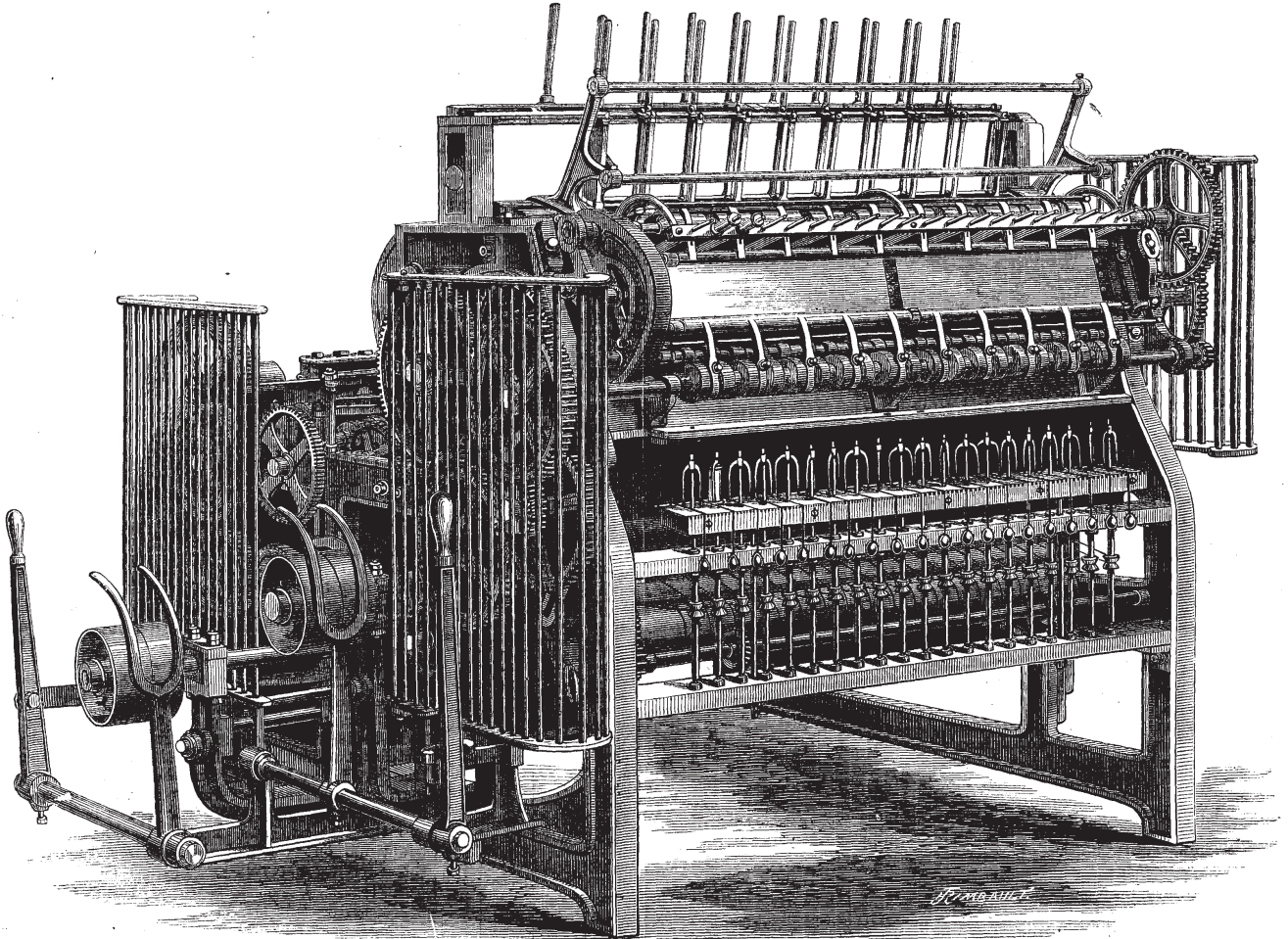


## MACHINERY FOR TREATING SILK WASTE: SPINNING FRAME.

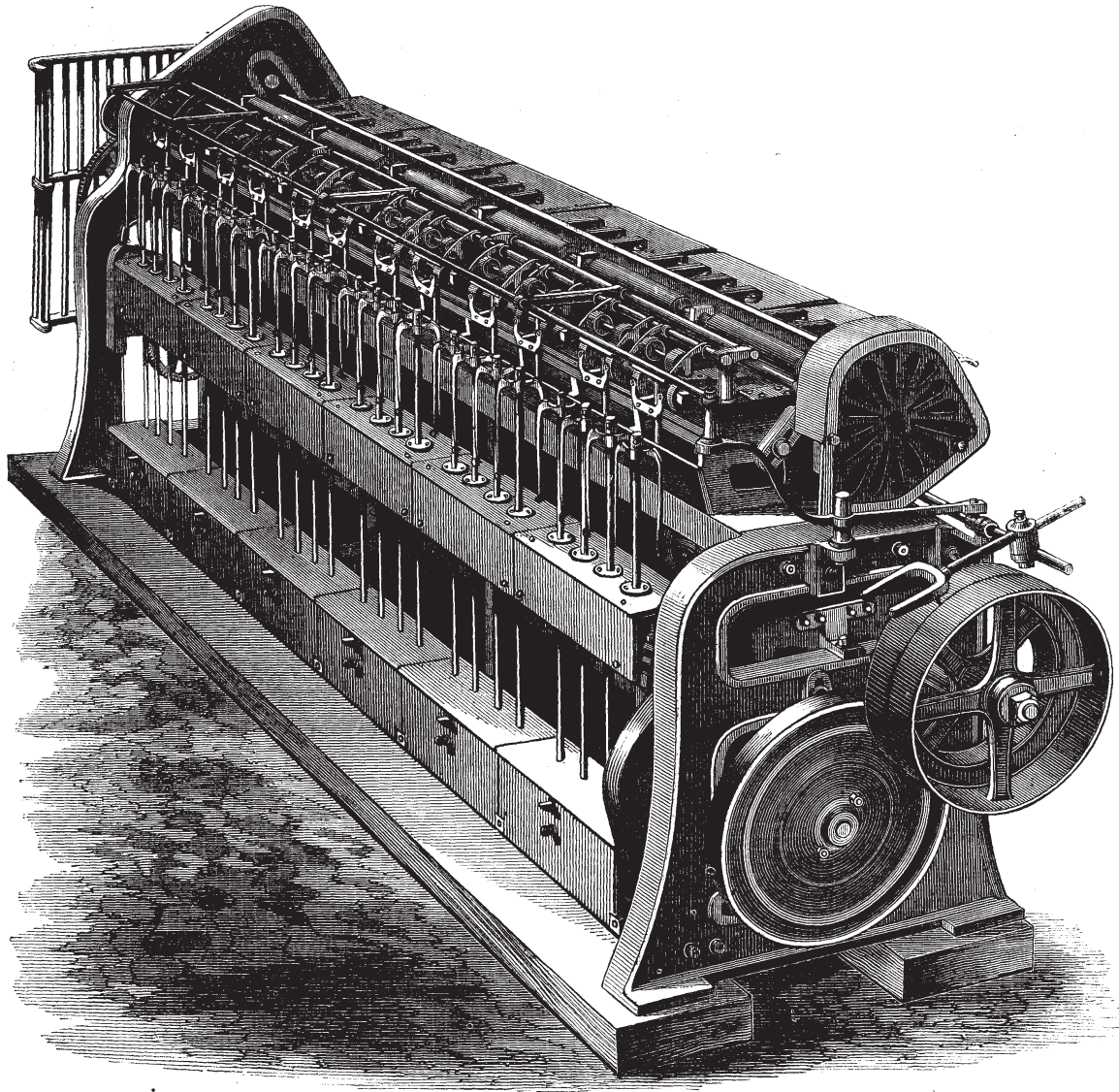
CONSTRUCTED BY MESSRS. GREENWOOD AND BATLEY, ENGINEERS. LEEDS.

*(For Description, see Page 100.)*

MACHINERY FOR TREATING SILK WASTE: SCREW GILL ROVING FRAME.

CONSTRUCTED BY MESSRS. GREENWOOD AND BATLEY, ENGINEERS, LEEDS.

