C. MAZZUCCHELLI.

DOUBLING AND TWISTING MACHINE.

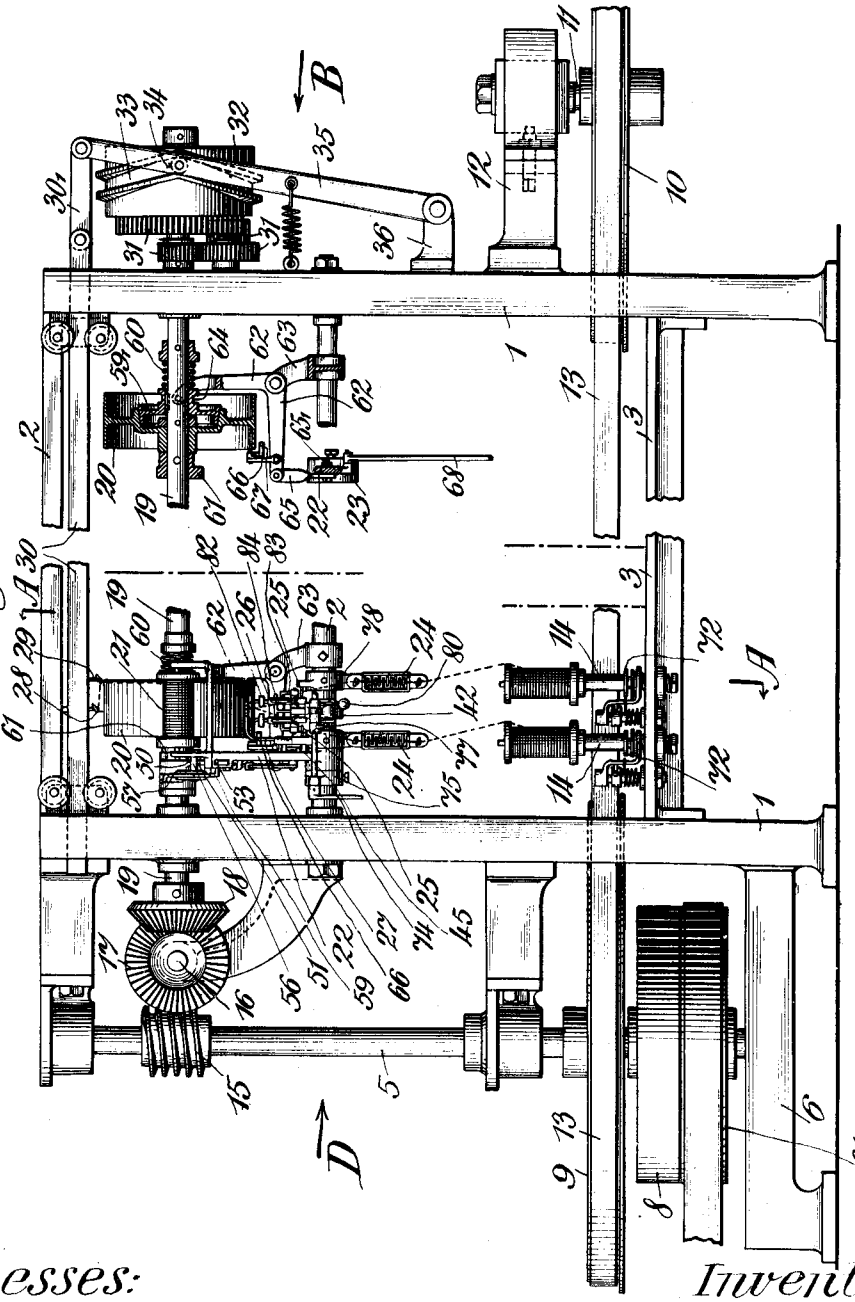
APPLICATION FILED JUNE 15, 1914.

1,193,041.

Patented Aug. 1, 1916.

4 SHEETS—SHEET 1.

Fig. 1



Witnesses:

B. Kommers

E. Leckert

Inventor:

Celestino Mazzucchelli

By Henry Orth & Co

Atty.

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4 SHEETS—SHEET 2.

