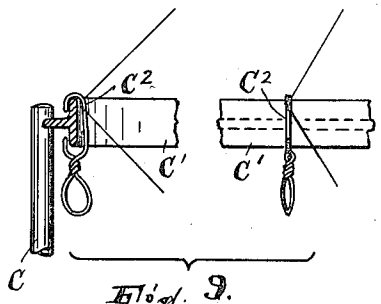

Fig. 2.

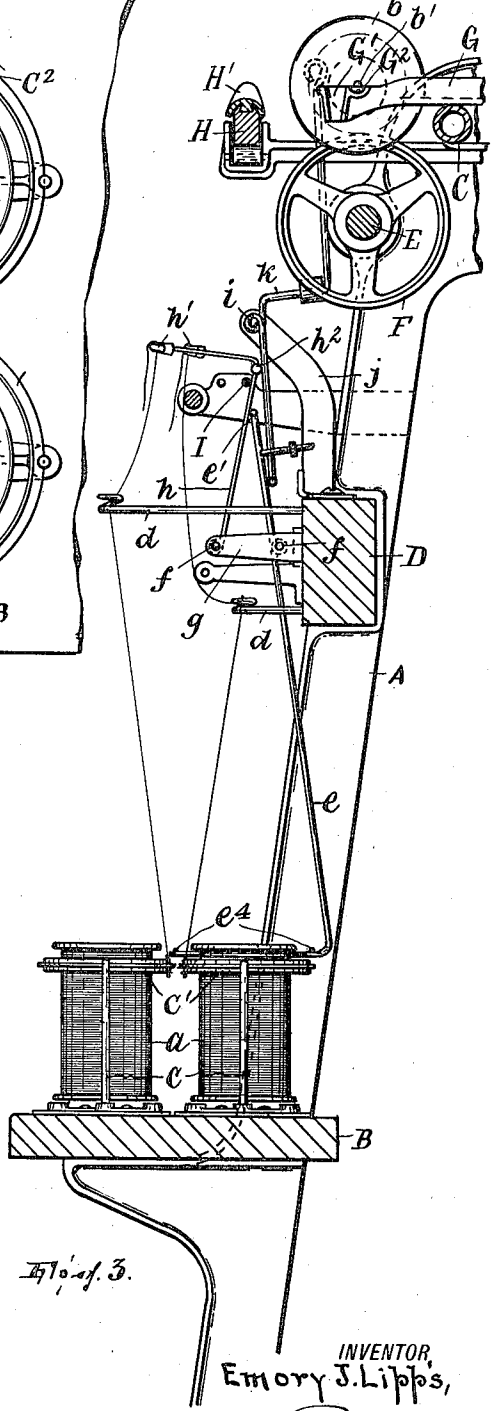

Fig. 3.

WITNESS:

Wm. Bell.

INVENTOR,
Emory J. Lipps,
BY
Johnson Stewart.
ATTORNEY.

E. J. LIPPS.

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4 SHEETS—SHEET 3.

