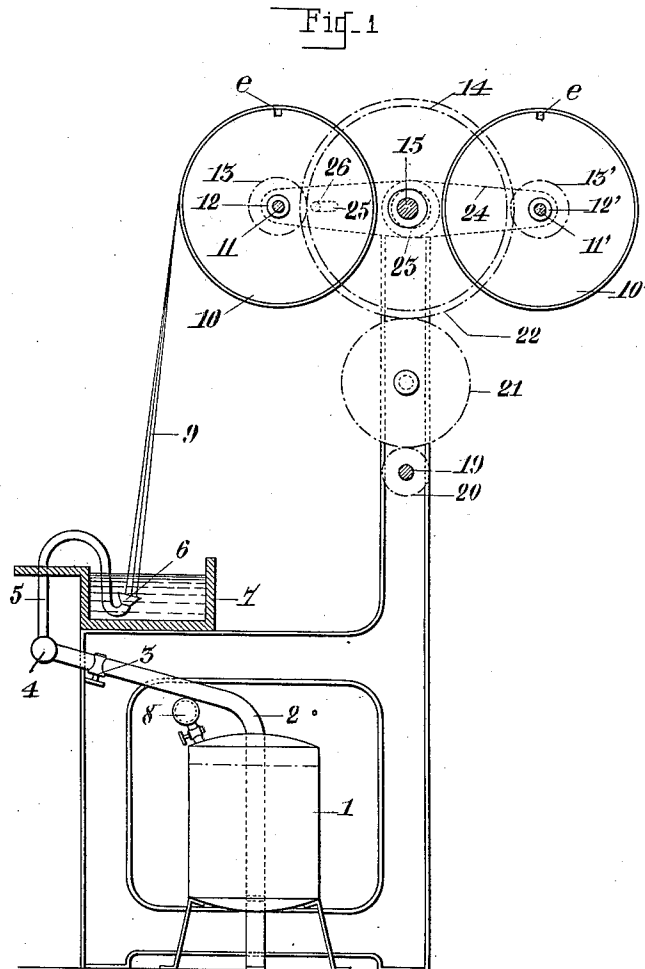


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 PROCESS FOR THE PRODUCTION OF ARTIFICIAL FIBERS.
 APPLICATION FILED FEB. 28, 1912.

1,164,084.

Patented Dec. 14, 1915.
 3 SHEETS—SHEET 1.



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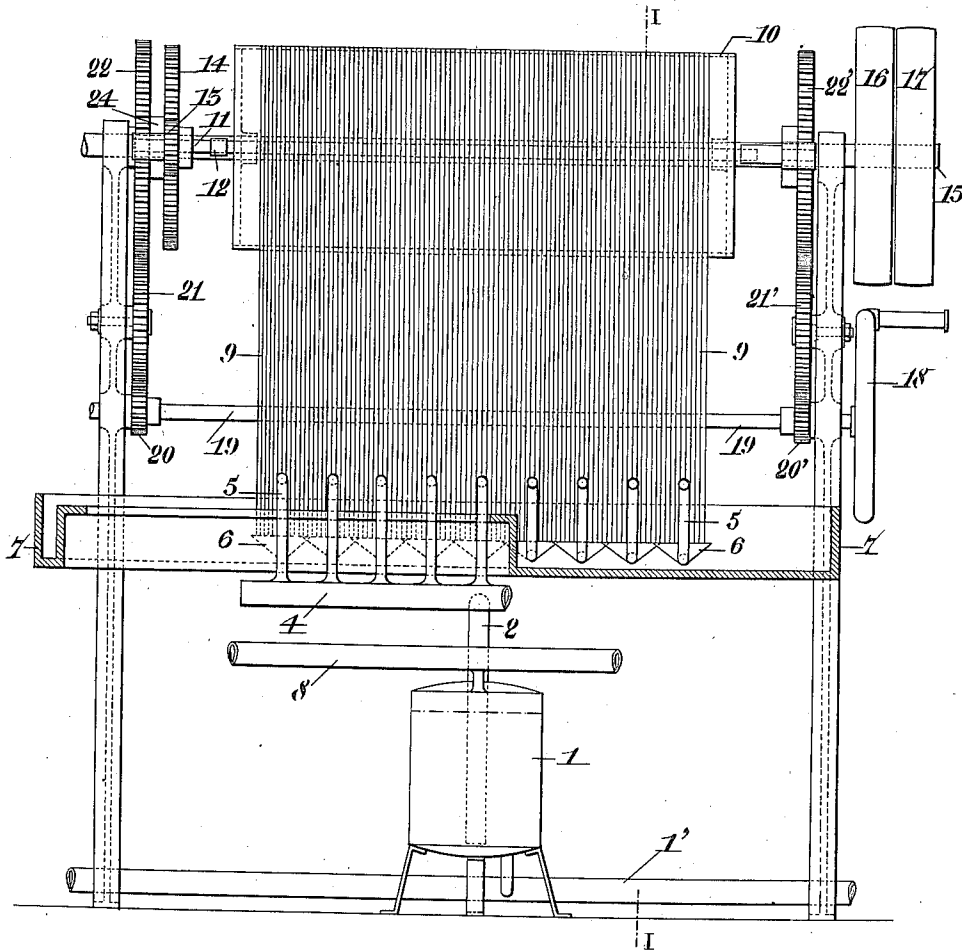
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Fig. 2



