BEAM WARPERS

PRINCIPAL PARTS OF WARPERS

ENTWISTLE WARPER

1. Introductory.—Warping, the process that follows spooling, is an important feature of the ordinary method of cotton-warp preparation. As the yarn comes from the spooler, it is taken to the machine known as the **warper,** the object of which is to unwind the yarn from a large number of spools and place it in an even sheet on a beam, which is a cylinder of suitable length with heads at each end. The yarn is then in a more suitable shape for handling in the future processes. Warping is divided into several different classes according to the manner in which the yarn is treated. The class being dealt with at present is known as *beam warping*, from the fact that the yarn as it is unwound from the spools is wound on a beam.

2. The plan on which the warper for beam warping is constructed and operated is simple, as it consists of arranging spools of yarn in a creel so that they revolve with the least possible resistance, while the yarn that they contain is wound on a roll, or beam, rotated by contact with a revolving cylinder. As warpers do not vary much in their general construction, a description of the **Entwistle** will serve as an explanation of all. The special devices will be described later. Fig. 1 shows the creel and warper as they appear when in operation, while Fig. 2 shows a section of the parts

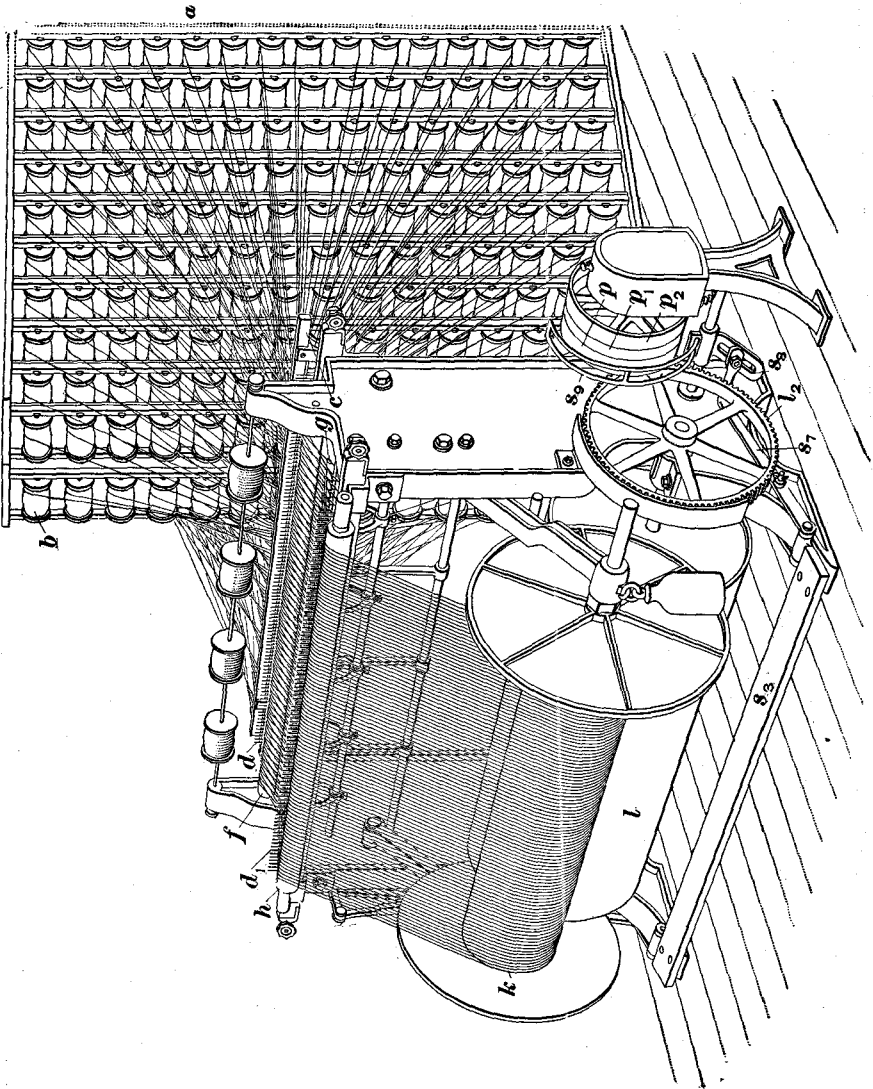

FIG. 1

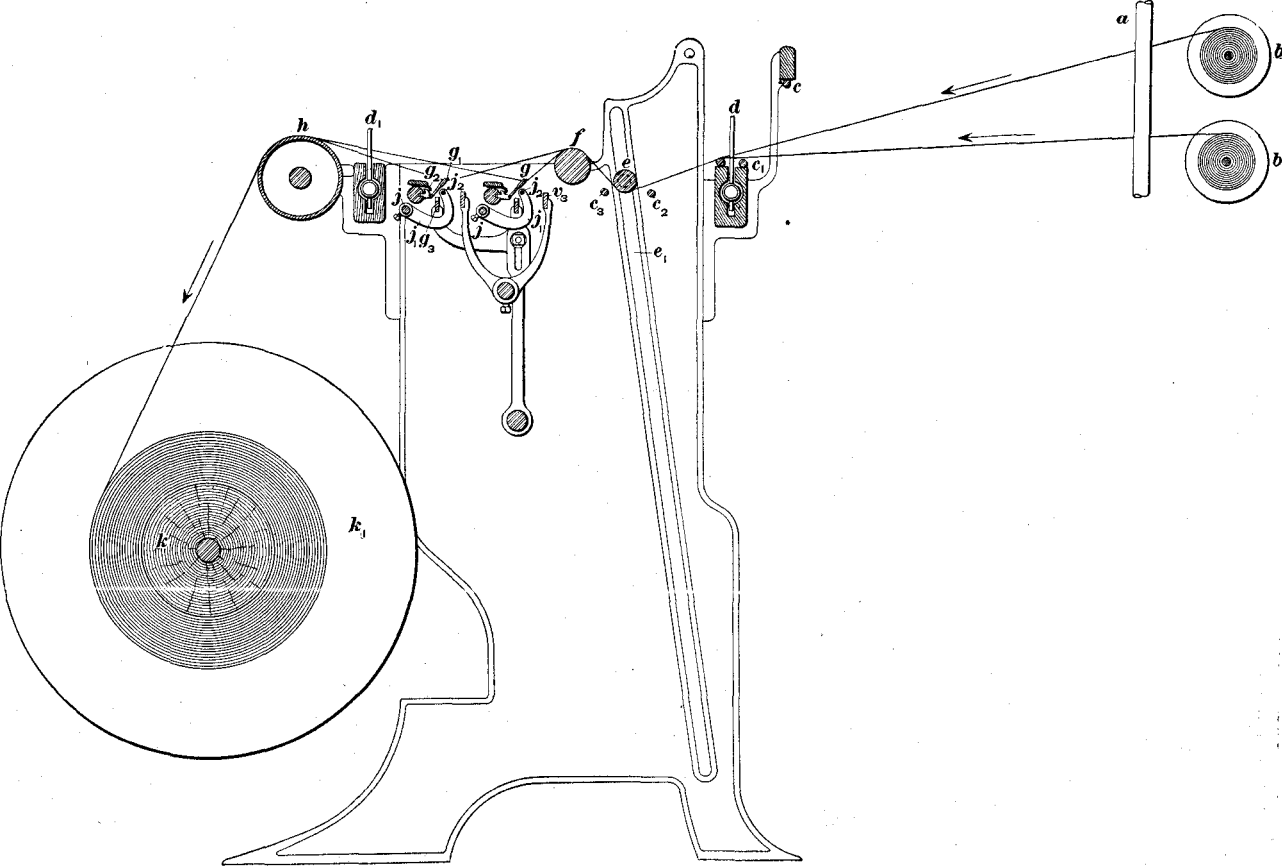

FIG. 2

of the warper with which the yarn comes in contact when passing from the creel to the beam. Referring to these figures, *a* shows the creel that holds the spools *b*. The ends are gathered from the spools and passed between the guide rods c, c_1; they then pass through the expansion comb *d*, under the drop roll *e*, over the guide roll *f*, through the drop wires g, g_1, through the expansion comb d_1, over the measuring roll *h*, and then to the beam *k*, on which they are wound in an even sheet.

3. Warper Creels.—The essential features of all **creels** are to have them so constructed that the different ends will be unwound from the spools without snarling; that the pull on the yarn will be as straight as possible; and that there will be the least possible strain on the yarn. The form most generally used at the present time is known as the **V** creel, shown in Fig. 3. It is so constructed that it holds the spools