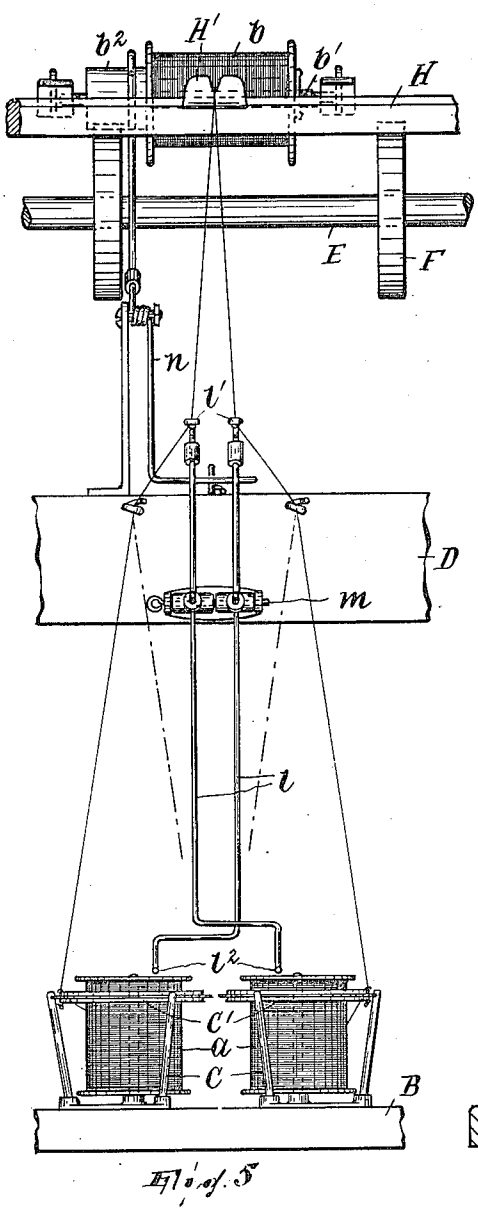

Fig. 5.

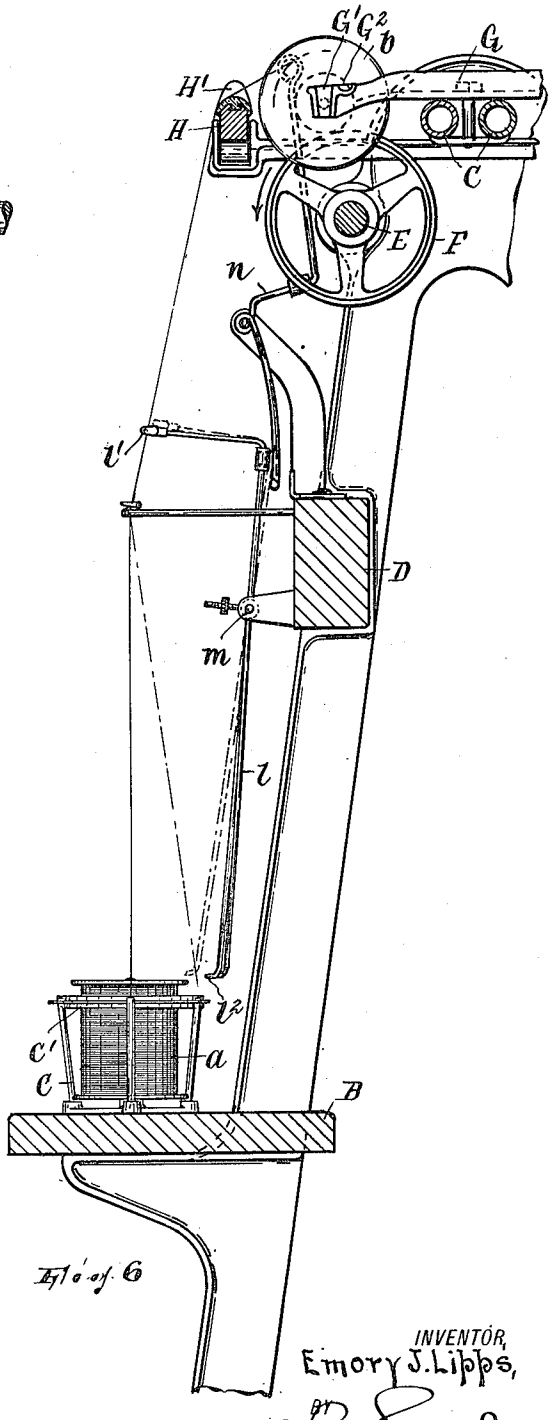

Fig. 6.

WITNESS:

Wm. Wall.

INVENTOR,

Emory J. Lipps,

BY

Johnston & Howard.

ATTORNEY.

E. J. LIPPS.

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4 SHEETS—SHEET 4.

