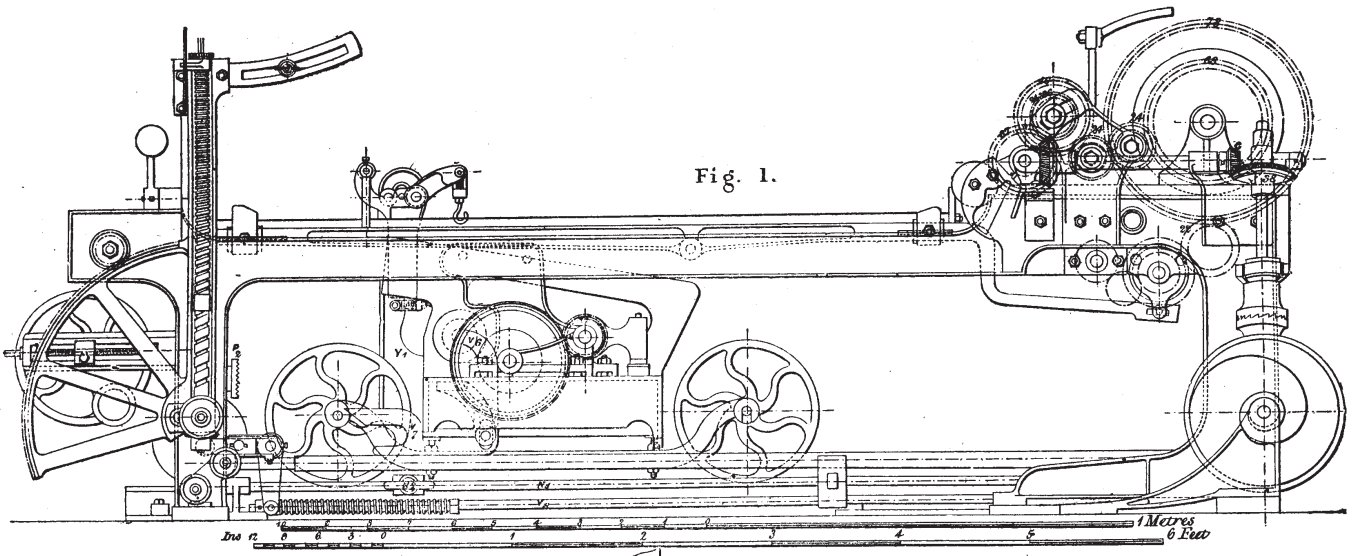
SELF-ACTING WOOLLEN MULE.

CONSTRUCTED BY THE MASCHINEN VEREIN, ENGINEERS, CHEMNITZ.

Fig. 1.