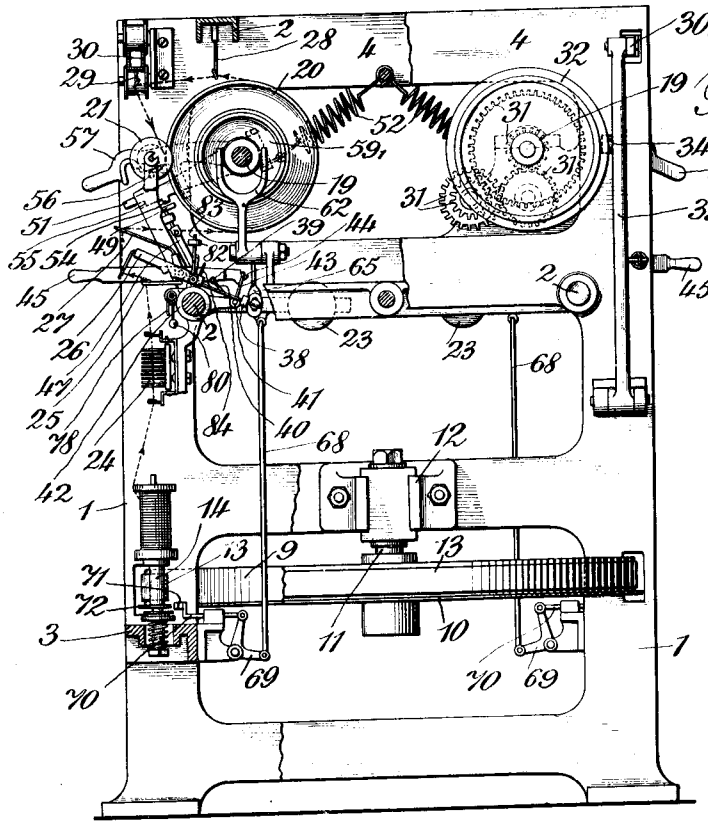


Fig. 2

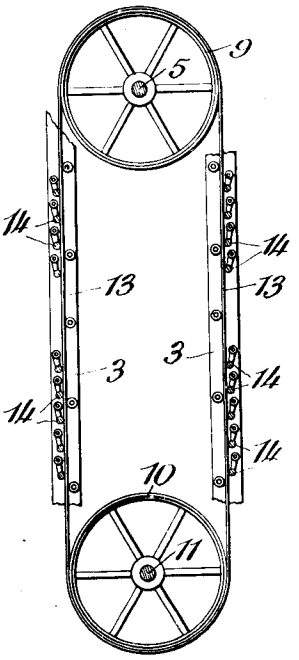


Fig. 4

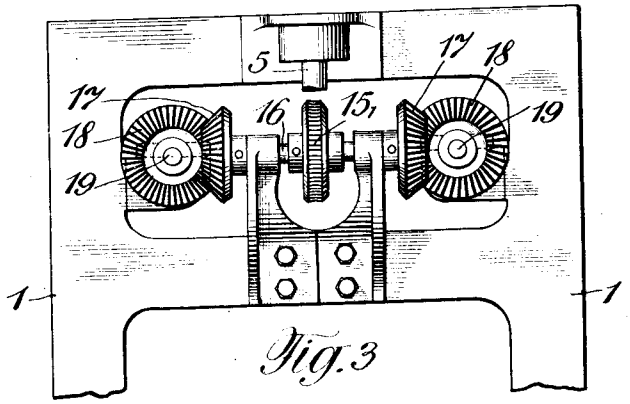


Fig. 3

Witnesses:

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E. Leckert

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By Kenyon & Kenyon

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4 SHEETS—SHEET 3.