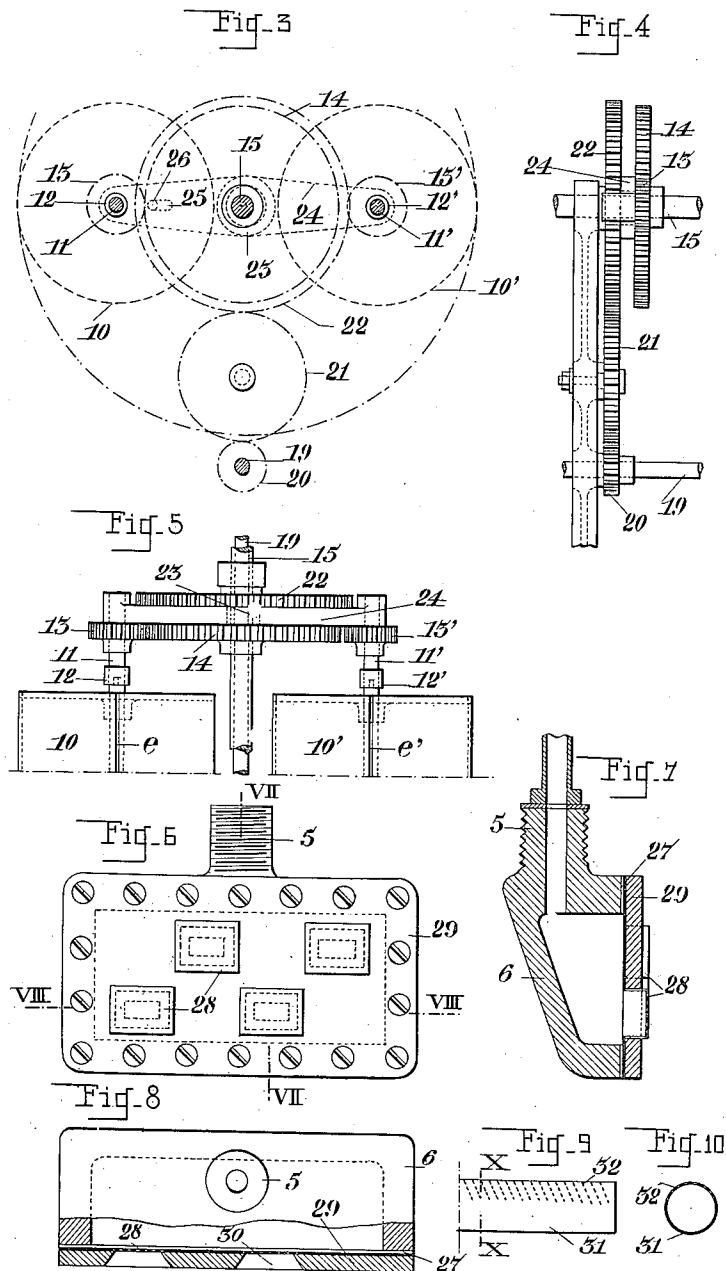
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UNITED STATES PATENT OFFICE.