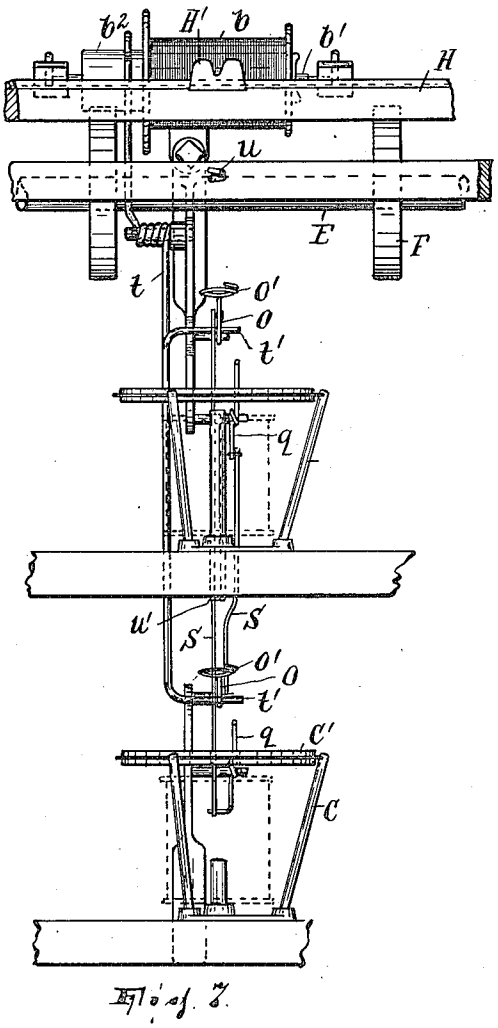

Fig. 7.

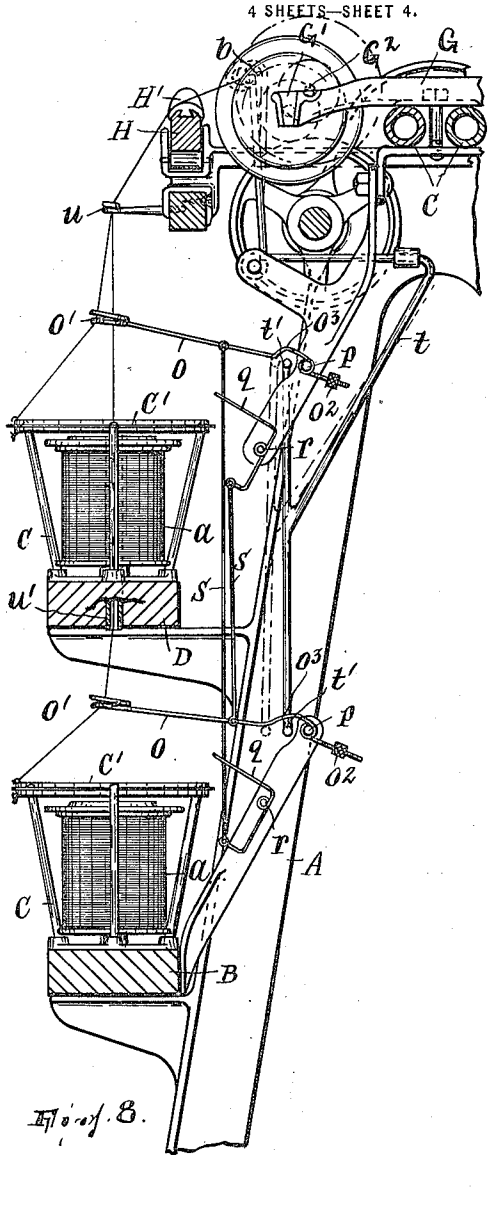

Fig. 8.

WITNESS:

Wm. Bell.

INVENTOR,

Emory J. Lipps,

BY

Johnson Kinnard

ATTORNEY

UNITED STATES PATENT OFFICE.

EMORY J. LIPPS, OF FOUNTAIN HILL BOROUGH, PENNSYLVANIA.

DOUBLING-MACHINE.

1,401,618. Specification of Letters Patent. Patented Dec. 27, 1921.

Application filed January 7, 1921. Serial No. 435,628.

To all whom it may concern:

Be it known that I, EMORY J. LIPPS, a citizen of the United States, residing at borough of Fountain Hill, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Doubling-Machines, of which the following is a specification.

In doubling machines provided with automatic means for stopping the doubling operation as to any doubling unit when a yarn breaks said means has heretofore accomplished the stopping by causing the checking of the rotation of the receiving bobbin, and this has considerably kept down the speed and so limited the production of such machines, thus: The broken end will become more or less wound in on the bobbin with the complementary unbroken end or ends—making it correspondingly more or less difficult and time-wasting for the operator to find it—according to the number of revolutions the bobbin makes after the breakage occurs; it would be impracticable at any suitable speed to stop the bobbin instantaneously, and if it is stopped gradually (which is the usual way, as by raising it out of contact with its rotating driver) then the speed of the machine can not be very great without so much of the unbroken yarn becoming wound on the bobbin after the break occurs and by the time the bobbin "runs down" and stops that it would make it unduly tedious and time-wasting to attempt to locate the broken end.