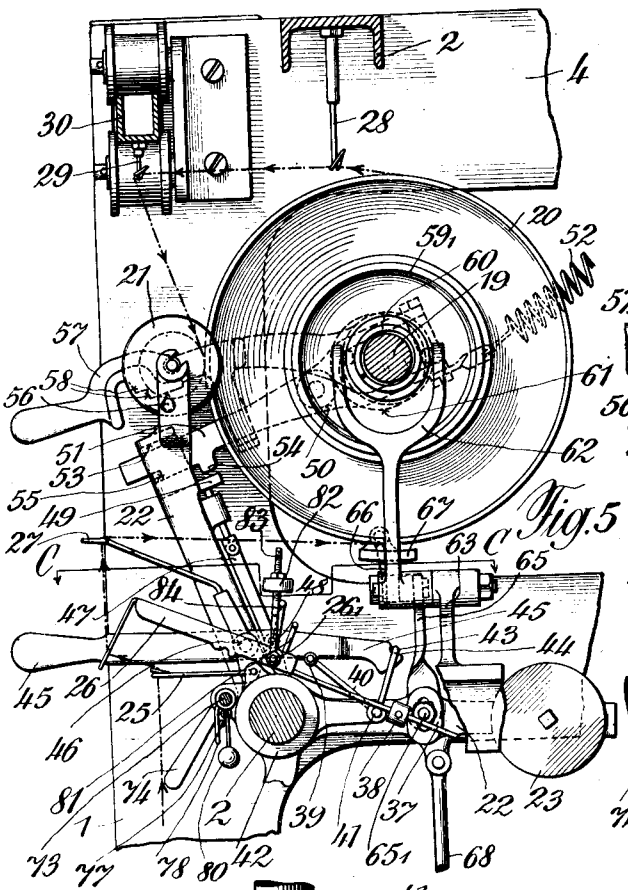


Fig. 5

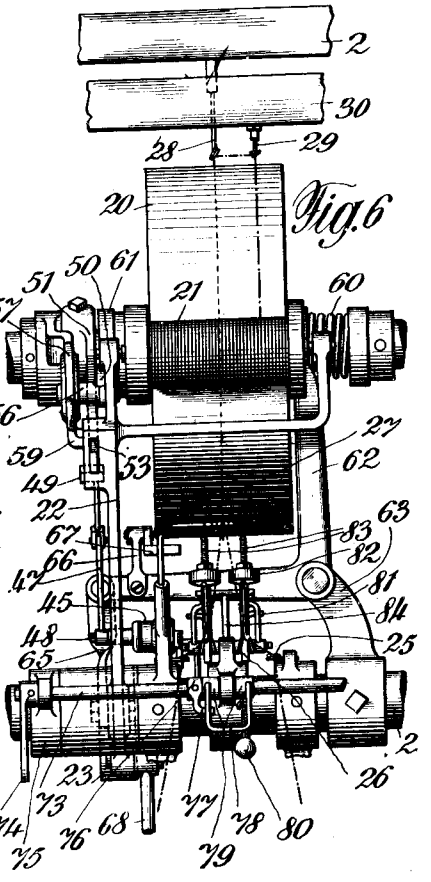


Fig. 6

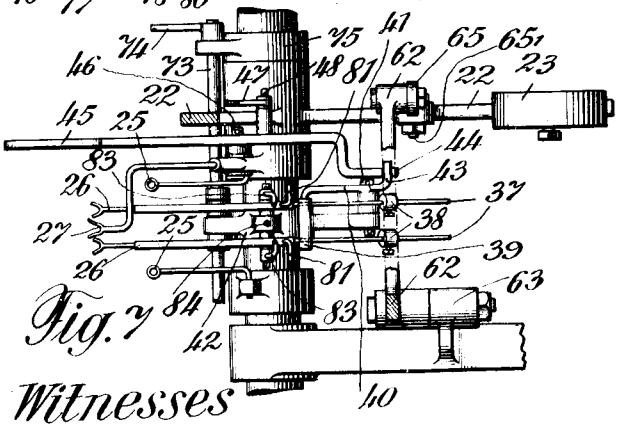


Fig. 7

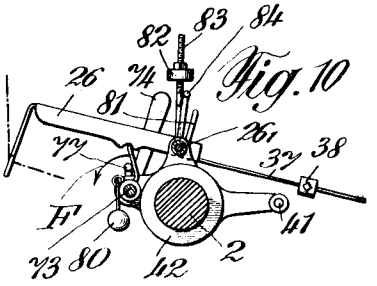


Fig. 10

Witnesses

B. Dommers

E. Leckert

Inventor:

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DOUBLING AND TWISTING MACHINE.

APPLICATION FILED JUNE 15, 1914.

1,193,041.

Patented Aug. 1, 1916.