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PROCESS FOR THE PRODUCTION OF ARTIFICIAL FIBERS.

1,164,084.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, PAUL GIRARD and JEAN SONNERY, citizens of France, residing at Lyon, Department of Rhône, France, have invented a Process for the Production of Artificial Fibers, of which the following is a specification.

Up to the present in the artificial silk industry, attention has been confined to the production of continuous threads connected together by throwing and reassembling as closely as possible natural silk. Artificial silk waste has also been treated in like manner to schappe, reeling waste, and floss from natural silk to make threads suitable for weaving. These two methods have the drawback of being costly owing to the various manipulations they require. In the first case, the artificial silk filament being fragile it was necessary to keep it somewhat coarse and it is not industrially possible to reel or throw threads the filaments of which have not a coarseness of above 6 or 7 deniers. This process therefore yielded only threads formed of filaments averaging 6 to 10 deniers and about 15 in number. The value of the thread thus obtained was very small, since the value depends on the fineness of the filament which should not exceed 1-3 deniers in a thread of superior quality. Moreover it frequently happens that the holes of the formers or nozzles become clogged which causes breakage of the filaments and occasions great loss of time owing to the necessity of unclogging the formers the work being thus always irregular. In the second case, the carding and combing of the filaments issuing from the former, which operations are necessary to give them the classification in counts and the parallelism indispensable to their treatment in the ordinary processes for spinning schappe, constitute expensive manipulations which have the further drawback of giving much waste and products of inferior quality.

In practice, by previously known processes which yielded continuous threads, there could be obtained only about 20% of thread of first quality, that is threads capable of giving when woven a cloth without nap.

The present invention has particularly for object to effect the manufacture of threads formed of filaments the general coarseness of which is not greater than that

of silk floss, *i. e.* 1 to 3 deniers, or cotton fibers, which coarseness may be fixed at 2 deniers, the said filaments being produced mutually parallel and in superposed parallel fleeces or layers which can be directly passed to the drawing rollers and spun on continuous or self acting frames without being previously subjected to combing in order to arrange the filaments parallel and of equal length and to successively form fleeces, all of which is eliminated in the process forming the object of this invention, the machine for carrying out the process directly yielding the filaments and fleeces mutually parallel. It is obvious that under these conditions the drawbacks referred to in the continuous spinning of irregularity in working owing to breakage of the thread, become of much less importance since the operation of spinning will be effected as in the case of schappe.

Otherwise stated the process forming the object of the invention is to some extent a mixed process, consisting in producing the thread by the process of continuous spinning and then simply subjecting it to the last operations of the spinning of schappe which means that the said process obviates the drawbacks which the treatment of schappe necessarily implicates.

According to the process forming the object of the present invention, on issuing from the formers or nozzles immersed in the coagulation baths, which formers are of suitable form preferably rectangular and contain from 2,000 to 4,000 holes, the artificial filaments are already mutually parallel and grouped in parallel fleeces, which are wound on bobbins or spools, of which the diameter depends on the thickness desired and are cut according to the length which the fleeces and filaments are to be finally given.

It is to be noted that the previous circular formers used in the making of artificial fibers contained only from 15 to about 25 holes and yielded a thread constituted of the union of only 15 to 25 filaments and endowed with a regulating motion termed reciprocating which resulted in a crossing and not a superposing of parallel fleeces of parallel filaments obtained without crossing.