By the present invention this difficulty is overcome and a very much greater speed is possible, with consequently and correspondingly greater output. My invention contemplates means which, instead of checking the rotation of the receiving bobbin, stops the doubling operation when a yarn breaks by disrupting the remaining yarn or yarns. In the examples herein set forth the supply bobbins are arranged so that each delivers over one end or head thereof toward the receiving bobbin rather than sidewise; this has several advantages, the most important of which is that the rotating of the supply bobbins (usually accomplished where the delivery is sidewise from these bobbins by the pull of the yarn thereon) does not have to be considered, and so the speed may be considerably increased on that account. In some cases I have provided for the supply bobbins being arranged side by side; but I may also arrange them with their axes in substantial alinement and projecting toward the receiving bobbin, which is very advantageous because among other things it makes it possible for my aforesaid means for stopping the doubling operation to be devised, as will appear, so as to operate as a tension regulator, and also for a twist to be put into the doubled product, with a certain consequent advantage hereinafter set forth. My invention contemplates, in addition to the foregoing, certain provision for facilitating the attendant's work in piecing the broken ends together when a stopping of the doubling operation on account of breakage has been effected.

In the accompanying drawings,

Figures 1 and 2 are front and side elevations of a doubling unit embodying my invention in one form thereof and as applied to a four-yarn doubling operation;

Fig. 3 is a view like Fig. 2, but showing the parts in the position they occupy when the broken ends are to be pieced together;

Fig. 4 is a horizontal sectional view taken just above the supply bobbins in Figs. 2 or 3;

Figs. 5 and 6 are front and side elevations of a doubling unit embodying my invention in another form thereof and applied to a two-yarn doubling operation;

Figs. 7 and 8 are front and side elevations of a doubling unit embodying my invention in still another form thereof; and

Fig. 9 is an inside elevation and a section on line 9—9, Fig. 4, of a detail.

In all the forms shown, A designates the frame of a doubling machine; B its lower rail for the support of the supply bobbins; C a pair of bars forming its top rail; D its intermediate rail; E a suitably rotated shaft carrying the rotary drivers F; G brackets on the top rail having guides G′ and seats G^2 for the receiving-bobbin spindles; and H the suitably reciprocated traverse rail. *a* in all the forms shown designates the supply bobbins and *b* the receiving bobbins.

Referring, first, to Figs. 1 to 4: The supply bobbins *a*, standing upright, are arranged in two pairs, one directly in front of the other, and each bobbin is preferably set in a skeleton frame *c* arranged on the rail B having, at the top and nearly as high as the bobbin, a ring *c′* on which is a traveler c^2 (Fig. 9); to keep this traveler from binding against the ring as it moves around the same (that is, to preserve it as nearly as possible upright while in motion) I provide it

