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NEW SERIES.

## Improved Silk-Assorting Machine.

All butterflies, moths or millers come into existence as worms or grubs. The grub is hatched from the egg, grows to maturity and then changes into a curious mummy-like form called the chrysalis. In this state it is dormant, and appears to be dead; but the forces of nature are busy in its structure, changing it so strangely from the crawling worm into the perfect and beautiful insect that floats away above the earth upon its gossamer wings, these metamorphoses affording the most forcible suggestion that is furnished by nature of the possible change of men from the animal to the angelic state. During its dormant condition the chrysalis would be very liable to be eaten by birds or otherwise destroyed, did not Nature make provision for its protection, and numerous are the contrivances to which she has resorted for this purpose. The plan which she has most commonly employed is to teach the worm to weave a little house around his person from matter secreted in his body before he passes into his immovable and helpless condition. The thread with which the insect, *bombyx*, builds the cocoon for his habitation during his chrysalis state is of so strong, smooth and glossy a character that it has been appropriated by man for his most beautiful garments. It is known in the English language by the name of silk.

The individual fibers of the silk cocoon are so attenuated that several of them are combined to make the very finest thread. The fibers also differ very much in size, and this variation has been a source of great difficulty to silk manufacturers, especially in making sewing silk; and more especially that which is to be used in sewing machines. For these machines it is very important that the thread should be of uniform size, and great efforts have accordingly been made to accomplish this result, efforts which have resulted in notable improvements in the evenness of sewing silk since the introduction of sewing machines.—

Most of these efforts have been directed to the more careful assorting of the raw silk in parcels of uniform size; and several machines have been invented to facilitate the operation. The accompanying engravings illustrate one of these machines, invented by John E. Atwood, of Mansfield, Conn., and Lewis Leigh, of Seymour, Conn., and for which pat-

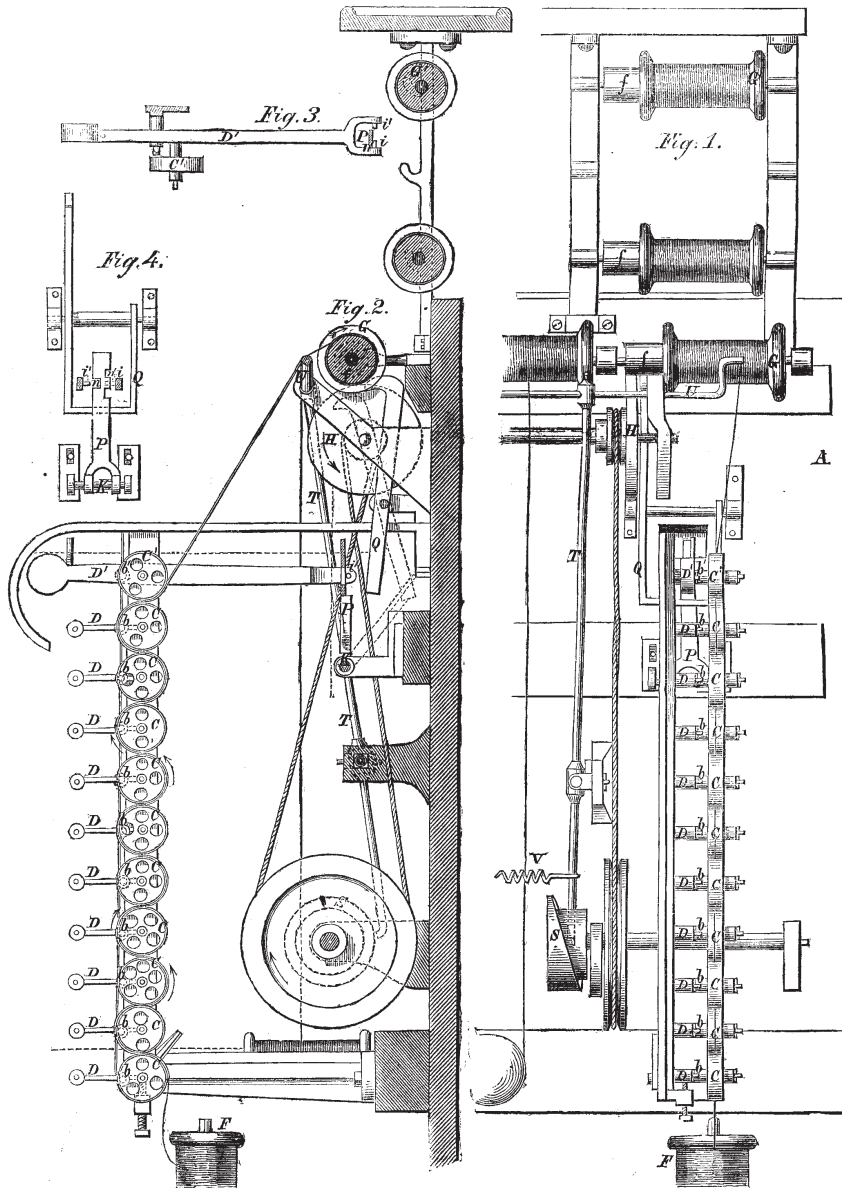
ents have been procured through the Scientific American Patent Agency, in England, France and the United States.