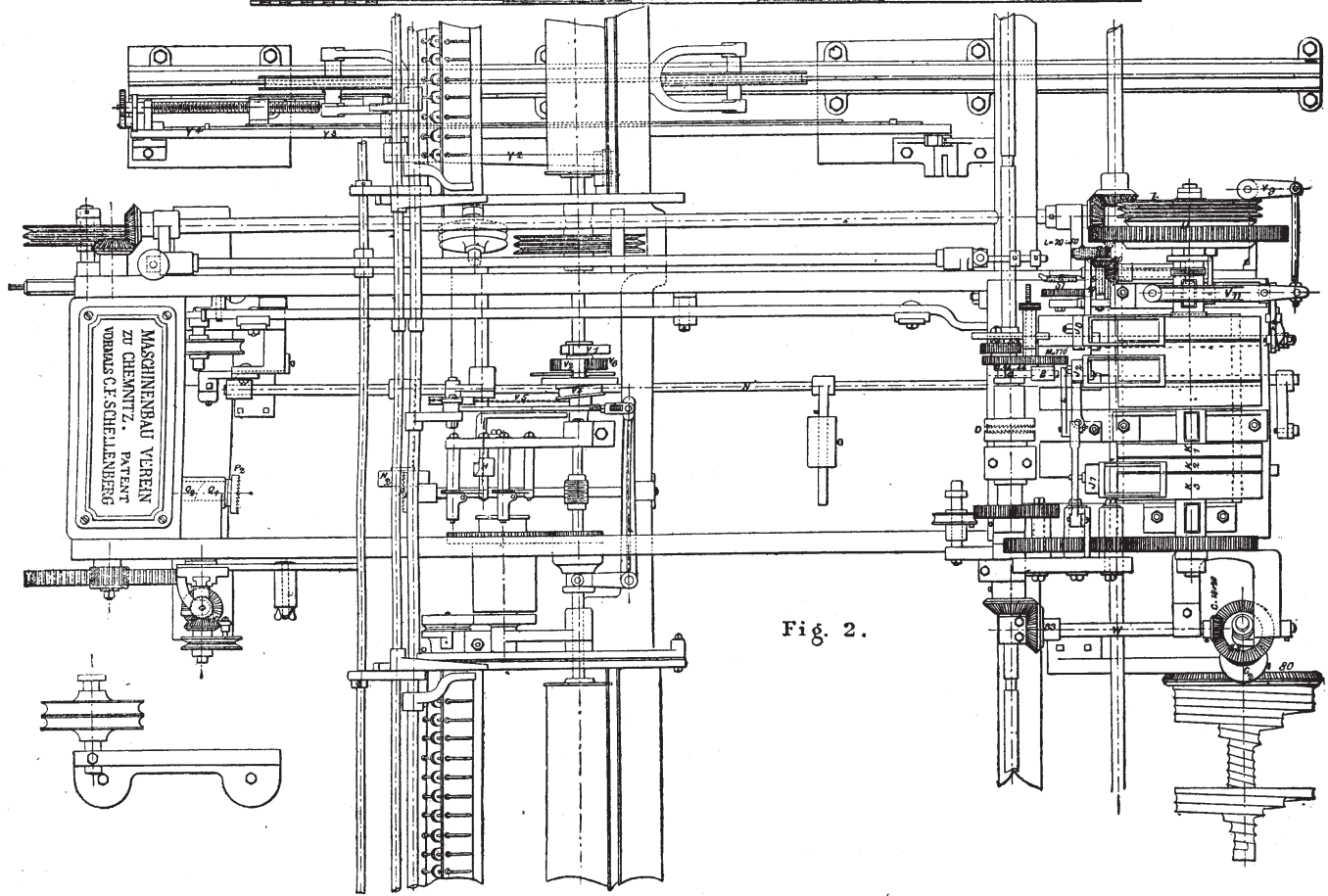


Fig. 2.

carded and combed wool. The improvements in the self-actor for carded wool is often spoken of. But this is a mistake. The machine for carded wool is not a self-actor in the sense of the Crompton-Roberts machine. It is only a cylinder spinning machine for wool, and this has been created out of the original Hargreaves arrangement, only by modification in detail. In the original machine a certain length of the rovings was passed between two pieces of wood, one of which was fixed in a horizontal position, and the other suspended over it until brought down by the spinner, when the rovings were clasped and held whilst the carriage or clasp receded from the spindles, thus drawing out the threads until the spindles were revolving rapidly and connecting the roving to the yarn. A pair of cylinders was introduced; but this did not convert the spinning jenny into a self-actor.

We may commence our notice of modern self-actors by the cylinder spinning machine for carded wool of Mr. Schellenberg, of Chemnitz, now the Maschinenbau Verein, of Chemnitz. See Figs. 1 to 5 on the present and opposite pages.

In the process of spinning carded wool, five distinct movements are performed during the traverse of the carriage. These are:

1. The delivery of the rovings with a quick motion of the carriage when the twisting is performed.

2. The delivery cylinders stop. The rovings are drawn out by a continued and slower movement of the carriage, and the spindles are now caused to revolve more rapidly.

3. The carriage stops. The spindles are rotated very rapidly, whilst the carriage is slightly drawn back to prevent the breaking of the threads.

4. The motion of the spindle is reversed, and the "faller wire" is allowed to descend to roll the threads on the cops.

5. The carriage is allowed to return to admit of the unrolling of the threads upon the cops.

All these operations are performed by the same mechanism, which at first was very complicated,

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Fig 4.

