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SPINNERET POLISHING MACHINE

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Fig. 1.

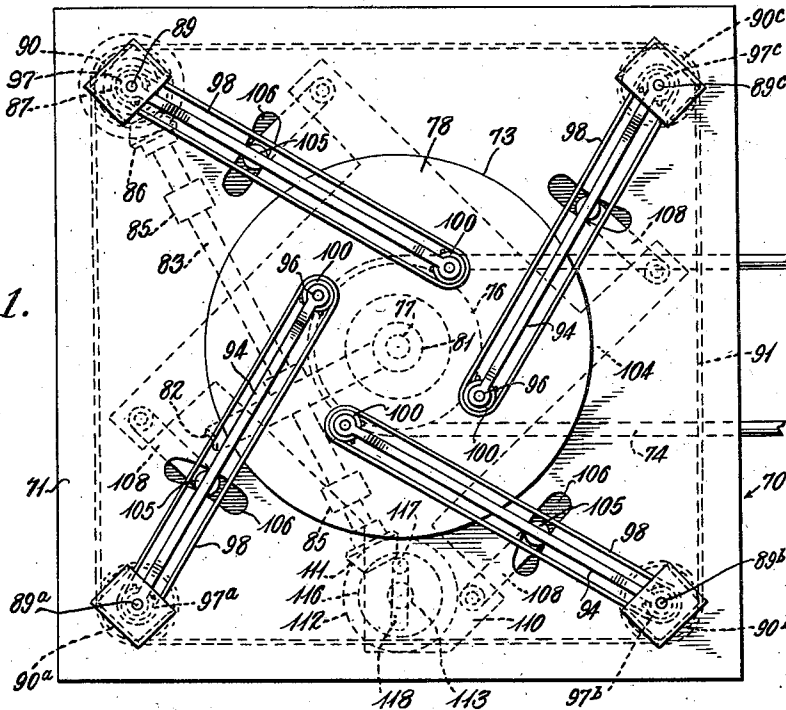
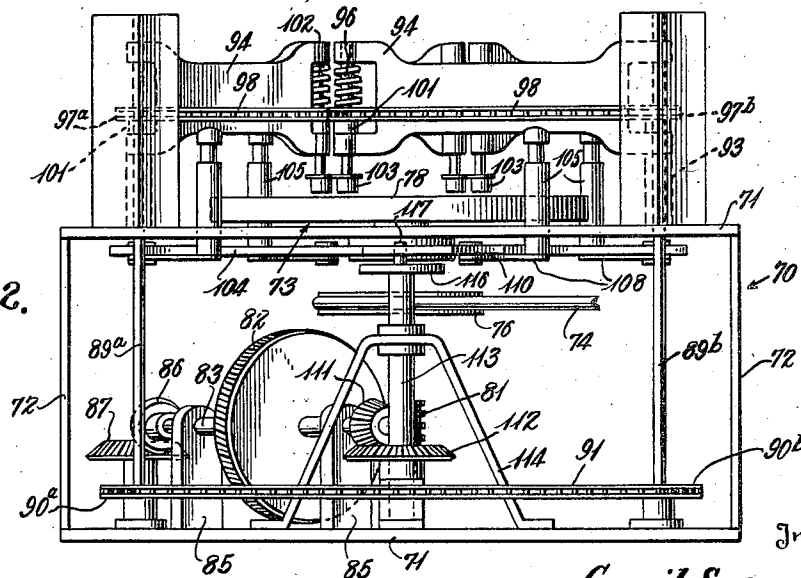


Fig. 2.



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SPINNERET POLISHING MACHINE

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84,757. Divided and this application May 10,
1937, Serial No. 141,807

5 Claims. (Cl. 51—124)

This application is a division of my appli-
cation Serial Number 84,757 filed June 11, 1936.

The present invention relates to spinnerets
adapted for use in the manufacture of artificial
silk, and more particularly to a machine for
polishing spinnerets which have become impaired
by wear or damage.

A normal spinneret as employed in the artificial
silk industry is in the form of a small cup-shaped
die, the base plate of which is perforated with
minute openings through which a cellulosic solu-
tion may be forced as individual fine streams. It
is these thus formed fine streams which when
subjected to conditions to cause coagulation of
the solution comprise the multiplicity of fila-
ments used in the formation of artificial silk yarn.
Due to the severe conditions to which the spin-
nerets are normally subjected during spinning
operations, they must be constructed of materials
which will withstand long and hard usage with
the necessity for the replacement thereof being
maintained at a minimum. The spinnerets must
also be resistant to the corrosive action of the
various chemicals to which they are subjected
during use.