4 SHEETS—SHEET 4.

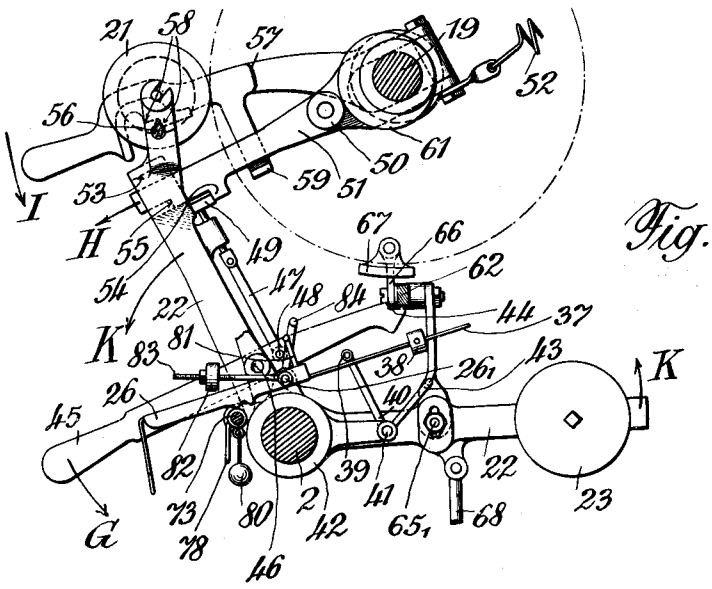


Fig. 8

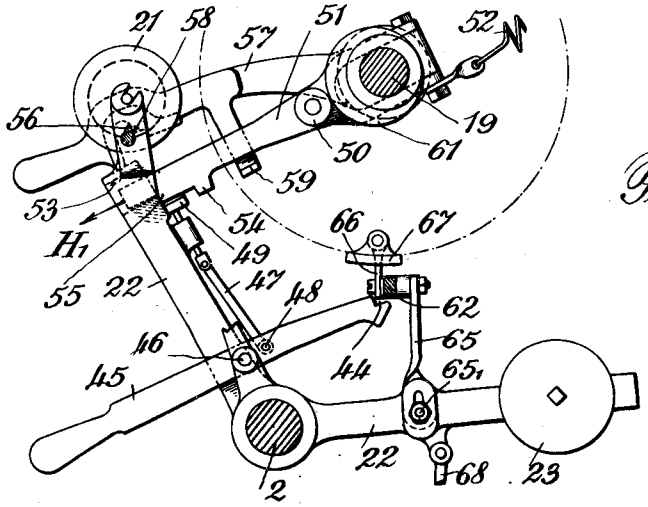


Fig. 9

Witnesses:

B. Dommers

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Inventor:

Celestino Mazzucchelli.

By Henry Orth & Co

Atty.

UNITED STATES PATENT OFFICE.

CELESTINO MAZZUCCHELLI, OF COMO, ITALY.

DOUBLING AND TWISTING MACHINE.

1,193,041. Specification of Letters Patent. Patented Aug. 1, 1916.

Application filed June 15, 1914. Serial No. 845,126.

To all whom it may concern:

Be it known that I, CELESTINO MAZZUCCHELLI, a subject of the King of Italy, residing at Via Briantea 1, Como, Italy, have invented new and useful Improvements in Doubling and Twisting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in a method for doubling and twisting raw silk threads and similar very thin textile fabrics and to a machine for carrying out this method.

The object of this invention is to provide a doubling and twisting machine, wherein the twisting of the single threads of silk or the like may be carried out simultaneously with the doubling of two or more threads and with the winding up of these threads upon bobbins, from which they may be wound off during the subsequent treatment of the twine.

A further object of this invention is to provide a machine of the hereinbefore mentioned type, which operates to subject doubled threads to all twisting operations not only in the case that the single threads have been first twisted, but also in the case that this has not been done, and which further permits the manufacture of every kind of yarns in a most advantageous manner.

The machine according to this invention is so constructed that it can be used either as a doubling and twisting machine or only as a doubling machine, in which latter case the thread is drawn off from a stationary bobbin. All variations in the number of revolutions of the bobbins from which the thread to be twisted is wound off and, therefore, also the degree of the twist and the speed of delivery of the machine may be altered in a most convenient manner. On the other hand, a variation in the direction of travel of the belt driving the twine-bobbins operates to alter the direction of rotation of the twine.