Fig 5

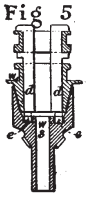

Fig. 3.

but which gradual and successive inventions have simplified. The modifications of Schellenberg are of high importance, as will be understood from the following description.

To effect the first operation, Mr. Schellenberg commences the movement of the shaft with the eccentric wheel A during the return of the carriage. This shaft is not mounted in the headstock parallel to the path of the carriage, but it is placed on the carriage, and partakes of its to-and-fro movement. The shaft by means of the eccentric A gives a turning motion to the levers B and C, and effects by this the gearing of the coupling D and the revolution of the cylinder to deliver the rovings. Besides this, the partial turn of the shaft gives, by means of the eccentric E, and by the lever F_1, by G_1, by F_2, and by the clutch G_2, a motion to the snail for the receding travel of the carriage, and on the shaft of which is also mounted the counter snail. The two snails are so laid out as to give to the carriage a rapid motion at first, which gradually decreases. The transmission of movement on the snail shaft is effected by a pair of bevel wheels, and the speed of the snails, and with it that of the carriage, may be modified by means of bevel change wheels.

The receding snail is constructed with two paths, and two cords may be employed. The same arrangement exists also in the advancing snail, and this modification is the subject of a patent by the maker.

At the moment when the carriage returns, the finger H on the carriage presses upon the lever F, and then the belt passes on to the pulley K^3. Motion is thus transmitted to the cops.

The movements of the second period above mentioned, are effected as follows: The finger N throws out the clutch, which drives the roving cylinders. A slight blow is given by the wheel M to the finger N, which raises it and throws out the gearing, so that the delivery cylinder and the rovings also remain stationary. By change wheels the period of connexion may be varied, and through this means the delivery of the rovings is changed.

In order to give greater twist by a more rapid motion of the cops Mr. Schellenberg has devised the following mechanism: The finger N resting on the carriage, presses against the finger N^2, which is mounted on the shaft N^1. By this action the lever F_2 shifts the belt of the second motion on the first pulley, but removes that of the first motion and stops it. During the advance of the carriage the mechanism arrests the motion of the receding snail. To effect this the belt for the third motion is placed on the first pulley, and that of the second is thrown off, while the velocity of the cops is also increased. At the same time the crown wheel P_1 comes into contact with P_2. The former rests in the carriage, and the latter in the headstock. As soon as these wheels engage, the motion of the snails Q_1 and Q_2 commences, and when these reach their greatest height the spring Q_3 acts on the snail Q_1, and the arrest of the carriage by this movement, drawing back the snail Q_1 throws P_1 and P_2 out the gear.

When the twist of the yarn is completed a finger acting on the changeable wheel R presses on the levers S and F_3, and the belt of the third motion passes on to the loose pulley. The eccentric T raises the latch T_2, and the brake U comes into action, effects the reverse motion of the main shaft, and also continues the revolution of the cops. For this latter purpose there is a spring V in the carriage which connects the pawl U_2 and the ratchet wheel V_3. By this connexion the snail U_4 is put in motion and winds up the chain V_5, which allows the apparatus to descend for rolling the threads on the cops. The snail V_4 also raises the lever V_6, which by means of the bar V_8 and the levers V_9, V_{10}, V_{11} again actuates the brake V. At the same time the break W of the advancing snail is liberated, by means of W_1, and the lever W_2, the receding snail is put in motion, and a new travel of the carriage commences. The brake W is ingeniously contrived. It is actuated not only by the friction of the projections W_4 (see Fig. 5), which are covered with leather, but also by the feathers *d d*, which fall into the recesses *e e*.

To graduate the travel of the carriage in returning it presses on the bar X, which with the aid of the bar X_2 and the lever X_3 draws out the feathers *d d*, the rest of the motion is effected by the friction of the leather-covered projections.

