(No Model.)

3 Sheets—Sheet 1.

T. BRIGGS & E. WEBB.

DOUBLING AND TWISTING MACHINE.

No. 346,396. Patented July 27, 1886.

FIG: 1.

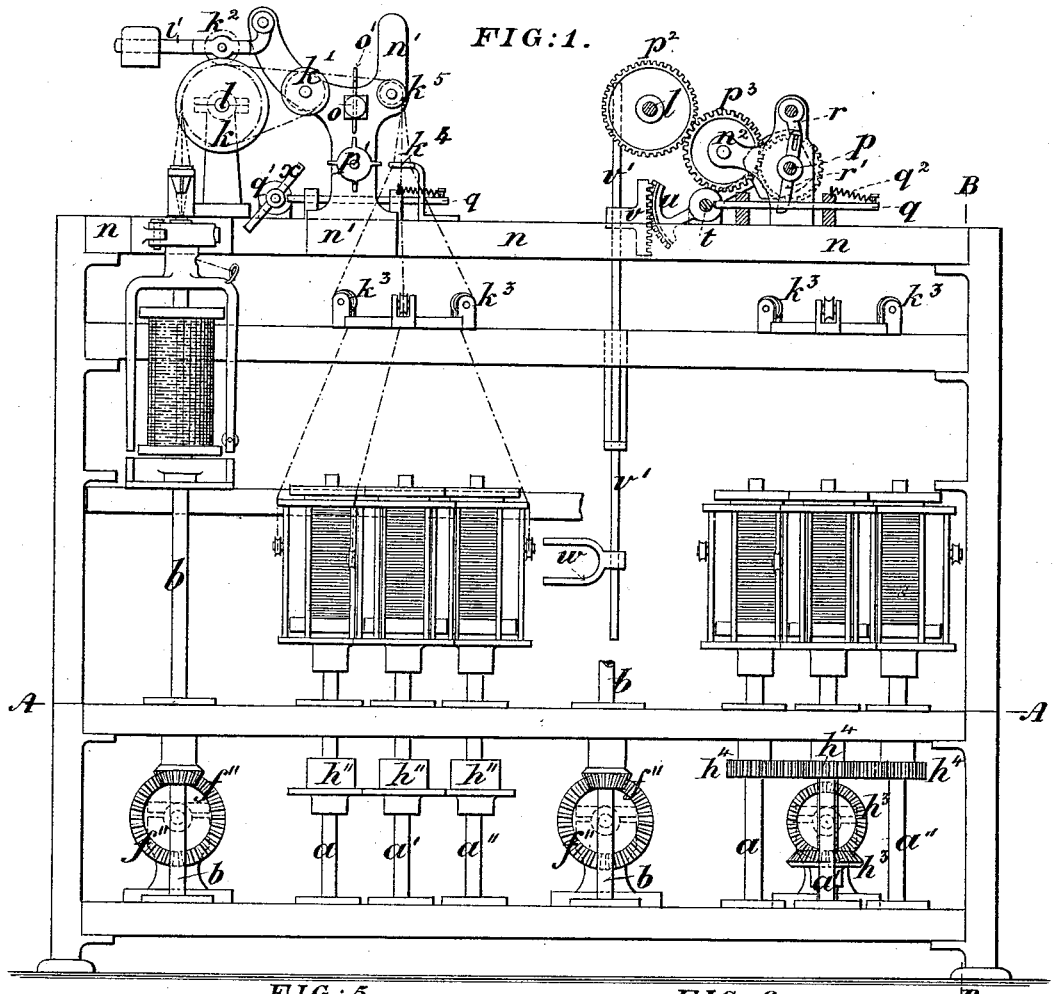


FIG: 5.

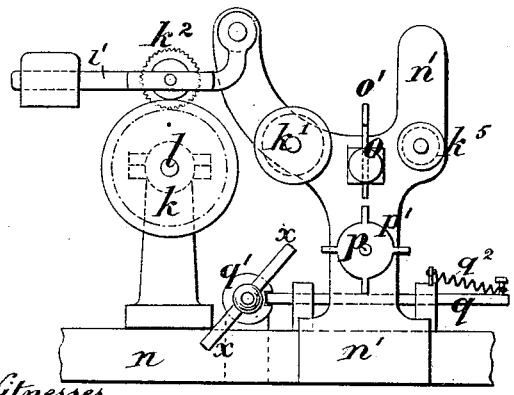
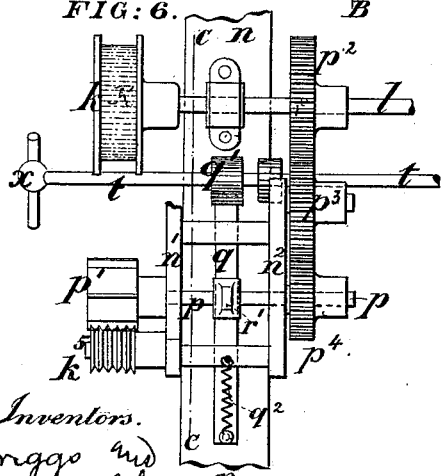


FIG: 6.



Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

T. BRIGGS & E. WEBB.

DOUBLING AND TWISTING MACHINE.

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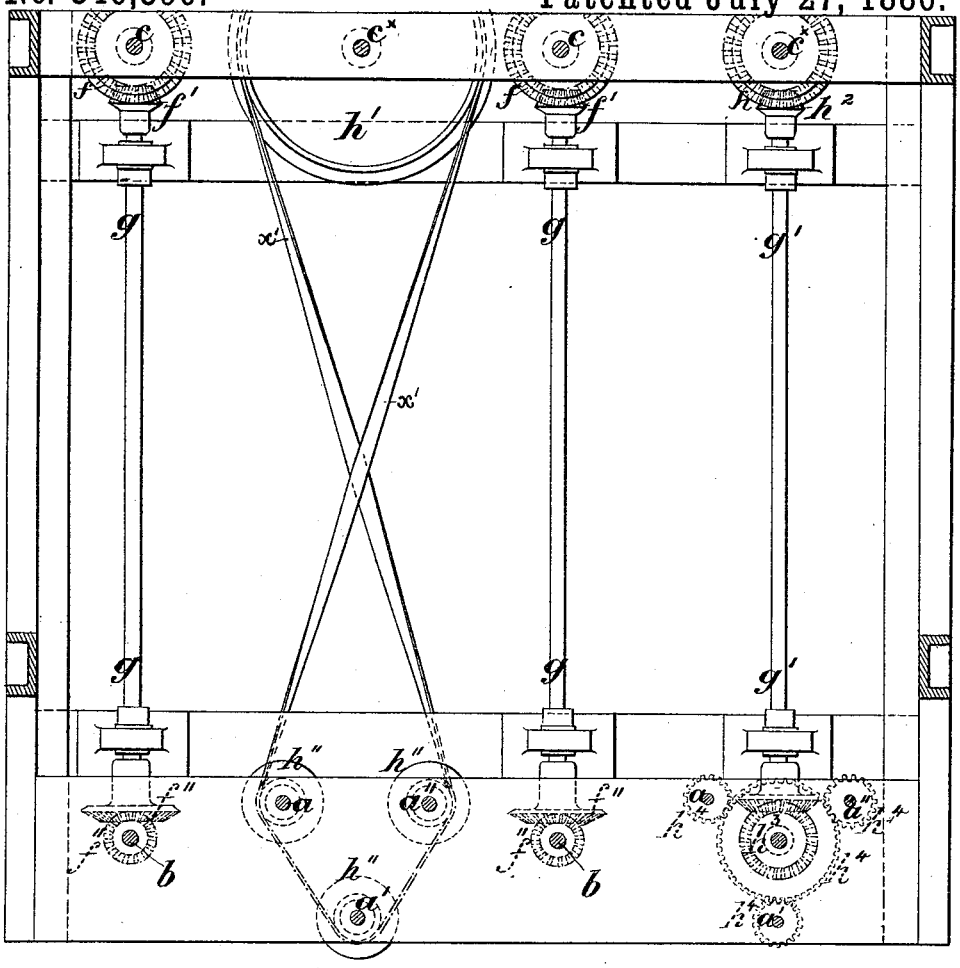

FIG: 2.

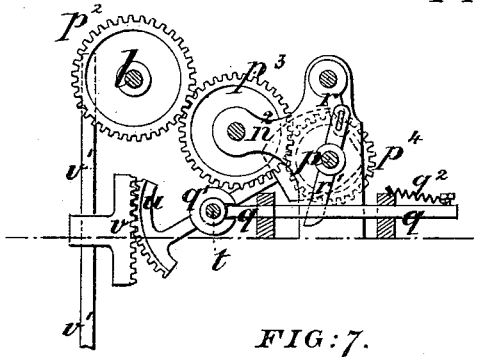

FIG: 7.