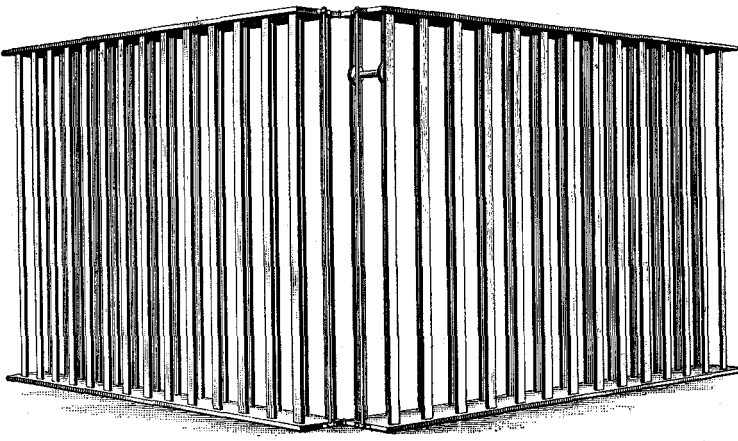

FIG. 3

in tiers; the end from any spool can pass to the warper in as nearly a straight line as possible without rubbing against any other spool. The creels are made of wood but have metal or glass rods on the outside strips to reduce the friction on the threads as much as possible. The ends of the wooden skewers passing through the spools rest in metal or

glass steps inserted in or attached to the side of the framework; by this method the least possible resistance to the turning of the spools is obtained. A glass step is shown in Fig. 4. Creels are usually screwed to the floor, but the distance between the strips supporting the spools can in some cases be changed to meet the requirements of different sized spools. Creels generally have a capacity of 15 spools in a vertical row and 17 in a horizontal row; the creel, consequently, holds 510 spools—255 on each side. Different sizes are, of course, met with, creels with a capacity of 780 spools being sometimes used.

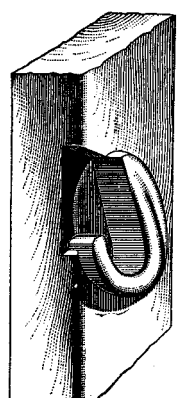

FIG. 4

In passing the ends from the creel to the warper, those from the front of the creel come to the center of the comb *d*, Fig. 2, while those at the right hand of the creel at the back come to the right-hand side of the comb and those from the left of the creel at the back come to the left-hand side of the comb. The first end taken from either side of the creel should be the one from the top spool in the front row on that side, and the ends should then be taken in regular order downwards. When the ends have been taken from the front row of spools in this manner, the second row should be treated in the same way, and so on until the ends from all the spools in the creel have been taken to the warper.

The **V** creel is not the only style used in connection with warpers, as spools are sometimes placed on an almost horizontal creel immediately behind the machine and also on a vertical creel behind this, while for a small number of ends a curved framework is sometimes used.

4. Expansion Combs.—The first important part of the warper with which the yarn comes into contact as it passes from the creel is the **expansion comb** *d*, Fig. 2, shown alone in Fig. 5. It is constructed by inserting wire teeth d_2 through spiral springs d_3, which are held by the rods d_4. A

rod d_6 that passes through the springs d_3 is connected to a thin brass strap d_7 wound around a stud on the hand wheel d_5. These parts are duplicated at the other end of the comb. The tension on the springs d_3 may be increased or lessened by turning the hand wheel d_5, so that the spaces between the wire teeth may be enlarged or reduced, and the fineness of the comb regulated so as to uniformly distribute the sheet of yarn over the whole width of the machine irrespective of the number of ends being run. The center of an expansion comb is usually designated by having the central

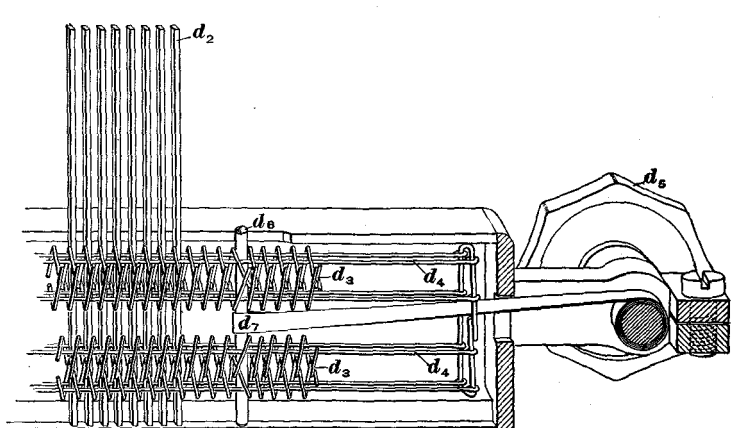

FIG. 5

tooth slightly shorter than the others, so as to readily show where to begin passing the ends through the comb when starting a new set of spools in a warper.

Fig. 2 shows two expansion combs d, d_1 on one warper. In some cases the teeth in the comb at the front of the machine are made of round wire.