When the amount of filaments wound is considered sufficient, they are all cut along one or more generating lines of the spool, or bobbin, there is thus obtained a fleece

formed of equal and parallel filaments of length equal to the total or partial linear development of the spool or bobbin and of breadth the height of the cylinder which they formed previously, or better, the breadth of the former. As these filaments are mutually parallel they can be sent to the drawing rollers without combing or other process, and thence to the spinning frames where they are treated like cotton roving or slivers of silk.

The threads obtained after winding may be longer than and as fine as cotton threads while possessing the luster of artificial silk.

For the carrying out of the process hereinbefore set forth, it is preferred to use a machine as illustrated in the accompanying drawings, in which:

Figure 1 is a sectional elevation, on the line I—I of Fig. 2, of the machine. Fig. 2 is a front elevation of a group of parts forming one unit of the machine. Fig. 3 is a detail view of the drive for the spools. Figs. 4 and 5 are partial views in front elevation and plan respectively of the same drawing mechanism. Fig. 6 is a front elevation of a filament former or nozzle. Figs. 7 and 8 are sectional views of two constructions of former, through the lines VII—VII and VIII—VIII respectively of Fig. 6. Fig. 9 is an elevation of another construction of former, and Fig. 10 a section through X—X of Fig. 9.

The same references denote the same parts in all the figures.

The viscous solution from which the filaments are made is contained in a suitable receiver 1 filled through the pipe 1' and connected by a pipe 2 having a stock-cock 3 with a vessel 4 which supplies the solution through pipes 5 to the various formers 6 disposed within a trough 7 containing the coagulating liquid.

To force the viscous material in the receiver 1 to issue through the holes of the formers 6, there is provided at 8 a connection to a compressed air supply so as to create above the free surface of the solution a pressure sufficient to attain the above mentioned object. The filaments issuing from the formers 6 form a lap 9, the number of filaments in the said fleece being as large as possible while their thickness depends on the qualities which the textile to be produced has to possess, it being of importance in practice to make the filaments as fine as possible. The filaments are then wound on a spool, such as 10 combined with another spool 10' which may be substituted for the first one, as far as the winding of the filaments is concerned, by means of mechanism hereinafter described.

The number of pairs of spools such as 10 and 10' working alternatively depends only on the requirements of the service and the

arrangement of the departments of the factory, so that in practice the machine in question consists of a series of mechanisms similar to the one shown in Figs. 1 and 2.

The spools are caused to rotate as follows. The spool 10 is mounted on a spindle 11 having a clutch sleeve 12 by means of which the spool 10 can be coupled at will to the spindle 11. On this spindle is keyed a spur pinion 13 which can mesh with a spur wheel 14 on the main driving shaft 15 which is rotated through the agency of any suitable transmission, for example by the usual fast and loose pulley arrangement as at 16, 17.

Similarly to the spool 10 the spool 10' is mounted on a spindle 11' carrying a clutch sleeve 12' by which the said spool can be coupled at will to the spindle 11' which likewise has keyed thereon a spur pinion 13' which can engage with the spur wheel 14.

The mechanism according to the present invention enables a filled spool to be easily replaced by an empty spool, which is effected by the following mechanism. The main frame of the machine carries a wheel 18 having a handle, keyed on a spindle 19 actuating two sets of gear wheels 20, 21, 22 and 20', 21', 22'; the spur wheels 22 and 22' being similar and capable of turning on a sleeve such as 23 (Figs. 1, 5) carrying a rocking lever 24 supporting one end of the spindles 11 and 11' of the spools 10 and 10'. Each of the levers 24 has a groove or slot 25 in which project pins 26 carried by each of the wheels 22. The sleeves 23 are eccentric relatively to the main shaft 15, whereby their rotation allows a pinion 13 associated with the spool to be filled to be put in mesh with the wheel and a pinion 13' associated with the filled spool to be disengaged. The machine tender is thus enabled to easily effect the substitution of a filled spool by an empty spool without stopping the working.

In Figs. 6 to 8 of the drawings there is shown in detail the construction of one of the formers 6 disposed in the trough 7 containing the coagulating liquid, which formers receive through the pipes 5 the viscous solution from which the filaments are made.

