This invention relates to winding apparatus of the kind wherein yarn ends are drawn from individual supply packages in a supporting creel, and wound as a continuous sheet with the aid of a "beam warper" upon beams for convenience of transfer to looms or other textile machinery for further processing. Such beam warpers are ordinarily equipped with automatic mechanical stop mechanism controlled by broken yarn end detecting means located close to the beams on which the yarns are wound. Under these conditions, it is impossible to effect stoppage of the warper before a broken end is taken in and lost on the beam; or, in other words, by virtue of the location of the detecting means aforesaid, there isn't available a sufficient reserve length of the yarn to satisfy overrun of the beam resultant upon sudden stoppage, particularly in view of the tardy action of the linkages, etc., between said detecting means and the stop mechanism.

The present invention, in part, directed toward overcoming the difficulties pointed out by provision, for maintenance, before the creel, of a reserve length in the yarn capable of compensating for the overrun of the warping beam incident to automatic stoppage of the apparatus with insurance against the loss of the broken end or ends.

A further object of my invention is to improve the cooperative action between the stop mechanism of the warper and the coordinated yarn-engaging stop control to the end of securing the above desideratum with increased speed of the apparatus and correspondingly greater productive output.

Still another object is to provide for lateral distribution of the yarns incident to their passage between the supply creel and the warper such that any defective or broken ends may be easily observed and repairs readily made without inconvenience to the operative, and for the further purpose of promoting ready emergence of the yarns into one continuous sheet at the warper.

In the drawings, Fig. I shows more or less diagrammatically, the plan view of a yarn winding apparatus conveniently embodying my invention.

Fig. II is a side elevation of the organization shown in Fig. I.

Fig. III is a partial front view of one of the eye boards which I employ between the warper and the creel to guide the yarns and to support the control instrumentalities for the warper stop mechanism.

Fig. IV is a rear view of the eye board depicted in Fig. III; and,

Fig. V is a section taken locally as indicated by the arrows V—V in Figs. III and IV.

With more detailed reference to these illustrations, 10 indicates comprehensively, the beam warper which, generally speaking, is of standard construction embodying a driving roller 11 with its shaft 12 journaled at opposite ends in the sides of the warper frame 13. Arms 14 having pivotal connection at 15 with the side frames 13, serve to floatingly support the winding beam 16 for maintenance under its own weight, in running contact with the driving roller 11. The stop mechanism 17 (Fig. I) for the warper embodies an electrically-operable trip means 18, which, when actuated, allows a spring 19 to draw the clipper 20 for transfer of the driving belt 21 from the tight pulley 22 to the loose or idler pulley 23. The trip means 18 may be of any approved design, for example, a latch bolt 25 retractable against spring or gravity influence from normal engagement with a lug 26 on the belt clipper rod 27 by means of a solenoid such as conventionally delineated at 28 in Fig. I.

The creel, generally designated by the numeral 30, is longitudinally aligned with the beam warper 10, but spaced therefrom by a liberal interval as shown. This creel 30 is of the sort known in the textile art as a "magazine" creel, with its wing sections 31 disposed to opposite sides of the longitudinal center of the apparatus, and complementarily adjustable angularly to suit various conditions of practice. Each such creel wing section 31 stationarily supports a multiplicity of yarn packages or cones 32 arranged in vertically-spaced horizontal rows and grouped in pairs whereof the two components have their axes convergent relative to common yarn guides 33 located at the focal point. By tying the leading end of the reserve cone 32 to the trailing end of its active companion, it will be apparent that a continuous supply of yarn may be had by successive substitutions when the reserve cones become exhausted, without necessitating stoppage of the apparatus. The use of a creel 30 of the described type is favorable in the present connection, firstly, because it provides continuous supply of yarn, and
secondly, because of its capacity to deliver the yarns "over end" from the stationary packages or cones 32 entirely free from tensile restraint and at very much higher speeds than possible with creels in which the packages or cones are individually rotated bodily by draft induced in the yarns. It is however to be understood that other types of creels 30 may be employed in connection with my invention if desired, or if any special conditions of mill operation should warrant or require it.

As a means to guide the yarn ends on route from the creel 30 to the beam warper 10, I provide, in accordance with my invention, supplemental boards 33, associating one such with each of the creel wings 31. These boards 33 are sustained in a vertical position, contiguous to the front end of the creel 30, with capacity for relative adjustment transversely of the apparatus in the interval between said creel and the warper 30, by means of positionally fixed upper and lower channel guides 36, 37. In their construction, the boards 33 comprise frames 38 that perimetrically engage and sustain inset panels 39 of insulating material; and, at levels corresponding to the elevations of the several horizontal yarn package rows in the creel 30, said boards are equipped with transverse lines of uniformly-spaced guide eyes 40 through which the yarn ends from the respective rows of cones 32 are led and incidentally distributed laterally for mergence subsequently into one continuous sheet in rounding the guide rods 41, 42 in advance of the leading reed 43 of the warper 10. In order to facilitate access to opposite sides of the boards 33 for the purposes of ready threading, elongated horizontal openings 44 are provided between adjacent rows of the eyes 40, see Figs. III and IV. At the back, and beneath each row of guide eyes 40 the boards 33 are further equipped with serially-arranged electric stop control instrumentalities 45—to a corresponding number— which are fulcrumed upon a common pivot rod 46 supported by a bracket plate 47. These control instrumentalities 45 are preferably fashioned to the angular configuration shown in Fig. V from stout wire, with loops at their outer ends for suspension individually by the yarns in an interval between the guides 40 and a directional guide rod 48.

