WOOL-WASHING MACHINERY.

CONSTRUCTED BY MESSRS. JOHN AND WILLIAM MACNAUGHT, ENGINEERS, ROCHDALE.

(For Description, see Page 18.)
TEXTILE MACHINERY, AT THE VIENNA EXHIBITION.

(For Description, see Page 18.)

Fig. 1. Wool Opening Machine, Constructed by Messrs. Schimmel and Co., Engineers, Chemnitz.

Fig. 2. Scutching Machine, Constructed by Messrs. Oscar Schimmel and Co., Engineers, Chemnitz.

Fig. 3. Continuous Dividing Apparatus for Carding Machines, Constructed by Messrs. Bede and Co., Engineers, Verviers.
TEXTILE INDUSTRY AT THE VIENNA EXHIBITION.—No. XVII.

By Dr. H. G. Grote.

SPECIAL MACHINERY FOR THE PREPARATION OF WOOL.

Referring to our general report ("Textile Industry at the Vienna Exhibition, No. II.") p. 69 of our last volume) on the machines for the preparation of wool at Vienna, we may proceed to illustrate and describe in detail the chief interesting and novel arrangements shown for this purpose.

We may commence with the wool-washing machine exhibited by Messrs. John and William McNab, of Glasgow. This is a combination of the first construction of the self-acting wool-washing machine, by Petrie, of Rochdale, these machines having been afterwards improved, and several combinations have been introduced from time to time. The system under notice, known under the name of the "Levitaux," consists of a combination of two, three, or four single machines, with a suitable arrangement for transferring the wool from one washing reservoir into the next. In general, all the working parts of these "Levitaux" have to produce simply a continually advancing movement of the washed wool, so that consequently the particles of dirt and sweat dissolved by the washing fluid may easily be removed by this. If this motion has not already been obtained by the washing process. This operation is greatly facilitated by a constant renewal of the washing fluid and by a constant supply of cold circulating water at the end of the process.

The wool-washing machine of Messrs. McNab is illustrated in Fig. 1. It consists of a series of two machines combining the washing machine used as a single self-acting wool-washing apparatus for smaller quantities of wool, whilst the lower figure shows the transfer arranged apparatus provided for carrying the wool from one washing reservoir to another in a series of machines. The advantage of these parts of this apparatus will be easily understood from the engraving. The washing reservoirs are provided with circular dished sides, as are also the sides of the tube, through which the washing fluid can pass from one reservoir to the other; this movement is effected in a peculiar manner, a steam injector being fixed in the tube, the steam jet of which when acting forces the fluid through the tube into the first reservoir, from whence it can pass back again into the pipe as soon as it has reached the height of the communicating pipe. The wool is put into the apparatus by means of swing-rakes, which are moved in the manner shown in our engraving. The transferring arrangement for the wool from one reservoir to the other is 3,2,1, the initial and the latter end of this link is a jointed center carried by a slotted bearing, of which the rod A, or the iron rod, is carried, which pierces through the wool, while a bush connected with the crank r, the axis of which is in put in rotation by the rack, can slide along the rod a, when the rotation of a produces an elliptical motion of the points of the rakes the larger axis of this ellipse, described by the rakes, is in the direction of the motion of the wool, and the points of the rakes are through one-half of the curve, in connection with the wool, and travel forwards, while they rise above the wool and travel backwards through the second half of the curve. The rakes which carry the wool forward through the troughs are similarly arranged, and at the point of contact of each of the curves described by the four systems of the rakes, the upper figure shows, page 16, fixed rakes are provided, through the wool is pressed on one side and caught on the other side by the rakes. The last rakes are those where the wool is removed from the wool being thus effected. Returning to the arrangement for transferring the wool from one reservoir to the other, the upper figure on page 16 that the last system of rakes carries the wool on to an inclined plane, through which then or C C C C, which latter hold the wool on the inclined plane B where the points of the rakes A have to travel back forwards. The wool is transferred from one machine to another by a separate apparatus, H, to which a curvilinear motion is also given by the crank I. The motion for this purpose is transmitted to the male between the无所谓, I, from which it passes either one another roller, as shown, into the following washing, being caught by the roller D worked by the crank O and the roller a or over a second squeezer or pressing roller to the drying machine, as shown in the upper figure of page 16, the use being perfectly, while the mode of forcing the washing fluid from one reservoir into the other by a jet of steam is very simple, and also gives most satisfactory results.