with a pendant weight, as shown, which may be a depending loop of the wire of which the traveler is formed. The yarns from the four bobbins *a*, engaged with the guides H′ on the traverse rail H in the usual way, pass for doubling onto the single bobbin *b*, which when driven by the driver F has its spindle *b′* engaged in the guides G′ of the brackets G and when idle has its spindle supported in the rests G^2. Suitable yarn guides *d* are arranged on rail D so that their yarn-guiding eyes are in alinement with the respective axes of the four bobbins *a;* these confine the cones formed by the yarns as each is drawn off its bobbin and plays around the same to definite positions. In the present example the means for stopping the doubling operation may be regarded as divided into two separately movable portions, to wit, the upper or yarn-engaged or detector portion and the lower or disrupting portion, the former being adapted on movement to move the latter. The lower portion or disrupter is a lever *e* pivoted on a horizontal transversely extending pin *f* (so that the lever moves in a vertical front-to-rear plane) which is mounted in a bracket *g* projecting from rail D. The lever extends above its pivot or fulcrum and has above the same a transversely extending or T-head-forming portion *e′* and also a rearwardly reaching threaded stem e^2, on which is screwed an adjusting weight e^3; the lower end of the lever is bent forward, standing between the bobbins of both pairs, and this forwardly bent portion has two transverse cross-arms e^4. The weight of the lever, which moves quite freely on its fulcrum, normally retains it in about the position shown by full lines in Figs. 2 and 4, *i. e.*, so that the ends of its cross-arms are just clear of the cones formed by the yarns as they are delivered from the bobbins *a;* if the lever is shifted so as to move its lower end forward (dotted lines, Figs. 2 and 4) the cross-arms, being interposed in the paths of the yarns, will disrupt them, to which end it is preferable to give the ends of the cross-arms a slight hook-shape, as shown in Figs. 1 and 4, so as to insure their effectually catching and so disrupting the yarns in the position indicated. It will be understood that the position in which the lever is normally retained (*i. e.*, its idle position) may be nicely determined by adjusting the weight e^3. The upper or detector portion of the aforesaid means consists of a set of fallers *h* each pivoted on a pin *f′* at its lower end and having its upper end bent forward and equipped with a yarn-guide *h′*, the several yarns from the bobbins *a* being respectively engaged with these yarn-guides, each of which is normally held by the yarn in about the position shown in Figs. 2 and 4 but which, when released by the yarn, will under the influence of a weight h^2 fall backward; the fallers are arranged two on one and two on the other side of the plane of movement of lever *e* and so that each when it falls back will press rearwardly against one of the arms of the T-head of said lever and so move the same to the yarn-disrupting position already explained. A transverse bar I of the machine may limit the forward movement of the fallers. It will be understood that if any yarn breaks while the doubling operation is proceeding the falling back of the corresponding faller and consequent movement of the disrupter *e* results in the disrupting of all the other yarns, the bobbin *b* continuing to rotate, however, until it is stopped. Upon observing that the doubling operation has been stopped the attendant takes the bobbin *b* from the machine and finds the broken ends preparatory to piecing them with the broken ends of the yarns extending from the bobbins *a*, which is readily accomplished if the mechanism is adjusted so that on the breaking of a yarn the others will be disrupted with promptitude and therefore said ends are not circumferentially far apart on bobbin *b*. The attendant then restores the bobbin *b* to the machine, placing it however in the rests G^2, in order to piece the yarns, and as the yarns on bobbins *a* should be free to travel around them without interference by the disrupter at this time I provide means controlled by the bobbin *b* for controlling the position of the disrupter, or more specifically, for holding the disrupter in the idle or normal position (full lines, Figs. 2 to 4) whenever the bobbin *b* is out of position to be driven by driver F, thus: On a transverse pin *i* projecting from a bracket *j* on rail D is fulcrumed a detent lever *k* having its lower end bent laterally and traversing the upper end of lever *e* and its upper end crooked rearward and weighted and adapted to bear against the whirl b^2 of the spindle for bobbin *b*. When the bobbin is present in its guides G′, or driven position, the whirl b^2 holds detent lever *k* in the (idle) position shown in Fig. 2, so that lever *e* is free to move to disrupting position; but when the bobbin is removed for the purpose of finding the broken ends the detent lever falls backward and so shifts the lever *e* to the idle position (Fig. 3) and holds it there until, the attendant having meanwhile placed the bobbin in the rests G^2 till the piecing of the yarns is completed, the bobbin is restored to the guide G′ and so shifts the detent lever back to its normal or idle position.

Referring, now, to the form shown in Figs. 5 and 6: Instead of there being a plurality of detector members, one for each yarn, controlling a disrupter member common to the yarns, as before, there are in this case (adapted for a two-thread doubling op-

eration) separately movable stopping means each adapted to disrupt one of the yarns but controlled by the other yarn. In the example shown each of these means consists of a lever *l* fulcrumed on a pin *m* to move freely in a vertical front-to-rear plane and having its upper or detector end bent forward and equipped with a guide *l'* for one of the yarns and its lower or disrupting end bent laterally and downwardly and terminating in a hook l^2. The yarn normally holds the levers in the position shown in full lines in Fig. 6, where the hook of each is just clear of the yarn-cone of the relatively opposite bobbin *a;* but if one of the yarns breaks the corresponding lever falls back to the dotted line position and its hook l^2, interfering with the play of the yarn of the opposite bobbin around the same, disrupts it also. *n* denotes a detent lever substantially the same in construction and function as the detent lever *k* already described.