Attempts have been made to manufacture suit-
able spinnerets of corrosion-resistant non-metals
such as glass and bakelite, but the only materials
found to be generally satisfactory are the noble
metals and their alloys. It is found, however,
that metallic spinnerets become distorted by the
pressure imposed in use and further that the
minute openings in the spinnerets become
clogged by incrustations and agglomerations
formed from the spinning solution. Heretofore
it has been the practice to melt down damaged
spinnerets and to recast the metal to form spin-
nerets in the desired condition.

The past practice involving the reconstruction
of impaired spinnerets was thought to be neces-
sary because of the fragile character of the spin-
nerets and the fact that the openings therein are
so minute. Reconstruction was considered es-
sential in order that the spinnerets have the exact
precision required in the production of high grade
artificial silk.

This invention has as an object the provision
of a device for polishing and removing a coating
previously applied to spinnerets during former
reconditioning stages.

It is a further object of the present invention to
provide an improved polishing machine especially
adaptable for polishing the faces of spinnerets
that have become impaired during usage.

Other objects and advantages of this inven-

tion will be apparent from the following detailed
description when considered in connection with
the accompanying drawing wherein:

Figure 1 is a top plan view of a spinneret face-
polishing mechanism; and

Figure 2 is a side elevational view of the polish-
ing machine shown in Figure 1.

Referring to the drawing in detail, the ap-
paratus for polishing the spinnerets is shown and
includes a rigid frame-work 70 having spaced
upper and lower beds 71—71 inter-connected by
side supports 72. The apparatus polishes the
spinnerets by rotating them individually, pre-
senting them to a rapidly rotating polishing ele-
ment 73 and simultaneously oscillating the spin-
nerets transversely of the surface of the rotating
polishing element. Said apparatus is driven from
any suitable source of power (not shown) through
a belt 74 which drives a pulley 76 fast to a cen-
tral shaft 77 suitably journaled in upper and
lower beds 71. Above upper bed 71 polishing ele-
ment 73 is secured to the upper end of shaft 77.
Polishing element 73 consists of a circular plate
78 covered with any suitable durable polishing
fabric such as canton flannel fixed to the exterior
right side out, and dressed with a suitable polish-
ing medium such as chrome-oxide suspended in
tallow. It will be understood that when pulley
76 is rotated circular plate 78 will be driven at
the same rate.

Rotation of the spinnerets is obtained through
worm 81 on shaft 77 in driving engagement with
worm wheel 82 fast to horizontal shaft 83. The
shaft 83 is carried by suitable bearings 85 fixed
on the lower bed 71. At one end, shaft 83 is pro-
vided with bevel gear 86 meshing with bevel gear
87 secured to rotatable vertical shaft 89 on which
is fixed sprocket wheel 90. At spaced points
about the polishing element 73 rotatable vertical
shafts 89a, 89b and 89c are disposed, journaled in
suitable bearings in the beds 71. Adjacent the
lower end said shafts are provided with sprocket
wheels 90a, 90b and 90c respectively, which are
interconnected by continuous chain 91 whereby
it will be observed rotation of bevel gear 87
causes shafts 89a, 89b and 89c to be driven from
sprocket wheel 90.

Above the upper bed 71 the spaced vertical
shafts 89, 89a, 89b and 89c are each provided with
a spaced collar 93 for mounting a horizontal
housing or arm 94 which extends toward the axis
of the polishing element 73. Horizontal arms 94
are bifurcated at each end and bored freely to
accommodate at one end the vertical rotating
shaft 89 and at the other a spinneret shaft 96.

Sprocket wheels 97, 97a, 97b and 97c keyed to the shafts 89, 89a, 89b and 89c are interconnected by chains 98 with sprockets 100 keyed to the spinneret shafts 96. Sprockets 97 and 100 have spacing hubs 101 which maintain them in horizontal alignment during polishing, the sprockets 100 being normally urged to alignment by expansion springs 102 retained thereon. Spinneret holders 103 are secured to the lower end of the shafts 96.