When released consequent upon yarn breakage, the controls 45 drop to the dotted line position shown in Fig. V, thereby electrically bridging the bracket plate 47 and a spaced parallel contact plate 49 immediately therebelow. As shown in Figs. III and IV, the bracket and contact plates 47, 49 of the several groups of controls 45 are respectively connected in parallel by conductor strips 50, 51 that extend to terminal posts 52, 53 at the fronts of the boards 33.

The operation of the apparatus is as follows: With continuous movement of the driving roller 11 in the beam warper 10, the yarns are continuously drawn from the creel 30 and wound upon the driven beam 16. Immediately upon rupture of one of the yarns at the creel 30, the corresponding electric control 45 effects closure of the circuit through leads 54, 55 (Fig. I) and energization of the solenoid 58, which actuates the trip means 18 associated with the stop mechanism 17 of the warper 10, thereby causing stoppage of the apparatus with current supplied by conductors 56, 57 extending from a suitable source of electricity, not shown. As a consequence of the uniform separation and lateral distribution of the yarns at different levels by the boards 33, the usual difficulty of locating broken ends is obviously entirely avoided. Moreover, the liberal spacing of the warper 10 and the creel 30 when taken in connection with the allocation of the stop controls 45 on the eye boards 33 in close proximity to the creel 30, provides an ample reserve before the warper 10 so that the apparatus can be safely operated at high speeds without danger of the broken yarn ends becoming lost on the winding beam 16 incidentally to sudden stoppage, in the manner hereinbefore explained.

Having thus described my invention, I claim:

1. The combination in yarn winding apparatus embodying a beam warper with electrically-controlled automatic stop mechanism, and a creel to support a multiplicity of individual yarn supply packages in vertically-spaced horizontal rows; of a board of insulating material interposed transversely of the apparatus in a spatial interval between the warper and the creel, said board being equipped with horizontal lines of yarn guide eyes at levels corresponding to the elevations of the horizontal rows of yarn packages in the creel, and, in association with each line of guide eyes, a set of serially-grouped yarn-engaging stop control instrumentalities pivotally engaging a common axis on a fulcrum bracket plate for capacity, when released through yarn breakage, to electrically bridge the bracket plate and a contiguous cooperating contact plate, the two groups of plates being respectively connected in parallel in the circuit through the stop mechanism aforesaid.

2. The combination in yarn winding apparatus embodying a beam warper, and a creel with angularly adjustable wings each supporting a multiplicity of individual yarn packages; of supplemental insulating-material panels for association respectively with the wings of the creel, said panels supporting the yarn engaging stop controls of the respective wings and being disposed transversely of the apparatus in a spatial interval...
The combination in yarn winding apparatus embodying a beam warper, and a creel to support individual yarn supply packages; of relatively-adjustable boards disposed transversely of the apparatus in a spacial interval between the warper and immediately contiguous the creel, mounted on the rear face thereof capable, upon being released incidental to yarn breakage, of causing instantaneous closure of the circuit through the stop mechanism aforesaid to bring the apparatus to a standstill with the broken yarn visible in advance of the warper.

8. The combination in yarn winding apparatus embodying a beam warper, and a creel to support a multiplicity of individual yarn supply packages in vertically-spaced horizontal rows; of relatively-adjustable boards with yarn engaging stop controls mounted thereon, each said board being arranged transversely of the apparatus in a spacial interval between the warper and immediately contiguous the creel, and any overrun of the warp beam satisfied from the reserve aforesaid without entailing loss of such broken end.

9. The combination in yarn winding apparatus embodying a beam warper, and a creel to support a multiplicity of yarn supply packages in vertically-spaced horizontal rows; of relatively-adjustable insulate-material panels disposed transversely of the apparatus in a spacial interval between the warper and immediately contiguous the creel, each said panel being equipped with horizontal lines of yarn guide eyes and associated yarn engaging stop controls at levels corresponding to the elevations of the yarn package rows in the creel.
10. The combination in yarn winding apparatus embodying a beam warper, and a creed to support a multiplicity of individual yarn supply packages in vertically-spaced horizontal rows; of relatively-adjustable insulate-material panels interposed transversely of a special internal between the warper and immediately contiguous the creed, each said panel being guided for movement in positionally fixed channel guides and indvidually equipped with horizontal lines of guide eyes and associated yarn engaging electrical stop controls mounted on a common axis at levels corresponding to the elevations of the horizontal yarn package rows in the creed, and having openings between the lines of guide eyes and stop controls permitting access to opposite sides of the board locally to facilitate threading.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 12th day of November, 1926.

GEORGE B. COCKER.