Messrs. McNaught build these machines of various sizes, and provide with several machines, all shown in our illustration on page 16, with a feeding cloth and a brass revolving immerser; the squeezer has a capacity of 30 in. diameter, and are covered with hemp or wool, while the fixed rakes are adaptable.

In one of the New French opening machines for lamb's wool exhibited at Vienna is shown in Fig. 1, page 17. One of the features of this machine is a new arrangement of feeding apparatus, consisting of the levers over, which form a semicircular body underneath the feeding roller, and which are pressed against the latter by the weights fixed on the arm c. The pressure of the levers against the roller, or the distance between the two, is adjusted by the screw a. The wool is carried along the feeding cloth e, and after the superfluos material has been removed by the southern, the wool is offered a rise to the cylinder a, which is provided its circumference with opening teeth, and which passes over a movable cylinder of opening on the last opening. This opening machine is constructed by Messrs. Oscar Schimmel and Co., of Chemnitz, who also exhibited at Vienna the wool opening machine shown by Fig. 2, page 17. This machine, which is of very simple construction, and which has been largely adopted on the Continent, consists of two shafts a and b, provided with scatters, between which the wool has to pass when coming from the feeding apparatus, and the opening of the machine of the latter includes nothing new, and will be readily understood from the engraving.

We have already mentioned the four former articles that the machine for the preparation of wool by Messrs. Bedee and Co. of Verviers (formerly Hugon and Teston), a very great simplicity, and we may add here that this feature distinguishes the contain closed dividing apparatus for carding machines of Messrs. Bedee and Co., as we illustrate by Fig. 3, page 17. This apparatus consists of two series of fixed steel bands, a, and b, and the bands, which are arranged in the form of the ones of the series correspond in position to the spaces between the bands of the other series; these steel bands are made so as to form teeth of the one size, and the other, and thus such a manner that the steel band a passes at first round one fourth of the circumference of c, and then round another portion at the top to the flame a. Endless leather bands pass round the rollers c and e, and the rollers d and f respectively. The spaces of the rollers c and e are vertically arranged systems of squeezer, with similarly arranged rotating and alternating motion of the roller. The feed of wool coming from the defying cylinder passes between the steel bands, and is carried off by the leather bands round the rollers c and e, at those points where the steel bands do not cover the rollers; in this manner the feed is divided into strips, one set passing upwards and the other downwards. The strips of wool are carried by the rollers k k under the rollers a and f, whence by the combined action of these rollers with the machine is entire for the wool. The two lower views on page 16 show the details of the arrangement, whilst the upper view shows the construction of the carding iron machinery, from which it will also be seen that the strips from each of the squeezer pass each on to a pair of rollers, by a method of forming strips gives satisfactory results.

DIVING APPARATUS IN MINES.

On this subject, which becomes of the utmost importance both with respect to the use of coal mines, Dr. A. G. Oulaf put a lecture at the Lower Scottish Society for Natural and Medical Science, at Bonn, on Monday, January 26, following it was an account of the art of living under water by means of air chambers built up only since the beginning of the 16th century. Armstrong, however, speakers of the custom of the Greek divers to take a bottle with them under water, and prolonging their stay there, it being supposed that they descended with the weight inverted over their heads, and thus carried into the bottle a limited amount of air. The use of the diver's apparatus in ancient and medieval times seem to be wanting entirely. Only John Tauscher and several others describe in a very different period, and many thousand spectators, two Greeks with a burning light descend in water in a large kettle and return with dry clothes. Somewhat later diving apparatus are more frequently mentioned; thus in the time of James II., when an American, William Philo, on the coast of Hampshire, or Deming, recovered bars of silver from a sunken Spanish ship, with 500,000 of cold water, while the air holds from a depth of 7 fathoms. Complete essays on the art of living under water, by Edmund Halley, secretary to the London Society, may be found in the 'Philosophical Transactions' of 1717 and 1721; here Halley describes his improved diving bell, with which he could descend to 40 feet at a time. The air supply was managed with air-tight leather bags, which were filled by breathing into them. He also constructed a diving helmet of lead with a leather hose, by means of which he was enabled to leave the bell and to move about in this manner. In 1715, Sir Martin Triewald, lighted a diving bell made of copper, with an improvement made in the use of the hose by which he was enabled to enter the holds of sunken ships.