By the use of the machine which forms the subject matter of this invention the following advantages are obtained:

1. The remarkable length of the thread acted upon, imparts to the thread a great elasticity, and the very sensitive thread-tensioner, so regulates the tension of the thread and keeps it uniform, that it is possible to draw off the thread by a conveying pulley in a uniform and very quick manner from said pulley, and with threads of the finest kind, the velocity with which the thread can be pulled off the pulley is only limited by the number of revolutions of the bobbins, which may rotate in a machine according to this invention with a speed of about 14000 revolutions in a minute, while in the hitherto known machines the highest number of revolutions attainable was 8000–10000. Owing to the high speed of the twine-bobbins the output of the machine can be considerably increased as compared with the hitherto known arrangements. At the same time the exactness with which the twisting and doubling are carried out is very great and the thread is not subjected to any strong tensile stress as is the case when the doubling is carried out separately, so that the frequent breaks of the thread and the waste connected therewith are avoided, the doubling being carried out according to this invention in such a slow manner that breaks of the thread are entirely prevented.

2. Owing to the fact that the machine is provided with means for bringing the single groups of the machine to a standstill as soon as the corresponding thread breaks or as soon as a bobbin is full, a considerable saving in workers as well as in machines and power may be attained. These advantages are particularly of great importance for countries, in which night work is not permitted.

The construction of the single machines is such, that a plurality of machines may be arranged one above another.

In the accompanying drawings a construction according to this invention is illustrated by way of example.

Figure 1 shows a front elevation, partly in section, of the whole machine; Fig. 2 is partly a section on the line A—A of Fig. 1 and partly an end view seen in the direction of the arrow B shown in Fig. 1. Fig. 3 is a part of an end view seen in the direction of the arrow D shown in Fig. 1, illustrating parts of the driving gear, Fig. 4 shows a diagrammatic top view of the means for driving the twist-bobbins, Fig. 5 shows on an enlarged scale a part of a section on the line

A—A of Fig. 1, illustrating the means for bringing the machine to a standstill the instant the thread breaks or as soon as the spool is full, Fig. 6 is an end view of Fig. 5, seen from the left hand side, Fig. 7 is a section on the line C—C of Fig. 5, Figs. 8 and 9 show the mechanisms illustrated in Fig. 5 in two further positions and Fig. 10 shows a detail.

A strong frame having lateral standards 1 rigidly connected by means of shafts 2 and having also bobbin-carriers 3 supports the different mechanisms of the machine. The upper ends of the lateral standards 1 support plates 4. The shape of these plates 4 is such, that other lateral standards 1 may be arranged above them, in case that there has to be provided a machine consisting of several superimposed single machines.

5 denotes the main driving shaft extending over the whole height of the machine. This shaft 5 is supported in a separate frame 6 provided on the left hand side of the main frame of the machine (Fig. 1). On the shaft 5 there are mounted a loose and fast pulley 7 and 8, respectively, as well as a large driving pulley 9.

10 denotes a second pulley mounted on a vertical axis 11, which is capable of being adjusted in a horizontal direction in a bracket 12 provided on the right hand side of the main machine-frame (Fig. 1). An endless belt 13 passes over the pulleys 9 and 10 and rotates the twist-bobbins 14. (Figs. 1, 2 and 4). The vertical shaft 5 carries near its upper end a worm 15, which meshes with the worm wheel 15_1 mounted on the shaft 16 carrying the bevel wheels 17. The latter mesh with the bevel wheels 18 mounted on the shafts 19. On the shafts 19 there are mounted the conveying pulleys 20 for the thread, said pulleys being arranged in a suitable manner with regard to the bobbins 14. 21 denotes the bobbins upon which the doubled thread has to be wound. Each of these bobbins 21 is pressed normally against one of said conveying pulleys 20 (Figs. 2 and 5) and each of them is carried by a double armed lever 22 having a bifurcated upper end (Fig. 6). The levers 22 are pivotally mounted on one of the connecting shafts 2 and a weight 23 (Figs. 2 and 5) acts in such a manner upon them, that a good frictional contact between the bobbins 21 and the conveying pulleys 20 is obtained.