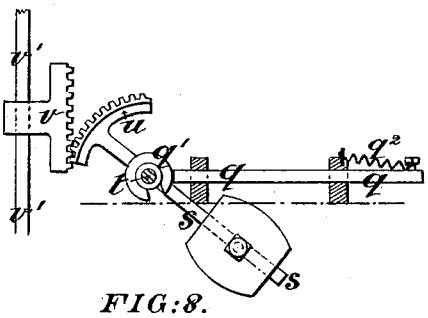

FIG: 8.

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DOUBLING AND TWISTING MACHINE.

No. 346,396. Patented July 27, 1886.

FIG. 3

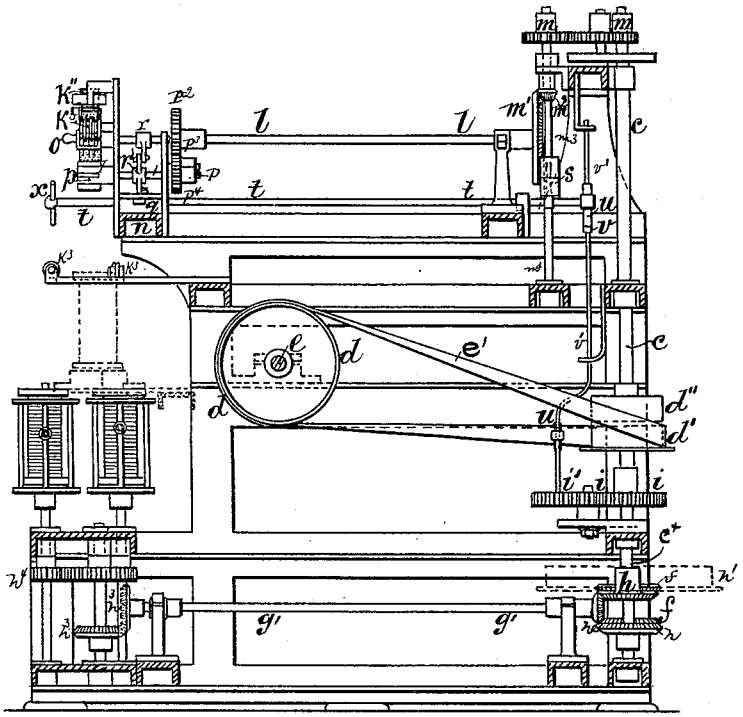
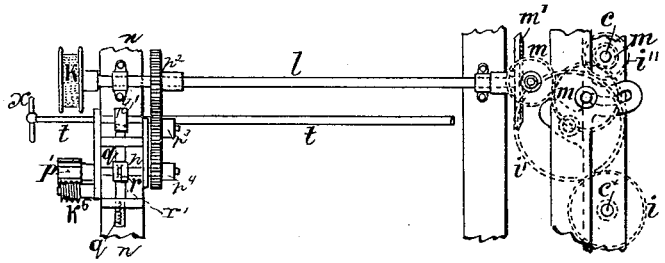


FIG. 4.



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T. Briggs and E. Webb
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Howson and Sons

UNITED STATES PATENT OFFICE.

THOMAS BRIGGS AND EDWARD WEBB, OF SALFORD, COUNTY OF LANCASTER, ENGLAND.

DOUBLING AND TWISTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 346,396, dated July 27, 1886.

Application filed May 6, 1885. Serial No. 164,517. (No model.) Patented in England January 31, 1884, No. 2,425.

To all whom it may concern:

Be it known that we, THOMAS BRIGGS and EDWARD WEBB, subjects of the Queen of Great Britain and Ireland, and both residing at Salford, in the county of Lancaster, have invented Improvements in Doubling and Twisting Machines, (for which we obtained a patent in Great Britain, No. 2,425, dated January 31, 1884,) of which the following is a specification.

This invention relates to the construction of machinery or apparatus for twisting and doubling yarns, and is more particularly applicable for the purpose of forming a laid twine cord or banding and winding the same onto bobbins.

In order that our invention may be clearly understood, we have annexed hereunto three sheets of drawings illustrative thereof.

