

April 14, 1925.

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R. NAITO ET AL
AUTOMATIC FILAMENT SUPPLIER

Filed April 18, 1923

FIG. 1.

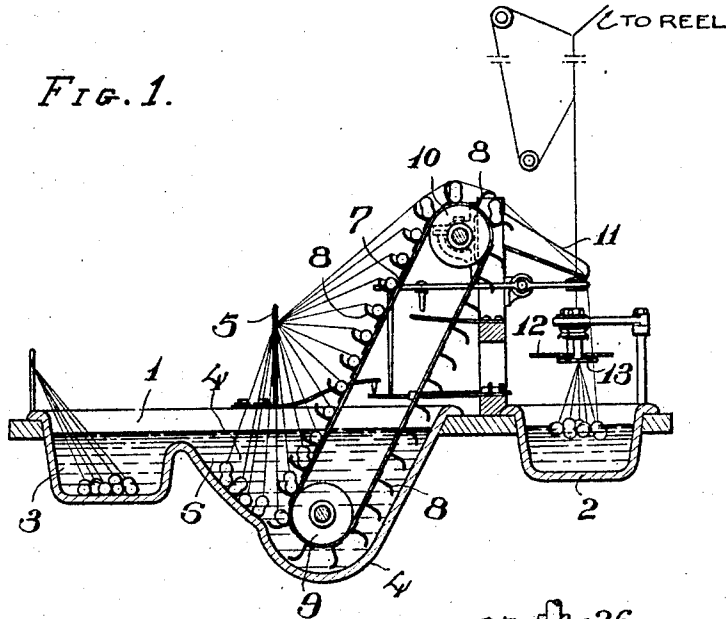


FIG. 2.

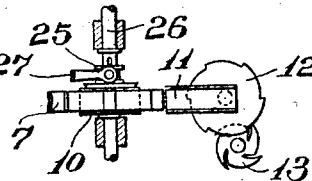


FIG. 4.

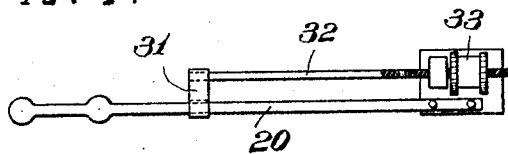
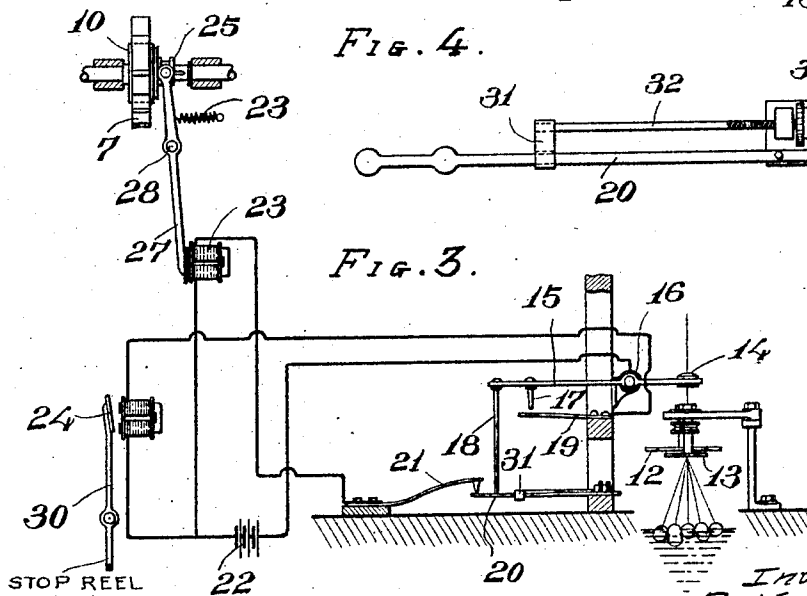


FIG. 3.



Inventors
R. Naito
H. Niwa
By Marshall Clark
Attys.

UNITED STATES PATENT OFFICE.

RYOICHI NAITO AND HIDETARO NIWA, OF KOBE, JAPAN, ASSIGNORS TO KANEGAFUCHI BOSEKI KABUSHIKI KWAISHA, OF TOKYO-FU, JAPAN.

AUTOMATIC FILAMENT SUPPLIER.

Application filed April 18, 1923. Serial No. 632,998.

To all whom it may concern:

Be it known that we, RYOICHI NAITO and HIDETARO NIWA, subjects of the Empire of Japan, residents, respectively, in care of Business Department of Kanegafuchi Boseki Kabushiki Kwaisha, Higashi-Shiri-Ike, Kobe, Japan, have invented a certain new and useful Invention in Automatic Filament Suppliers, of which the following is a specification.

Our invention relates to an apparatus for supplying filaments and for automatically controlling the filament supply in silk reeling machines. In silk reeling machines, hitherto in use, the operation of controlling the supply filaments and consequently the diameter of silk thread, has been left to the operator's sense of touch. The present invention has for its object to improve the previous methods, by the application of a mechanical means for controlling the supply of filaments whereby the delicate operations of reeling silk can be performed entirely automatically so that the labour is saved, the production is increased and raw silk of uniform size can be manufactured.

The accompanying drawing shows an example of the apparatus as applied the present invention. Fig. 1 is a sectional view. Fig. 2 is a plan view showing the disposition of the cocoon feeder and filament supplier. Fig. 3 is a side elevation of the apparatus diagrammatically showing the principle of operations. Fig. 4 is a detailed plan view of the adjustable spring.