The thread wound off the bobbins 14 receives from the latter the necessary twist and passes at first through the thread-tensioner 24, which may be of any suitable construction, whereupon it is fed past the stationary thread-guide 25, the controlling and stopping fork 26 and the thread guide 27, where it is doubled (see Figs. 1 and 5 to 7). From this guide 27 it is fed around one half of the circumference of the pulley 20, from where it is guided over a stationary thread-guide 28, which is fixed to the machine frame and which prevents a shifting of the thread upon the conveying pulley, and over a movable thread-guide 29 to be finally wound upon the bobbin 21. All the thread-guides 29 working together with the pulleys 20 mounted on the same shaft 19 are fixed to a rail 30 extending over the whole length of the machine. To impart to each of the rails 30 a uniform to and fro movement in their longitudinal direction, there is provided in connection with each of the shafts 19 a toothed wheel gearing 31 transmitting the drive of the shaft 19 to a disk 32 having a groove 33. In this groove 33 works a roller 34 of a lever 35 pivotally mounted at its lower end to a projection 36 (Fig. 1) of the machine frame and connected at its upper end by means of an arm 30_1 to the rail 30.

The thread-tensioner 24 operates to regulate the thread tension just as circumstances may require and the tension imparted to the thread by this device corresponds to the tension with which the thread is wound upon the bobbin, since the tension will not vary after the thread has passed the tensioner 24 but for the additional small tension produced in the thread-guides.

The conveying pulleys 20 securing a uniform winding off of the thread impart to the bobbins 21 an absolute uniform rotary movement corresponding to the speed of rotation of said pulleys, so that the thread is wound uniformly upon the bobbins 21, the diameter of which cannot exert any influence upon the speed with which the thread is wound upon these bobbins.

The hereinbefore mentioned controlling and stopping fork 26 exerts a pressure upon the thread, which is smaller than the pressure to which the thread is subjected.

The different means controlling the winding up of the thread, which may be adjusted in the manner as circumstances may require and which will be hereinafter more fully described, operate to increase considerably the speed with which the thread may be wound up, this speed being only limited by the speed of rotation of the bobbins 14, which, as already mentioned, may make 14000 revolutions in a minute. For the purpose of varying the number of revolutions in a minute there has only to be varied the speed of rotation of the conveying pulleys 20, for which purpose I make the different bevel-wheels 17, 18 interchangeable.

I shall now more fully describe the means for bringing the single groups of the machine to a standstill as soon as the corresponding thread breaks or as soon as the corresponding bobbin is full.

At first I shall describe the means for stopping a group when the corresponding thread breaks. These means are best shown

in Figs. 5 to 9. The controlling and stopping fork 26 resting upon the thread and pivotally mounted at 26_1 to an eye of a hub provided on one of the hereinbefore mentioned shafts 2 carries at one end a small rod 37 carrying an adjustable weight 38.

40 denotes a double-armed lever pivotally mounted at 41 on the hub 42 and having a lateral projection 39 lying in the path of movement of the rod 37. A second lateral projection 43 provided on said lever 40 normally engages a recess 44 of a lever 45 pivotally mounted at 46 to a further eye of said hub 42. A rod 47 carrying at its upper end a projection 49 and lying on the lever 22 supporting the bobbin 21 is pivotally mounted at 48 to the lever 45, so that an oscillation of the latter causes a to and fro movement of the rod 47 in its longitudinal direction.

For each group of devices there is mounted on each shaft 19 an eccentric 61 (Fig. 8) driving a small roller 50 provided on a rod 51. The roller 50 imparts to the rod 51 a forward movement, while a spring 52 moves said rod 51 backward. The rod 51 is supported on one end by the shaft 19 and at the other end by a guide-slot 53 provided in the double-armed lever 22. The end of the rod 51 lying farther away from the shaft 19 has on its underside two offsets 54 and 55 respectively. The offset 55 slides in the guide-slot 53 of the lever 22, while the offset 54 is moved to and fro above the projection 49. The upper end of the lever 22 carries a small projection 56 acting as a support for a lever 57 pivotally mounted on the shaft 19 and having on its underside offsets 58. A downwardly extending projection of this lever 57 has a hook shaped lower end 59, which engages the rod 51 and brings the latter into its normal position after it has been displaced.

