the bobbins are carried to another machine-room, where the thread undergoes the operation of cleaning.@@1

The *cleaning, drawing,* or *picking-machine,* as it is vari­ously called, is represented in fig. 9. In this, as in the last machine, motion is communicated to the bobbins by a fric­tion shaft. The bobbins, *a* *a,* from the winding-frame are fixed on plain spindles, and placed in a horizontal position be­tween their supports. The threads are carried from the bob­bins over the iron or glass rod, *b b,* and each thread is passed through an adjustable opening, between the two iron blades of an instrument called the *cleaner, c c,* which is fixed to a bar of wood running along the machine, immediately behind the friction-rods. The *cleaner* is here represcnted on a larger scale, (figs. 10,11); *a* is the bar of wood to which the instrument is fastened ; *b, b,* are the blades, which are held together at the bottom by the screw *c∙, d* is the opening through which the thread is made to pass, the width of this opening being adjusted by means of a screw *e*, the key of which is kept by the steward of the room. The tops of the blades are curved outwards, so as readily to guide the thread into the slit. The threads, after having been passed through the opening of the cleaner, are put through the eyelet *d,* of the traverse bar, which is, in every respect, like that of the former machine, and then attached to the bobbins *e e.* When the machine is put in motion, the bobbins *e e* drag the thread from the bobbins through the cleaner; and, as the cleaner is adjusted to a cer­tain size, all impurities and irregularities are removed, and the thread thus rendered equal.

The process which succeeds that of cleaning is called spin­ning, although, as we have already observed, it is only twist­ing. Tne spinning-machine is represented in fig. 12. This, like the two former machines, consists of a series of frames placed at wide intervals, and connected by bars of wood, which serve as supports for the different parts of the machin­ery. The spinning machine contains sometimes two but generally three tiers of working apparatus in height. The bobbins on which the twisted silk is to be wound, are seen in the figure at *a a a,* placed horizontally along the ma­chine ; in this case they are not driven by friction-rollers, but by toothed wheels, fixed on the extremity of the axis of each bobbin, and corresponding ones on the shafts *b, b, b.* The bobbins are, as before, suspended by their axis in lit­tle grooves ; each bobbin bearer contains two such grooves, one higher than the other, so that, on the bobbin being

lifted from the lower to the higher groove, its toothed S wheel is thrown out of gear with the wheel of the shaft *b, b,* and it remains at rest. Under each bobbin is seen the twisting - apparatus. This consists of a bobbin *c,* fixed on an upright spindle *d,* to which motion is communicated by a belt from the drum *f,* fixed on a hori­zontal shaft *g,* pass­ing over a pulley on the bobbin spindle.

The silk threads from these vertical bobbins are wound three or four times round a bent wire *h,* fixed to a bar, ex­tending along the machine, passed through an eye in the end of each of these wires, carried through the eyes of the traverse-guides, and attached to the horizontal bobbins. On motion being given to the machi­nery, the vertical bobbins are made to revolve with a greater or less velocity, and the horizontal ones with a ve­locity so proportioned to the others, that they may only draw away the thread as it is twisted in the due degree, In figs. 13 and 14, we have represented, on a larger scale, a section and front view of these working parts : *a*, *a* is the bobbin from the cleaning­machine, *b* the fixed wire­guide round which the thread iscarried, *c* the traverse-guide for spreading the thread over the bobbin, *d* the bobbin for receiving the twisted thread.

Motion is communicated to the different parts thus: On one end of the drum-shaft *g,* (fig.l2,) is fixed a fast and loose pulley, not seen in the drawing, driven by a belt from the main shaft which traverses the apartment ; belts from the drum on the drum-shaft pass over the pullies of the vertical spindles *d,* and so give mo­tion to the bobbins *c ;* on the hither end of the drum-shaft is fixed the pinion *g,* which, through the intermediate wheel *e,* drives the spur-wheel *h ;* on the axis of this last wheel is fixed the bevel-wheel *m*, giving motion to the

@@@1 The doffing board is an adoption from the cotton manufacture, and its use, as described above, is, we believe, peculiar to Scotland. Its chief advantage is, the check it affords against pilfering. When carried to the machine-room, the wires of the empty board are filled with empty bobbins, anιd, as the bobbins of the machine become charged with silk, they are exchanged for the empty ones of the hoard. which is again carried to the warehouse, that the bobbins may be assorted according to the quality of the silk. The tilled bobbins are exchanged for empty ones, to be carried on the board to the winding machine room, and the same system is followed out in all the different stages of the operation.