Figure 1 is a front elevation showing a frame with two groups of spindles, and showing one of the automatic stop-motions (hereinafter described) in section. Part of the traversing rail and of one of the doubling-spindles is broken away. Fig. 2 is a sectional plan view of the machine through about the line A A, Fig. 1, and illustrating two constructions of devices for driving the letting-off spindles. Fig. 3 is a transverse section, drawn to a smaller scale, of the machine through about the line B B, Fig. 1. Fig. 4 is a plan view, also on a smaller scale, of part of the driving-gear and of part of the automatic stop-motion. Fig. 5 is an enlarged elevation of the automatic stop-motion. Fig. 6 is a plan thereof, part being broken away. Fig. 7 is a section taken through the line C C on Fig. 6, and Fig. 8 is a detached sectional view showing the bolt or latch withdrawn.

On the front of the machine we mount a series of spindles, *a a' a''*, termed "letting-off" spindles, which let off the strands of yarn, and at the same time impart an additional twist thereto. These spindles are arranged in groups of, say, three each, and at the side of these (and also in front of the frame) is mounted the doubling-spindle *b b*. This spindle *b b* forms the cord by doubling three strands together in the reverse direction to the twist which the letting-off spindles *a a' a''* have given them, and at the same time winds the laid twine or cord onto the bobbin in the usual manner, as described in my application bearing even date herewith, Serial No. 164,516, for patent for improved twisting-frame.

Conveniently situated at the back part of the machine, behind each group of spindles, is an upright shaft, *c*, which is driven by a belt, *e'*, from a pulley, *d*, on the driving-shaft *e*, Fig. 3, which passes from end to end of the frame. A fast pulley, *d'*, and a loose pulley, *d''*, are mounted on the shaft *c*, and the belt *e'* can be shifted from one to the other, as hereinafter described. On the lower part of this upright shaft *c* a bevel-wheel, *f*, is keyed, gearing into another bevel-wheel, *f'*, on a small horizontal shaft, *g*, which is carried across the frame, and drives the doubling-spindle *b* by means of another pair of bevel-wheels, *f''*, on the other end, Figs. 1 and 2.

On a rail at the back part of the machine (and in line with the above-named upright shaft *c*) is mounted a smaller shaft, *c**, Figs. 2 and 3, on which is also keyed a bevel-wheel, *h*. This latter drives the bevel-wheel h^2 on the shaft *g'*, which imparts motion through the bevel-gears h^3 h^3 and the toothed wheels h^4 h^4 h^4 h^4 to the spindles *a a' a''*; or the spindles *a a' a''* may be driven by a band, *x'*, passing round a pulley, *h'*, on the shaft *c** and round pulleys *h'' h'' h''* on the said spindles, as shown at the left hand of Fig. 2, and partially indicated by dotted lines in Fig. 3. A change wheel, *i*, is also keyed onto this small upright shaft, *c* c**, Figs. 3 and 4, which gears into an intermediate wheel, *i' i'*, driven by a spur-wheel, *i'' i''*, keyed onto the lower part of the first-named upright shaft *c c*. The draw-rollers *k k* are situated between the group of letting-off spindles *a a' a''* and the doubling-spindle *b*, Fig. 2, and are driven by means of the horizontal shafts *l l* and bevel-wheel *m'*, actuated by the bevel-wheel m^2 on the shaft m^3, Fig. 3, which is driven from the shaft *c*, by the spur-gearing *m m*. The strands pass, as shown at Fig. 1, through suitable guides, k^3 and k^4, over the pulley k^5, through the detector-pins *o'* in the frame *o*, Fig. 5, then over the pulley *k'*, round the draw-roller *k*, back over the pulley *k'*, and again over the draw-roller *k* to the bobbin on the doubling-spindle. A serrated or toothed roller, k^2, on a weighted

arm, l', bears on the strands as they pass over the said draw-roller k.

Another part of our invention (see Figs. 3, 5, 6, 7, and 8) consists of a self-acting stop motion for separately stopping the revolution of each group of doubling-spindle b and letting-off spindles a a' a'' and the draw-roller k connected therewith, whenever a strand breaks or a bobbin runs empty without stopping the action of the other spindles and draw-rollers of the machine. This is effected as follows:

On the cross-rail n of the machine is mounted, upon small brackets n' n^2, the oblong frame o, containing the usual detector or drop pins, o' o'. A shaft, p, is also mounted on the same brackets, beneath the pins o' o', on which shaft is keyed a boss, p' p', having projections thereon. This shaft p is always kept revolving by the gearing p^2 p^3 p^4 from the shaft l, and when a strand breaks or a bobbin runs empty its corresponding pin drops, and one of the projections on the boss p', coming into contact with it, partly turns the frame o, containing the pins o', at the same time withdrawing a latch or bolt, q q, from a notch in the boss q' q' on the shaft t t. The latch or bolt q q is held against the boss by a spring, q^2 q^2. The withdrawal of the latch or bolt q q from the notch in the boss q' q' is effected by the lever r r, attached to the frame o, or to its shaft, as shown in Fig. 7, acting upon the lever r' r', which is loose on the shaft p p. On the withdrawal of the latch or bolt q from the notch in the boss q' the shaft t is free to turn. This is effected by the weighted lever s, and the turning of the shaft t raises a sector, u, (see Figs. 7 and 8,) mounted thereon, which raises a rack, v, upon a rod, v', which carries the strap-fork w w, Fig. 1, thus removing the band from the fast pulley d', Fig. 3, to the loose pulley d'' upon the first-named vertical shaft c, and stopping its corresponding group of spindles. These may be started again by turning the handle x on the shaft t t, which can thereby be returned to its former position, lifting the weighted lever s, and consequently lowering the sector u, the rack v, the rod v', and the strap-fork w, and replacing the strap onto the fast pulley d'.

We have described only one section of the machine, consisting of, say, three letting-off spindles with their stop-motion, draw-roller, and doubling-spindle; but it will be understood that a complete machine consists of any convenient number of these sections, (each section complete in itself,) and all mounted in one frame and driven by one main driving-shaft extending from end to end, and that the stopping of one section does not in any way interfere with the working of the remainder.

This improved construction of laid-cord frame possesses the following advantages:

First. The method of arranging both the letting-off and the doubling spindles side by side in the front of the frame, and all immediately under the eye of the attendant, and so that the yarns do not pass inside the frame, simplifies the machine and the attendance, and dispenses with the necessity for passing from the front to the back of the machine, and also relieves the operator from the inconvenience, trouble, and danger of reaching into the interior of the machine past spindles or over rails to piece broken ends or put on new bobbins, as would be the case where the letting-off bobbins are behind the doubling-bobbins.

Second. The method of driving all the spindles by means of toothed gearing insures an equal amount of twist, both in the single strands and in the reverse turn, which is of the first importance in the production of a perfect cord, and which cannot be attained by the ordinary method of driving with light bands.

Third. The arrangement of the spindles and draw-rollers in separate groups, as stated, in such a manner that each group is capable of being started and stopped independently of the adjoining group, admits of the simultaneous production of a variety of cords upon the same machine, and avoids the constant stopping of the whole of the frame during the necessary and frequent renewals of the strand-bobbins or the doffing of the twisted cord.

Fourth. The self-acting stop-motion by stopping the group immediately upon the running bare of a bobbin or the breaking of a strand prevents the production of "waste," and enables the attendant to take charge of a much greater number of spindles, thus increasing the production and diminishing the cost.

We do not claim in this case the devices for driving the draw-roller and letting-off and doubling spindles from the same shaft c, nor the devices described for shifting the belt from the fast to the loose pulley, and vice versa, as these form the subject of Letters Patent granted to us May 11, 1886, No. 341,792.

We claim as our invention—

1. The combination of a series of sets of letting-off and doubling spindles side by side at the front of the machine, a separate vertical driving-shaft, c, for each set of letting-off and doubling spindles at the back of the machine, fast and loose pulleys d' and d'', mounted on said shaft c, bevel-gears f, f', and f'', transverse longitudinal shaft g, and devices, substantially as described, for transmitting motion from the shaft c to the letting-off spindles with a common longitudinal driving-shaft having a pulley, d, and belt e' for each shaft c, all substantially as set forth.

2. The combination of the vertical shaft c, horizontal shaft l, and devices for transmitting motion to the latter from the former with the drawing-roller mounted on the shaft l, stop-motion mechanism having a boss, p', and gears p^2 p^3 p^4, whereby the drawing-roller and stop-motion boss are operated from the same shaft l, all substantially as set forth.

3. The combination of the letting-off spindles and doubling-spindle, driving-shaft c, and intermediate gearing to transmit motion

therefrom to the spindles with a shaft, *t*, and devices whereby said shaft *t* controls the stopping and starting of the driving-shaft, notched boss *q'* on shaft *t*, and counterweight-bolt *q*, and actuating-spring, levers *r r'*, boss *q'*, driving mechanism for the latter, and frame *o*, carrying detector-pins *o'*, all substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOS. BRIGGS.
EDWARD WEBB.

Witnesses:
JNO. HUGHES,
J. ERNEST HUGHES.