*(For Description, see next Page.)*



## THE UTILISATION OF SILK WASTE.

*(Concluded from Page 6.)*

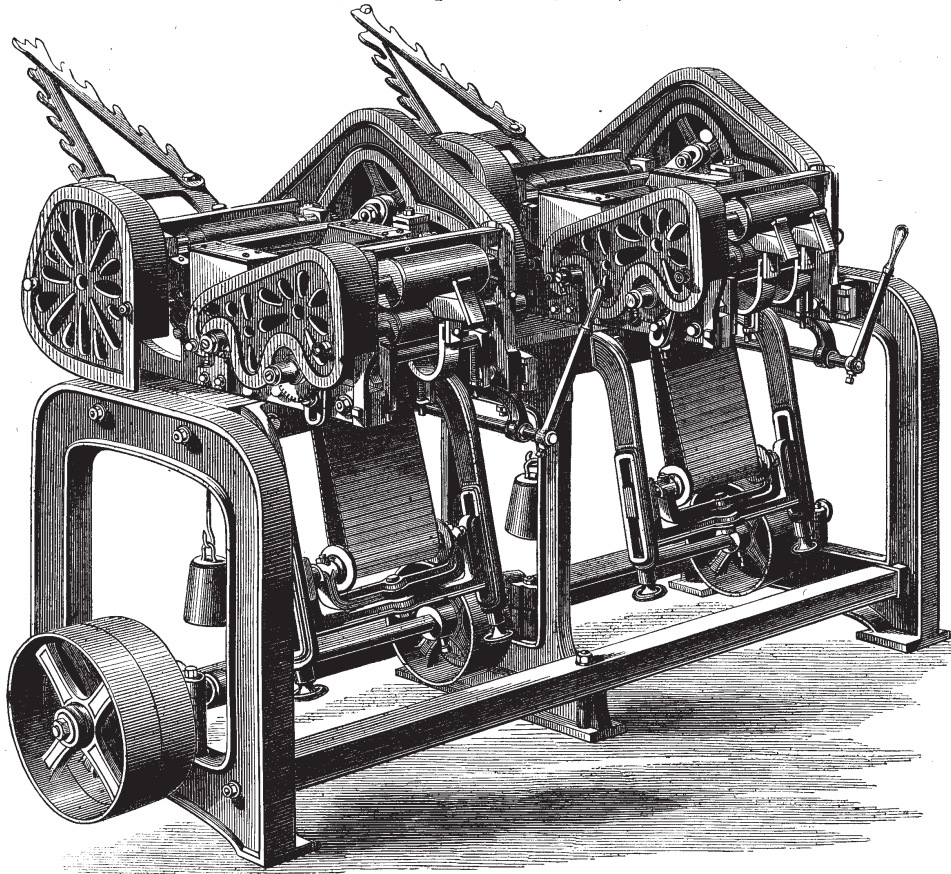
THE next operation is performed on the drawing machine (see page 106). This machine is similar in construction to the preceding machines, and the mode of operation is almost the same. The gills, however, are finer and closer together. A number of slivers from the set frame are passed through the drawing machine, and delivered in a small sliver. This is repeated some three or four times; each time the drawing action is reduced, and a greater number of slivers are put through, thus getting, by constant doubling, a fine, straight, and equal sliver for the roving frame. This roving frame (see page 99), still further reduces the sliver from the drawing frame by passing it through a very fine screw gill. But instead of delivering it again into a can, this very fine sliver is passed through a flyer at the top of the spindle, and slightly twisted, from one-half to five twists being put in the inch. The flyer winds this slightly twisted sliver, or as it is now called "rove," upon a bobbin running upon the spindle. This bobbin is driven at a varying speed by means of differential gear. This arrangement decreases the speed of the bobbin automatically as the winding on of the silk increases its diameter.

The rove is now taken to the spinning frame (see page 98), which is similar to what is used in dry flax and worsted spinning. The rove is passed through a pair of rollers at the top of the frame, passes over a tension plate, and through a pair of small carrying rollers into the bite of the bottom or drawing rollers. The rove is greatly reduced in size by reason of the drawing rollers running so much quicker than the top rollers, and is twisted and wound upon a bobbin working upon a spindle running below the rollers. The yarn is now completed, but is rarely used as spun. It is generally used doubled, similar to cotton, flax, and other yarns. This is a simple operation; two or more bobbins from the spinning frame are placed upon pins at the top of the twisting or doubling frame, passed over a series of tension rollers twisted together and wound upon a bobbin, exactly the same as in the spinning frame. The spinning and twisting frame exhibited are for economy of space combined in one machine (see page 98). They are usually made distinct machines, and have about 150 spindles on each side. After the twisting or doubling, the thread goes to the reeling machine (see page 106), and is made into hanks. This operation measures the thread into fixed standard lengths; the machine is arranged with self-acting stop motions, to stop the machine when the correct length is run out. The yarn is now made up into bundles for the market.