In the French "Philosophia Britannica" there is mentioned a diving dress which allowed independent locomotion in water. In the year 1739 an Englishman invented a stout leather dress which allowed of independent locomotion in water, the use of which was enabled to enter the holds of sunken ships.

The use in mines of the boll-shaped diving apparatus is of little service, as independent locomotion in a narrow space is impracticable. These dress are therefore generally used. The English apparatus, or Scaphander, is different in manner of air with the air pump, but is inflated with air, and is generally used by divers on the coast of Bohemia, and is very extensively used in the home of the mines. The use of the diving apparatus in airless has of late become the utmost importance for mines, as it affords a more general atmosphere to be allowed, and as soon as lives after an explosion of firebreak has taken place and the ventilation of a mine has been renewed.

It is no new idea to stay and work in an airless atmosphere, while the lungs are supplied with air from another source. Platiere da Roux, 60 years ago, proposed a mask with hose to be worn as a respirator, and Alexander von Humboldt invented an apparatus, filled with compressed air, which could be supplied from a large pressure, and was provided with a breathing tube and a mouthpiece by means of which compressed air is transmitted from the vessel and the consumed air discharged into the airless atmosphere. This apparatus was described by von Humboldt, engineer, mining of St. Etienne, and M. Desayrault, manufacturer. Paul Perotto, an entirely reliable arrangement, both for diving in water and foul air, and which at the same time permitted of breathing with a fresh air. The apparatus used in German mines are of several kinds. A water-tight dress with helmet and the air regulator for diving in water and foul air, which is generally assembled in combination with a hose-squeezer. In airless or other apparatus for diving, when the air diver remains in communication with the air pump through a hose, or as a high-pressure breathing apparatus, when an air hose is carried on a barrow in strong steel cylinders, which make a constant supply of air available. The regulator is of a very ingenious construction, and expands the compressed air just as much as the pressure of the air is reduced, so that the air can ever enter in the lungs and endanger the life of the
The physiological effect of compressed air upon the human body has been noticed by Edmund Halley, who complained of pains in the ears when going too quickly under water. Some divers in Germany have noticed below water a slight giddiness and pains in eyes and ears, at a depth of only 9 metres, though many have descended over 40 metres. Professor Bameaux, of Sfrasburg, supposes that the blood gases, carbonic acid, nitrogen, and oxygen, are strongly compressed by the pressure upon the lungs and blood vessels, and when this pressure suddenly ceases they will at once expand and act just as air bubbles, which are introduced in the air vessels, viz., they will cause pains, fits, or death. Dr. P. Bert has confirmed this view through experiments which he made with animals. He concludes from them that a diver can be exposed without danger to a pressure of 5 atmospheres or 40 metres of water, while at 70 to 90 metres danger becomes imminent; and Doctor A. H. Smith, of New York, examined quite healthy men with the sphygmograph, after they had been exposed one to one and a half hours to 15 to 17 lb. pressure of air in caissons; he found that the beats of the heart had increased from 82 to 84 up to 114 and 120 per minute, that the volume or intensity of the pulse, however, had greatly diminished. The men also perspired freely, which, however, was probably due to the very moist, almost saturated, air of the caissons. Under all circumstances, only perfectly healthy persons should be admitted to work in highly compressed air.