5. Drop Roll.—Passing from the expansion comb, the yarn comes into contact with the **drop roll** e, Fig. 2, which takes up any slack yarn that may be let off by the spools and not taken up by the beam. When the warper is stopped for any cause, the momentum of the spools causes considerable yarn to be unwound, which, if not taken care of in some

manner, may become snarled and break when the warper is again started. The roll e is a brass roll having bearings that slide in almost vertical slots e_1 constructed in the inside of the frame. It is supported by the yarn alone, the tension of which is sufficient for this purpose except when the ends become slack owing to the warper being stopped; in such cases the roll drops in its guide slots, taking down the slack yarn and, as the yarn is supported on each side of the drop roll by the rods c_2, c_3, Fig. 2, 6 feet of slack yarn can be taken care of, although the roll drops only about 3 feet. It should be understood that, if a smaller amount of yarn is let off, the roll drops only far enough to take up the slack, when it is again supported by the tension of the yarn.

6. Stop-Motion.—The principal object of a warper is to wind on a beam an even sheet of yarn that consists of the same number of ends at all times. To aid in accomplishing this, all modern warpers are supplied with **stop-motions,** which stop the machine if a single end breaks while passing from the creel to the beam. They also lessen the cost of production by reducing the number of persons necessary to tend the machines, since one attendant is then able to operate from four to eight warpers.

The principle on which the stop-motion is constructed is that of having each end that passes from a spool to the beam threaded through a drop wire, which is either held upright or in some cases entirely suspended by the thread. In case any end breaks, the drop wire that it supports falls and, by suitable mechanism, shifts the belt to the loose pulley and stops the machine. The relative position that these drop wires g, g_1 occupy in the warper is shown in Fig. 2, while the mechanism of the stop-motion itself is shown in Fig. 6. The foot-board s_3, Fig. 6, is pressed by the operator when starting the machine; this turns the shaft s, to which is fastened the lever s_2 carrying the weight s_1; at the same time the rod s_4 is lowered until the notch s_6 drops below a hole in the casting s_5, when s_4 falls to the right and is held in this position, although the weight s_1 is constantly tending to raise the foot-board s_3

and the rod s_4. The cam-bowl r attached to the lever r_2 works in the revolving cam r_1. The rod r_3 being attached to the lever r_2, is given an up-and-down motion and slides in the bearing r_4; when in its normal position it just clears the casting x. At its upper end, r_3 supports the part v by means of a suitable projection. As r_3 is pushed up it takes with it v;

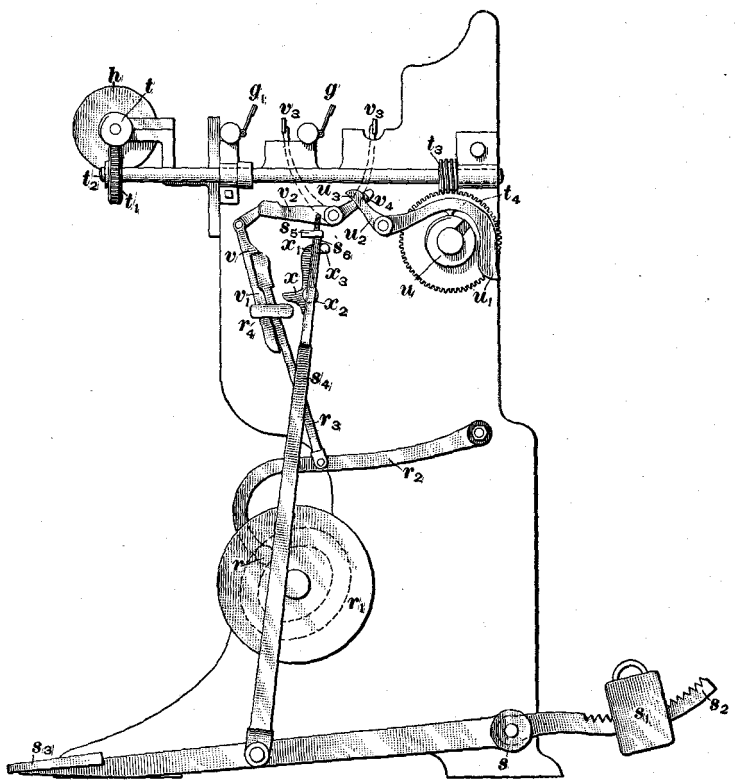

FIG. 6

when, however, it is brought down, it has no other effect on v than to allow it to fall by means of its own weight, which it does if it is not obstructed in any manner. The rod v_2, which works on a shaft on which are fastened the feelers v_3, is connected to v; consequently, as v is worked up and down, it gives an oscillating motion to the feelers v_3. The drop wires