A perforated plate 28 constituting the former proper is secured with insertion of packing 27, between a screwed down cover 29 and the jointing face of the box or reservoir of each former 6, the cover having openings 30 suitably located to expose the perforated portions of the plate 28.

In the case of Fig. 7 the perforated parts of the plate are dished so as to project above the cover 29, but a flat plate may be also used as shown in Fig. 8 and the openings 30 widened outward to facilitate cleaning, should clogging of the holes of the former occur. The former could also, as shown in

Figs. 9 and 10, consist simply of a tube 31 provided with suitably arranged perforations 32, such that in every case the lap of filaments issuing from the former is regular and unbroken. Further the tubes 31 can be combined with reservoirs as above by mounting the said tubes in openings 30 in the cover 29 with provision of suitable packing. The tubes 31 may be of any section, oval, square, triangular or other, and the perforations made on the most suitable face of the tubes.

As stated in the description of the improved process when the amount of filaments wound on the spool is deemed sufficient, the filaments are cut through along one or more lines of the spool. With this in view the spools 10 and 10' are provided on their periphery with one or more slits or grooves, such as *e* and *e'* parallel to the spindles 11 and 11' to allow the insertion of a blade for cutting through the filaments when the thickness of winding is sufficient.

In the machine above described the fleeces of filaments may be cut in equal lengths, on the spools themselves, but it is also possible and in some cases desirable not to cut through the filaments on the cylinders. Such is the case for example when the threads wound on the cylinders have to undergo before combing or spinning various operations such as purification from sulfur, bleaching etc., effected in a liquid, water for example, it being important in order not to impair the parallelism of the filaments, to keep the skeins whole and uncut until the final drying at the end of the above mentioned operations. These operations may be carried out by methods similar to those in common use in dyeing skeins by means of the dyeing box, dyeing poles, stirring devices, etc. In this case, the cutting of the filaments is then effected by means of a cutter or shears, at one point of the skeins or at several other points, after the said skein has been suitably stretched.

Having now particularly described and ascertained the nature of the said invention and in what manner it is to be performed we claim as our invention:

1. A process for obtaining artificial fibers, the said process consisting in producing, by means of nozzles arranged in coagulation baths, very fine filaments all mu-

tually parallel and constituting parallel superposed fleeces; winding these parallel filaments by groups, on spools of suitable diameter; cutting the said groups of filaments along generating lines of the spools; passing the fleeces of parallel filaments thus obtained directly to the drawing rollers of spinning frames; and spinning these fleeces into filaments suitable for weaving.

2. A process for obtaining artificial fibers, consisting in exerting air pressure upon the free surface of a viscous material in a feeding reservoir having nozzles, thereby forcing material from said nozzles; producing by means of said nozzles arranged in a coagulating bath very fine all mutually parallel filaments constituting parallel superposed fleeces; winding said fleeces on spools receiving a continuous rotary motion; providing bobbins for the filaments; substituting, without halting the manufacture, for the bobbin provided with filaments, a second empty bobbin for winding the said filaments; cutting the said group of filaments along generating lines of the spool; passing the fleeces of parallel filaments thus obtained directly to the drawing rollers of spinning frames; and spinning these fleeces into filaments suitable for weaving.

3. A process for obtaining artificial fibers, consisting in producing, by means of nozzles arranged in coagulation baths, very fine filaments all mutually parallel, having the same length and thickness and constituting parallel superposed fleeces; winding these parallel filaments by groups, on spools of suitable diameter, provided with grooves on their periphery and disposed along generating lines of the said spools; cutting the said groups of filaments along one or more of the said grooves; passing the fleeces of parallel filaments, thus obtained, directly to the drawing rollers of spinning frames; and spinning these fleeces into filaments suitable for weaving.

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

PAUL GIRARD.
JEAN SONNERY.

Witnesses:

MARIN VACHON,
MARIUS HERMAZ.