It will be observed that if the polishing plate 73 is rotated at any rate of speed the spinneret holders 103 will be driven at a corresponding but lower rate of speed through worm 81, wheel 82, shaft 83, bevel gears 86 and 87, vertical shaft 89, sprocket chain 91, sprocket wheel 97, sprocket chain 98 and spinneret shafts 96.

In order to insure optimum polishing conditions and to utilize substantially the entire surface of polishing element 73, it is proposed to cause the spinneret holders to traverse a constantly changing path with respect thereto, and this is accomplished by continuously oscillating horizontal arms 94 to carry the spinneret holders in an arcuate path between the axis and periphery of the polishing element. Mechanism for accomplishing this movement includes a horizontal spider 104 freely oscillatable about the main shaft 77 as an axis immediately beneath upper bed 71. Pivotal vertical rods 105 engage the under side of horizontal arms 94 and extend through arcuate slots 106 formed in the upper bed 71. The projecting end of each therebeneath is fitted with a pivotally connecting link 108, the opposite end of which is pivotally connected to the under side of spider arm 110. The relationship of the oscillating elements described is such that when the spider is rocked about the shaft 77 the arms 94 connected thereto by means of rods 105 and links 108 will be oscillated across the polishing element 73, the extent of said oscillation being limited by arcuate slots 106.

Rocking of the spider 104 is accomplished through power derived from the belt 74 and central shaft 77, applied through the horizontal shaft 83 which carries a beveled gear 111 keyed thereto on the end opposite bevel gear 86. The bevel gear 111 engages bevel gear 112 keyed to vertical shaft 113 supported for rotation in fixed bearing 114. Secured on its upper extremity the shaft 113 is provided with disk 116 having a projecting pin 117 eccentrically disposed with respect to the shaft 113. The pin 117 rides from end to end of straight slot 118 cut in the spider 104. It will be observed that continuous rotation of the shaft 113 as driven from the shaft 77 causes rotation of disk 116 to rock the spider through movement of pin 117 in opposite directions along slot 118.

Preferably the gear 112 is larger than the gear 87 in order that there might be obtained unbalanced equilibrium of the cooperating parts described, such coaction producing, for example, driving of the polishing disk at a speed of approximately 2,000 R. P. M. while the spinneret holders are rotated at about 100 R. P. M. and oscillated approximately 40 times per minute.

In lieu of driving the gear 112 from the shaft 83, the shaft may be connected to drive only the gear 87, it being feasible to drive the gear 112 directly from the main shaft 77 by connecting a suitably geared shaft between the worm 81 and the gear 112. When this modified construction is adopted, it will also enable the obtaining of different speed ratios between the cooperating parts as described above in order to maintain even

distribution of wear on the polishing element. Suitable arrangements of gears and shafting, and belts and pulleys may be substituted for the chain and sprocket drive described.

Operation of these mechanisms has been found to insure that all portions of the face of the spinnerets carried on the holders 103 are subjected to the uniform action of the polishing agent so that at the end of the polishing operation the face of the spinneret will have been treated evenly.

It is, of course, intended that the apparatus might be operated at different relative speeds of the various movements in the practice of the invention and that the specific speeds and gearing ratio indicated above are not essential to the successful practice of the invention.

What I claim is:

1. A polishing machine particularly adapted for the polishing of spinnerets during the reconditioning thereof comprising a platform, a polishing disc above the platform fixedly supported upon a rotatably mounted shaft for rotation therewith, said shaft extending below the platform, a plurality of arms supported at their outer ends upon rotatably mounted shafts with their inner ends extending over the polishing disc, a rotatably mounted spinneret holder at the inner end of each arm, a plate mounted under the platform extending adjacent each of the arms, linkage connecting the plate with respective arms, means connecting each spinneret holder with the shaft about which its respective arm is pivoted for rotating the holder upon rotation of the shaft, and means for concurrently driving the disk at a high speed, the spinneret holders at a relatively low speed, through the arm supporting shafts and connecting means and for causing the arms by movement of the plate to oscillate slowly with the spinnerets mounted thereon contacting the disc.