As will be best seen on the right hand side of Fig. 1, each conveying pulley 20 is loosely mounted on the corresponding shaft 19 and receives its drive from a friction disk 59_1. A spring 60 presses the disk 59_1 against the corresponding working surface of the pulley 20, which is kept in its proper position by the eccentric 61. The parts 59_1 and 20 may be thrown out of gear by means of a double-armed lever 62 pivotally mounted on an arm 63 fixed to one of the shafts 2. The lever 62 has a bifurcated upper end and carries on this end projections working in a groove 64 of the hub of the disk 59_1 and it is operatively connected to a link 65 having at one of its ends a pin 65_1 projecting in a slot of the lever 22. The lever 62 carries a projection 66 acting as a support for a friction block 67.

68 denotes a vertical rod fixed at its upper end to the lever 22, while its lower end is connected to a double armed lever 69 pivotally mounted on the frame of the machine. The other end of the lever 69 is connected to a rod 70 carrying a friction member 71, which may be pressed against a friction disk 72 fixed to the spindle of the bobbin 14. Such a rod 68 is provided in connection with each lever 22 and each bobbin 14.

The operation of the hereinbefore described stopping mechanisms is as follows: As soon as the thread breaks the controlling and stopping lever 26 resting normally upon the thread drops down. A projection 81 on the lever 26 thereupon strikes against a lever 83 pivotally mounted on the hub 42 and carrying a weight 82. (The lever 83 is held in its normal position by a stop 84). Thus, the lever 83 is rotated in a counter-clockwise direction, so that the weight 82 is brought to act upon the lever 26, the latter being then rotated under all circumstances through a certain angle. Owing to the downward movement of the lever 26, the lever 43 is raised, so that it comes out of engagement with the lever 45. The latter is then free to rotate in the direction of the arrow G shown in Fig. 8 and it moves thereby the rod 47 upward, so that the projection 49 is moved into the free space provided between the offset 54 and the lever 22 (see Fig. 8), the latter being moved in the direction of the arrow K (Fig. 8) as soon as the rod 51 carrying said offset 54 is moved in the direction of the arrow H shown in Fig. 8. Hereby the projection 56 provided on the lever 22 is moved behind one of the offsets 58 of the lever 57 (see Fig. 8) and is kept in this position by the projection 56 engaging one of the offsets 58, the lever 57 being then moved to a small extent in the direction of the arrow I, so that the bobbin 21 is brought out of the contact with the conveying pulley 20. The counter-clockwise movement imparted to the lever 22 operates the link 65 and the double-armed lever 62, so that the friction disk 59_1 and the conveying pulley 20 are thrown out of gear. During the next inward movement of the arm 51 the offset 55 of said arm comes to lie behind the lever 22 (see Fig. 9), so that the latter will be further rotated in a counter-clockwise direction as soon as the arm 51 is moved in the direction of the arrow H shown in Fig. 9. Owing to this second movement of the lever 22 in said direction the rod 68 is lifted to such an extent that the friction member 71 is brought to act upon the disk 72, thus stopping the bobbin 14, while the link 65 and lever 62 are so moved that the member 67 can act upon the conveying pulley 20 to quickly stop the latter. The increasing diameter of the bobbin 21, upon which the thread is wound, causes the lever 22 to move in a counter-clockwise direction until the offset 55 of the arm 51 sliding in the guide 53 is moved out of this guide and brought to rest

on the lever 22. As soon as this takes place the different stopping mechanisms will be actuated in the same manner as when a break of the thread takes place.

In order to prevent a dropping of the controlling and stopping fork 26 upon a stopping of the machine, *i. e.*, upon a slackening of the thread tension, in which case each single fork would have to be lifted separately, I provide a shaft 73 loosely mounted in an eye of the hub 42 and carrying at one of its ends a hand lever 74. This shaft is also loosely mounted in an eye of a collar 75 (Fig. 7) mounted on a shaft 2. Near the hub 42 there is fixed to the shaft 73 a collar 76 having a lateral projection 77 engaging a stirrup-like member 78, whose ends are fixed to two rings 79 loosely mounted on the shaft 73 and disposed on both sides of said eye of the hub 42. To one of the rings 79 there is fixed a weight 80 having the tendency to rotate the stirrup 78 in the direction of the arrow F shown in Fig. 10. Such a collar 76 and a stirrup like member 78 are provided in connection with each conveying pulley 20. Before the machine is stopped, the lever 74 is turned into the position shown in Fig. 10, whereby each stirrup 78 engages a notch provided in the lower side of the corresponding lever 26 and prevents the latter from dropping down when the thread tension becomes slacker. As soon as the thread has again the necessary tension and after the lever has again been turned into its starting position, the stirrup 78 is brought automatically out of engagement with the corresponding lever 26, owing to the action of the weight 80.