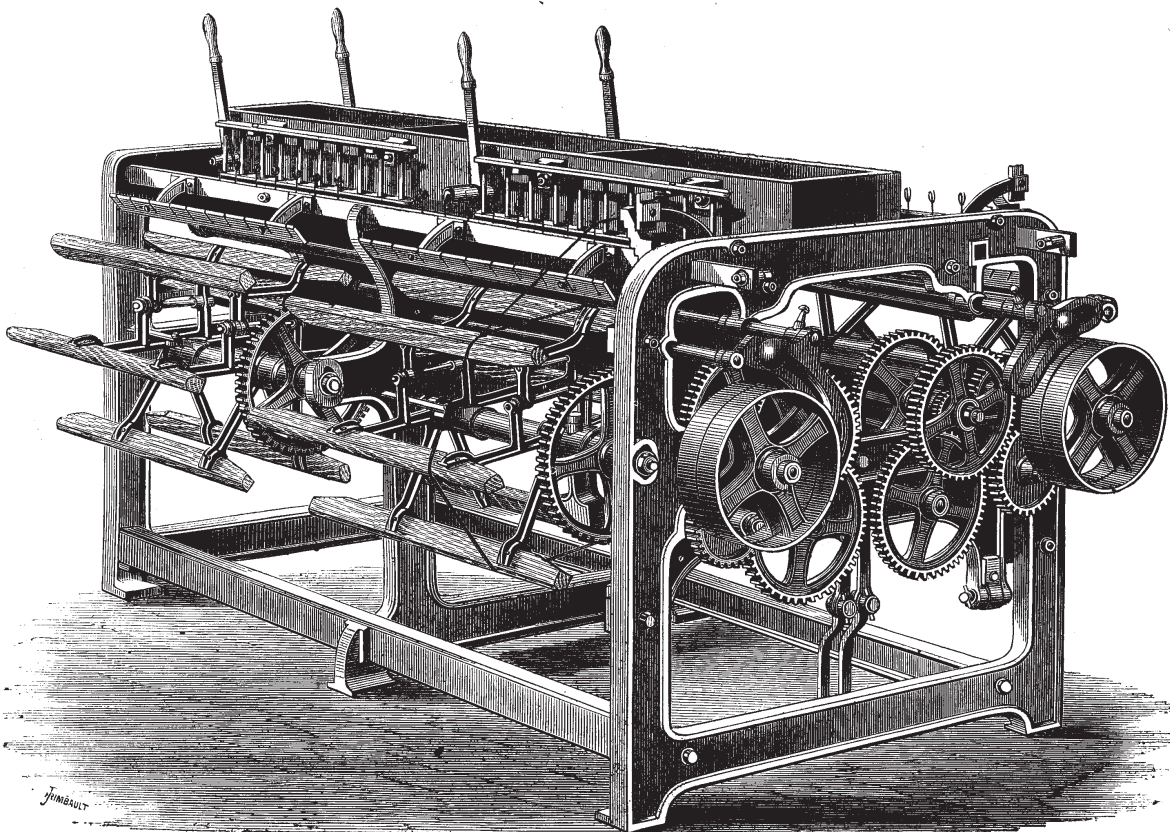
It will thus be seen that the preparing and spinning of waste silk is a branch of manufacture which has now been thoroughly worked out and established, and that a material which but a few years ago was considered worthless, is now utilised, the products being little, if at all, inferior to the thrown or neat silk. It is now extensively used as weft in the weaving of Bandanas and piece goods, satin and velvet, ribbons, cords, yarns for sewing threads, &c., and also in the fancy piece goods such as produced in Manchester, Bradford, and elsewhere. The spinning of waste silk is extensively carried on with Messrs. Greenwood and Batley's machinery in many parts of England, Switzerland, France, Germany, Italy, and the United States. The manufacture is one that is growing with extraordinary rapidity, as the continued perfection of their dressing and preparing machinery enables spinners to make use of low materials which a few years ago would scarcely have been looked at by the most enterprising manufacturer.

## MACHINERY FOR TREATING SILK WASTE.

CONSTRUCTED BY MESSRS. GREENWOOD AND BATLEY ENGINEERS, LEEDS.

*(For Description, see Page 100.)*

SILK-DRAWING MACHINE.



POWER REEL FOR SILK YARN.