2. A polishing machine comprising a platform, a polishing disc above the platform fixedly supported on a rotatably mounted shaft for rotation therewith, a plurality of arms supported at their ends upon rotatably mounted shafts with their inner ends extending over the polishing disc, a rotatably mounted spinneret holder at the inner end of each arm, a plate mounted under the platform extending adjacent each of the arms, linkage connecting the plate with respective arms, means connecting each spinneret holder with the shaft about which its respective arm is pivoted for rotating the holder upon rotation of the shaft, and means for concurrently driving the disc at a high speed, the spinneret holders at a relatively low speed, through the medium of the arm supporting shafts and connecting means, and for causing the arms by movement of the plate to oscillate slowly with the spinnerets mounted thereon contacting the disc from immediately adjacent its center to substantially the periphery thereof, said driving means for the arms and the disc being constructed to oscillate the arms at a predetermined speed with respect to the speed of rotation of the disc, such that each spinneret is contacted substantially with all portions of the disc prior to contacting the disc in a path identical to that previously traversed.

3. A polishing machine particularly adapted for the polishing of spinnerets during the reconditioning thereof comprising a base and a platform spaced thereabove, a polishing disc above the platform fixedly supported upon a rotatably mounted shaft for rotation therewith, said shaft

extending into the space between the base and platform, a plurality of arms supported at their outer ends upon rotatably mounted shafts with their inner ends extending over the polishing disc, a rotatably mounted spinneret holder at the inner end of each arm for lightly urging a spinneret mounted thereon into contact with the disc, means connecting each spinneret holder with the shaft about which its respective arm is pivoted for rotating the holder upon rotation of the shaft, means for concurrently driving the disc at high speed, the spinneret holders at a relatively low speed, through the medium of the arm supporting shafts and connecting means and for causing the arms to oscillate slowly with the spinnerets mounted thereon contacting the disc from immediately adjacent its center to substantially the periphery thereof, said driving means for the arms and the disc being constructed to oscillate the arms at a predetermined speed with respect to the speed of rotation of the disc such that each spinneret is contacted substantially with all portions of the disc prior to contacting the disc in a path identical to that previously traversed.

4. A polishing machine particularly adapted for the polishing of spinnerets during the reconditioning thereof comprising a base and a platform spaced thereabove, a polishing disc above the platform fixedly supported upon a rotatably mounted shaft for rotation therewith, said shaft extending into the space between the base and platform, a plurality of arms supported at their outer ends upon rotatably mounted shafts with their inner ends extending over the polishing disc, a rotatably mounted spinneret holder at the inner end of each arm for lightly urging a spinneret mounted thereon into contact with the disc, a plate mounted under the platform extending adjacent each of the arms, linkage connecting the plate with respective arms, means connecting each spinneret holder with the shaft about which its respective arm is pivoted for rotating the holder upon rotation of the shaft, and means for concurrently driving the disc at a high speed, the spinneret holders at a relatively low speed, through the medium of the arm supporting shafts

and connecting means and for causing the arms by movement of the plate to oscillate slowly with the spinnerets mounted thereon contacting the disc from immediately adjacent its center to substantially the periphery thereof, said driving means for the arms and the disc being constructed to oscillate the arms at a predetermined speed with respect to the speed of rotation of the disc such that each spinneret is contacted substantially with all portions of the disc prior to contacting the disc in a path identical to that previously traversed.

5. A polishing machine particularly adapted for the polishing of spinnerets during the reconditioning thereof comprising a base and a platform spaced thereabove, a polishing disc above the platform fixedly supported upon a rotatably mounted shaft for rotation therewith, said shaft extending into the space between the base and platform, a plurality of arms supported at their outer ends upon rotatably mounted shafts with their inner ends extending over the polishing disc, a rotatably mounted spinneret holder at the inner end of each arm for lightly urging a spinneret mounted thereon into contact with the disc, a freely rotatable spider mounted under the platform and linked to each of the arms, means connecting each spinneret holder with the shaft about which its respective arm is pivoted for rotating the holder upon rotation of the shaft, and means for concurrently driving the disc at a high speed, the spinneret holders at a relatively low speed, through the medium of the arm supporting shafts and connecting means and for causing the arms by movement of the spider to oscillate slowly with the spinnerets mounted thereon contacting the disc from immediately adjacent its center to substantially the periphery thereof, said driving means for the arms and the disc being constructed to oscillate the arms at a predetermined speed with respect to the speed of rotation of the disc such that each spinneret is contacted substantially with all portions of the disc prior to contacting the disc in a path identical to that previously traversed.

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