I wish it to be clearly understood, that while I have only shown a machine for doubling two threads, the machine according to this invention may as well be built in such a manner, that more than two threads can be doubled. In this case it is only necessary to increase accordingly the number of the bobbins, thread-tensioners and of the controlling and stopping forks, while all the other parts remain unchanged.

What I wish to claim is:

1. In a machine for working fine threads, two bobbins carrying the threads to be worked, a rotating thread conveying pulley, means to guide the bobbin threads around half the circumference of said pulley, a take up bobbin frictionally driven by the latter at the same peripheral speed of the pulley, a guide arranged to double the threads before they pass onto the pulley, and a movable guide for the doubled thread between the pulley and take-up bobbin.

2. In a machine for working fine threads, a main driving shaft, two bobbins carrying the threads to be worked, a take-up bobbin, a pulley over which the threads pass around half its circumference and rotating by friction the take-up bobbin at an absolute uniform peripheral speed, means transmitting the motion of the main driving shaft to said pulley, thread tensioners, controlling means acted upon by the threads, thread-guides arranged to double the threads before they pass around the pulley and fixed and movable guides for the threads after they pass the pulley, which after running off the pulley are wound upon the take-up bobbin.

3. In a machine for carrying out the hereinbefore described methods, a machine-frame arranged to superimpose several machines, a main driving shaft, two rows of bobbins carrying the threads to be worked, means transmitting the motion of the main driving shaft to the bobbins, adjusting means for controlling the velocity of said bobbins, take-up bobbins, pivotally mounted arms carrying the latter, pulleys acting as conveying means for the threads passing around half of their circumference and rotating by friction the take-up bobbins at an absolute uniform peripheral speed, means transmitting the motion of the main driving shaft to said pulleys including a friction-clutch, thread tensioners, thread-guides effecting a doubling of the threads before they pass around the pulleys, and fixed and movable guides for the threads, which after running off the pulleys are wound upon the take-up bobbins.

4. In a machine for carrying out the hereinbefore described methods, a machine-frame arranged to superimpose several machines, a main driving shaft, two rows of bobbins carrying the threads to be worked, means transmitting the motion of the main driving shaft to the bobbins, adjusting means for controlling the velocity of said bobbins, take-up bobbins, pivotally mounted arms carrying the latter, pulleys acting as conveying means for the threads passing around half of their circumference and rotating by friction the take-up bobbins at an absolute uniform speed of rotation, means transmitting the motion of the main driving shaft to said pulleys including a friction-clutch, thread-tensioners, thread-guides for doubling the threads before they pass around the pulleys, fixed and movable guides for the thread, which after running off the pulleys are wound upon the take-up bobbins, and means for stopping one of said pulleys as soon as the thread passing over this pulley breaks.

5. In a machine for carrying out the hereinbefore described methods, a machine-frame arranged to superimpose several machines, a main driving shaft, two rows of bobbins carrying the threads to be worked, means transmitting the motion of the main driving shaft to the bobbins, adjusting means for controlling the velocity of said bobbins, take-up bobbins, pivotally mounted

arms carrying the latter, pulleys acting as conveying means for the threads passing around half of their circumference and rotating by friction the take-up bobbins at an absolute uniform peripheral speed, means transmitting the motion of the main driving shaft to said pulleys including a friction-clutch, thread-tensioners, thread-guides for doubling of the threads before they pass around the pulleys, fixed and movable guides for the threads, which after running off the pulleys are wound upon the take-up bobbins, means for stopping one of said pulleys as soon as the thread passing over the pulley breaks, and means for stopping one of said pulleys as soon as the bobbin driven by said pulley is full.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

CELESTINO MAZZUCCHELLI.

Witnesses:

HANS ERNY,

ARTHUR P. CORDEN.