We have seen that the mechanism to facilitate the winding of the threads contains a lever X_1 Y_1, which is so lifted that it is placed on the roller *f* of the arm Y_2. A block *g* on Y_2 sliding on the round bar Y_3 is placed on the platforms Y_4, which are displaced at each advance of the carriage in such a way that Y_3 always falls. By this means the cops receive their proper form. The motion of the spindles is effected by means of the quadrant and chain, which unwinds, and gives motion to the barrel Z^1. But the inclination of the quadrants constantly diminishes the speed of the barrel in such a way that the inclination is greater when the cops are the largest.

As we have already said, on the arrival of the carriage, the wheels working the receding snail are thrown into gear, and by the levers F_1 F_4 and F_5, the coupling for the return motion of the carriage is thrown out.

We may now examine the relative velocities of the different portions of this self-actor. The driving shaft has a speed of 250 revolutions per minute. On it are three pulleys. The first is 9.25 in. in diameter, the second 16.73 in., and the third 26 in. These proportions give the following speeds for the machine: for the principal shaft driven by the first pulley 165 revolutions per minute, by the second 300 revolutions, and by the third 464. The three pulleys on the main shaft of the machine are each 13.78 in. in diameter. The travel of the carriage is 63 in. and the maximum diameter of the receding snail is 12.40 in., or with the cord 12.88 in. Motion is transmitted from the principal shaft with the first speed. To effect this a wheel with 68 teeth is mounted on the shaft. This wheel gears with a second wheel of 40 teeth, by means of two intermediate pinions of 24 teeth each. The wheel with 40 teeth is mounted on a shaft also carrying the change wheel of 24 to 36 teeth which drives a 37-toothed wheel connected to the cylinder itself. By this combination from 676 in. and 1014 in. of yarn can be delivered per minute. The receding snail is turned by the cylinder, to which a bevel wheel with 33 teeth is connected. This gears with a second bevel wheel, also of 33 teeth, and placed on a horizontal shaft; on the same shaft are placed the bevel change wheels (from 18 to 20 teeth) gearing with a wheel of 38 teeth on a vertical shaft, and also a bevel wheel of 65 which drives another of 80 teeth on the receding snail shaft.

For moving the wheel M, that is to say, the roving counter wheel, a pinion of 35 teeth is placed on the

cylinder shaft. This gears with one of 54 teeth, and change wheels on the cylinder (having from 24 to 44 teeth) drive the roving wheel with 140.

The spindles receive their motions by means of a disc or twist roller *k*, which is placed on the principal shaft. Four twist rollers (11.81 in., 33.46 in., 15.75 in., and 16.73 in. diameter) belong to the self-actor. The twist roller *k* transmits its motion by means of a cord to a cylinder 6.30 in. diameter. Each spindle contains a small disc which is driven by a cord, transmitting the movement of the cylinder just named.

The counter of the self-actor is driven by a worm on the main shaft gearing into a worm wheel with 26 teeth. This wheel gives motion to a shaft with two bevel wheels having 20 teeth, which turn a wheel of 28 teeth. This latter gears with change wheels of from 20 to 50 teeth, on a shaft on which is placed a wheel of 21 teeth, driving the counter wheel of 51 teeth. After a single turn of the latter the spindles stop. This combination gives from 25.5 to 90 revolutions for every 4 in. of twisted yarn.

The receding snails are actuated from the second motion pulley. With the loose pulley of this motion is mounted a bevel wheel of 27 teeth, gearing into a second on the vertical shaft W_5. On this is placed a wheel of 16 teeth, gearing through another wheel of 40 teeth on to the receding snail shaft. This combination gives, therefore,

$$300 \cdot \frac{27}{27} \frac{16}{16} \frac{9}{40} = 67.5 \text{ revolutions per minute.}$$

Another very important detail in this machine is the means adopted for stopping the main shaft at any point. All the various functions of the machine are performed with great facility, and the arrangement of the torsion and auxiliary torsion, the motion of the carriage, the movement of the spindles, &c., are practically perfect. As we have already stated, the self-actor of Mr. Schellenberg is chiefly intended for treating carded wool.

(To be continued.)