According to the present invention a basin (1) of a special shape, for gathering filaments of cocoons, is provided apart from the reeling basin (2) in an ordinary silk reeling machine. Boiled cocoons are put in the front part (3) of the basin (1), and all the cocoons are gathered and the ends of filaments located by any known means. Said cocoons saturated with hot water, then, are removed to the rear part (4) of the basin (1) and the ends of gathered filaments collected together are hung on a hook (5). The rear part (4) of the basin (1) has an inclined bottom (6) and at the end of said bottom an endless belt like feeder (7), provided with small buckets (8) at suitable distances, is supported on drums (9) and (10), as shown in Fig. 1. The cocoons in the rear part (4) gradually slide down, along the inclined bottom (6) by their own

weight, and the foremost one goes into one of the buckets (8) passing by, and cocoons, with their filament ends held on the hook (5), are elevated one by one according to the motion of the feeder (7). At the other side and adjacent the top of the elevator an inclined trough (11) is arranged, and the cocoon falling into said trough from the bucket (8) at the top of the feeder, rolls straight down from the trough (11) into the reeling basin (2) over the side of the filament supplier, as shown in Figs. 1 and 2. Said filament supplier comprises a set of toothed plates (12) and (13) respectively each having specially shaped teeth as shown in Fig. 2, and these plates are revolved in the same direction by small rope-pulleys at their tops. While the toothed plate (12) is revolving, the filament of a cocoon is caught by one of its teeth, and subsequently the same filament passes into one of the grooves of the revolving toothed plate (13), thereby the filament is sheared between both toothed plates, and its end is united with the other filaments running up together to make one thread in the course of reeling.

In Fig. 3, (14) represents a filament collector, usually made of porcelain, provided with a fine hole at its centre to permit filament to pass through it. (15) is a lever attached to said filament collector (14) at one end, and fulcrumed on the frame work by a pivot (16). (17) and (18) are push members projecting downwardly from the other end of the lever (15). (19) and (20) are springs respectively cooperating with the members (17) and (18). (21) is a spring normally contacting with the spring (20). (22) is an electric cell, and (23) and (24) are electro-magnets. (25) is a clutch slidably arranged on the axis (26) and adapted to engage the drum (10) of the cocoon elevator. (See Figs. 1 and 2). The drum (10) is loosely fitted on its axis (26) which always turns. (27) is a lever for operating the clutch (25) and fulcrumed at (28). The lower end of the lever (27) forms an armature to be attracted by the electro-magnet (23). (29) is a spiral spring attached to the upper end of the lever (27). (30) is a lever forming an armature to be attracted by the electro-magnet (24), and the other end of said lever is suitably related to a stop mechanism for stopping the reel (not shown in the drawing).

The spring (20) is fixed on the frame work at one end, and is provided with an adjustable support (31) as shown in Figs. 3 and 4. Said support (31) is slidably mounted on the spring (20) and is attached at the end of a screw rod (32) adjustably supported on the frame work by a nut (33). By turning said nut the support (31) can be moved backward and forward on the spring (20) and thereby the tension of the spring (20) can be varied.

The lever (15) is properly balanced so that its right end slightly inclines down by the weight of the collector (14), and the members (17) and (18) on the left end exert no pressure on the corresponding springs (19) and (20) while the reeling machine is at rest. When the machine starts, the collector (14) is drawn upwards by the frictional resistance of filaments or silk strand running through its fine hole and the lever (15) is tilted so that its left end moves downwards. By said inclination the longer push (18) comes in contact with the spring (20) first, and an electric circuit is closed between the cell (22), electro-magnet (23), springs (21) (20) and the push (18). The electro-magnet (23) is energized and attracts the lever (27), thereby the clutch (25) is engaged to the drum (10). Thus the cocoon elevator (7) is started, and cocoons elevated thereby are fed to the filament supplier one by one. When the diameter of the silk strand increases abnormally due to an excess supply of filaments, the frictional resistance on the collector (14) increases, so that the lever (15) is further tilted. This causes the depression of the spring (20) by the member (18) and the former moves off the spring (21). The circuit is thereby opened, the cocoon elevator is stopped and the supply of filaments is automatically suspended. On the contrary, when the silk strand again becomes normal owing to the reeling off or the breakage in the course of reeling, the resistance on the collector (14) diminishes and the spring (20) again comes in contact with spring (21), so that the electric circuit is closed again, the cocoon elevator is started, and filaments are supplied. Thus the cocoon feeder is operated or stopped according to

variations in the diameter of the silk strand in the course of reeling and the sensitiveness of control of the feed mechanism may be varied as desired by properly adjusting the support (31) of the spring (20).

In case a knob or any other obstacle on the silk strand is obstructed by the collector (14), the right end of the lever (15) is further drawn upwards and the shorter projection on the left arm of said lever contacts with the spring (19), so that the circuit of the cell (22), projection (17), spring (19) and the electro-magnet (24) is closed the last mentioned electro-magnet thereby attracts the armature or lever (30) and the winding of the reel is stopped at once by means of the stop mechanism related to said lever.

We claim:—

1. In combination, means for elevating cocoons one by one, a filament supplier, a pivoted lever, means on said lever for engaging the strand produced by the filament supplier and actuated according to the degree of friction exerted thereon by said strand, means for driving the cocoon elevating means, electro-magnetically controlled means for clutching the driving means with the elevating means, an electric circuit including the electro-magnetically controlled means, and a circuit controller interposed in said circuit and actuated by said lever.

2. An apparatus as claimed in claim 1 characterized by the provision of an electro-magnetically operated reel stopping device interposed in said circuit, and means actuated by the lever for controlling the stopping device.

3. An apparatus as claimed in claim 1 characterized in that said circuit controller includes adjustable means for varying the response of said lever to varying resistance of the strand.

In testimony whereof we have affixed our signatures in presence of two witnesses.

RYOICHI NAITO.
HIDETARO NIWA.

Witnesses:

W. CHIHORAH,
ICHIRO LUDZUK.