It is a device by which variations in the size of the thread are multiplied several fold, and the thread is wound in three sizes upon as many spools. Fig. 1 of the engravings is a front view of the machine, and

thread from the bobbin, F, is then carried over, under and between the rollers in the manner represented in Fig. 2, and led to the receiving bobbin, G, upon which it is wound. It will be seen that any increase in the size of the thread will raise the next to the lowest roller a little, the next roller above twice as much, and so on until the increased size is indicated by a

motion of the upper roller a number of times greater than the actual increase of size corresponding to the number of the rollers, C.

The lever, D', upon which the upper roller, C, is hung, is lengthened, as represented in Fig. 2, in order to increase the motion of its end, and then this motion is made to throw the receiving bobbin, G, out of gear whenever the size of the thread varies. For this purpose the lever is constructed as represented in Fig. 3, which is a plan view as seen from above. The end of the lever is forked and embraces the end of a lever, P (see Fig. 2). The lever, P, is inclined, and would fall outward from between the forks of the lever, D', were it not held by the pins, i and r'. To permit the lever, P, to fall out from between the forks, and to throw the receiving bobbin out of gear whenever the end of the lever, D', is raised or lowered by variations in the size of the thread, notches are cut in the edges of the lever, P, as shown in Fig. 4. The engravings represent the bobbin, G, in gear, which is intended to receive the medium-sized thread. The lever, P, now rests against the pin, i, and will thus rest as long as the vibrating end of lever, D', retains its position. But should a larger thread enter between the rollers, C C, the end of lever, D', would be raised, and the pin, i, would be brought opposite the notch, n, in the lever, P, allowing the lever, P, to fall out from between the forks of the lever, D'. As the lever, P,



ATWOOD AND LEIGH'S SILK-ASSORTING MACHINE.

Fig. 2 a vertical section. A series of light smooth rollers, C C C, are hung upon the ends of counterbalanced levers, D D D D', in such a manner that they may rest lightly one upon the other, as clearly shown in Fig. 2. The levers are suspended' on their fulcra, b b b b, with weights upon their outer ends to nearly counterbalance the weight of the rollers, C. The

lower end of lever, Q, carrying the bent upper end of this lever under the pulley, f, of bobbin, G, lifting this pulley out of contact with the friction roller, H, by which the bobbin is driven. This of course stops the winding of the thread upon the bobbin, G, which reminds the operator to change the bobbins. He accordingly substitutes for the ob-

bin, G, the bobbin, G', which is designed to receive the largest-sized thread. At the same time he slips the lever, P, sideways upon its fulcrum, k (see Fig. 5), when it rests against the pin, z'; this pin being raised above the notch, n, by the elevation of the lever, D'. The work now proceeds as before, until a section of smaller thread enters between the rollers, C C, when the end of lever, D', falls, bringing the pin, z', opposite the notch, n, in the side of lever, P; allowing the lever, P, again to fall forward and lift the bobbin out of gear. The action of a section of smaller thread is so similar that it needs no separate explanation.

The rod, U, is a guide for winding the thread upon the bobbin in regular spirals. It is secured to the upper end of the lever, T, the lower end of which lever is drawn against the cam, S, by the spring, V.

By this machine the variations in the size of the thread are so multiplied that the thread can be assorted in different sizes with the most delicate accuracy.

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