In Figs. 7 and 8 the supply bobbins *a* are arranged one above the other. Here again (where the doubling operation is of the two-thread type) there are separately movable stopping means each adapted to disrupt one of the yarns but controlled by the other yarn. One bobbin *a* is arranged on the lower rail B and the other on the intermediate rail D, in axial alinement with each other and with the receiving bobbin *b*, and each preferably in a skeleton frame *c* having ring *c'* and traveler c^2, as in Figs. 1 to 6. The detectors are levers *o* fulcrumed on pins *p* one above each bobbin, each having at its forward end a yarn-guiding eye *o'* (preferably circular) axially alined with the bobbins and on its rear end an adjusting weight o^2. The disrupters are levers *q* fulcrumed on pins *r* adjacent the respective bobbins and so as to be movable into and out of the paths of the yarns traveling around the bobbin heads in being delivered. A link *s* pivotally connects the detector adjacent each bobbin with the relatively opposite disrupter. The stopping operation in this case will be substantially the same as in the form shown in Figs. 5 and 6. *t* is a detent lever serving the same purpose as the detent levers *k* and *n* already described; that is, whenever the receiving bobbin *b* is removed from its guides G' the weight of the lever moves it to the dotted line position in Fig. 8, so that arms *t'* thereon engage bends o^3 in the detector levers *o* and by camming them up on their fulcra shift and hold the corresponding disrupter levers *q* clear of the yarns. The yarn from the upper bobbin is passed through a guide *u* axially alined with said bobbin and the yarn from the lower bobbin is passed axially through the upper bobbin, *u'* in Fig. 8 being a yarn guide in the rail D that is alined with the bore or hole of said bobbin. The arrangement shown in Figs. 7 and 8, it will be apparent, results in the twisting of the yarn from the upper bobbin around that from the lower bobbin. The doubled threads are therefore bound together, in consequence of which when they pass to the spinning operation it is unnecessary to resort to a flier for holding them together or subject them to any preliminary treatment to accomplish that purpose. This arrangement presents the further advantage that each detector lever, being placed immediately above a bobbin, serves as a regulable means to preserve such tension on the yarns as may be suitable or desirable according to their tensile strength and other conditions.

In the examples herein set forth the disrupting is an incident of checking the advance of the yarn under the draft of the receiving package—by checking the travel of the yarn around its supply package in the delivery of the coils thereof,—the yarn parting where it happens to be weakest.

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

1. In combination, with a pair of supply yarn-packages and the rotated receiving yarn-package of a doubling machine, one supply package being arranged with its axis of winding extending substantially in the direction of draft of the receiving package and so that its yarn will travel around the yarn from the other supply package when said yarns are subjected to said draft, means, controlled by one yarn, to at times check the advance of the other yarn under said draft.

2. In combination, with a pair of supply yarn-packages and the rotated receiving yarn-package of a doubling machine, one supply package being arranged with its axis of winding extending substantially in the direction of draft of the receiving package and so that its yarn will travel around the yarn from the other supply package when said yarns are subjected to said draft, means, controlled by the former yarn, to at times check the advance of the other yarn under said draft.

3. In combination, with a pair of supply yarn-packages and the rotated receiving yarn-package of a doubling machine, one of the supply yarn-packages having its axis of winding upright, a yarn guide for the yarn from said package substantially alined with the axis of and arranged above said package, and means, including an up-and-down movable gravity actuated eye penetrated by said yarn and arranged between said guide and package, to at times check the advance of the other yarn under the draft of the receiving package.

4. In combination, with a pair of supply yarn-packages and the rotated receiving yarn-package of a doubling machine, one of the supply yarn-packages having its axis of

winding upright, a yarn guide for the yarn from said package substantially alined with the axis of and arranged above said package, and means, including an up-and-down movable gravity actuated eye penetrated by said yarn and arranged between said guide and package, to at times apply a disrupting force to the other yarn between its supply package and the receiving package.

5. In combination, the frame of a doubling machine having a bearing in which to removably place the receiving package and means to support a supply package, a rotary driver for the receiving package journaled in the frame near said bearing, a device movable in the frame against the yarn extending from the supply to the receiving package to check the advance of said yarn, and means, controlled by the receiving package, to hold said device against movement when the receiving package is absent from said bearing.

6. In combination, the frame of a doubling machine having a bearing in which to removably place the receiving package and means to support a supply package, a rotary driver for the receiving package journaled in the frame near said bearing, a device movable in the frame against the yarn extending from the supply to the receiving package to check the advance of said yarn, and means movable normally to a position to hold said device against movement but adapted to be held against movement by the receiving package when in said bearing.

In testimony whereof I affix my signature.

EMORY J. LIPPS.