S. W. WARDWELL.

CREEL.

APPLICATION FILED MAR. 22, 1905.

1,022,283.

Patented Apr. 2, 1912.

2 SHEETS—SHEET 1.

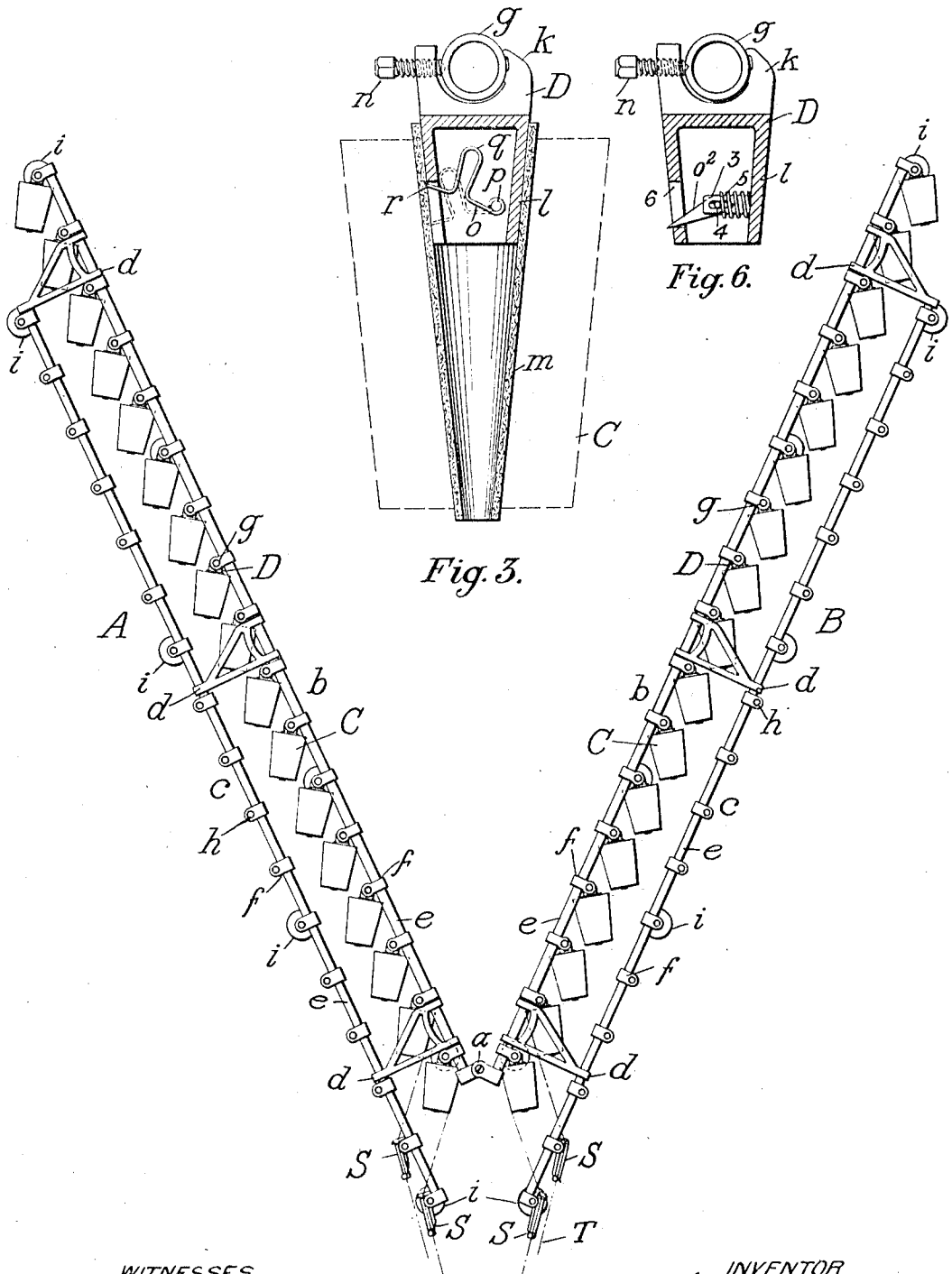

Fig. 3.

Fig. 6.

Fig. 1.

WITNESSES

INVENTOR

BY

ATTORNEYS

S. W. WARDWELL

CREEL.

APPLICATION FILED MAR. 22, 1905.

1,022,283.

Patented Apr. 2, 1912.

2 SHEETS-SHEET 2.

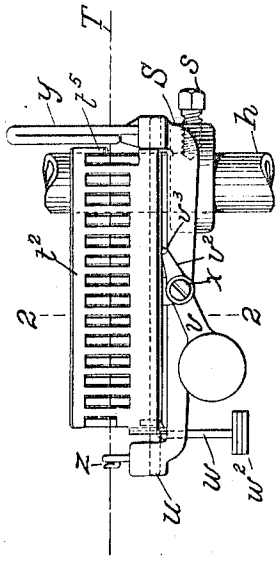

Fig. 4.

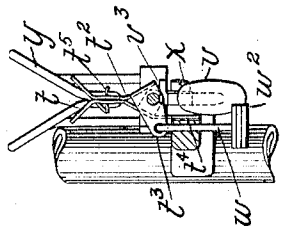

Fig. 5.

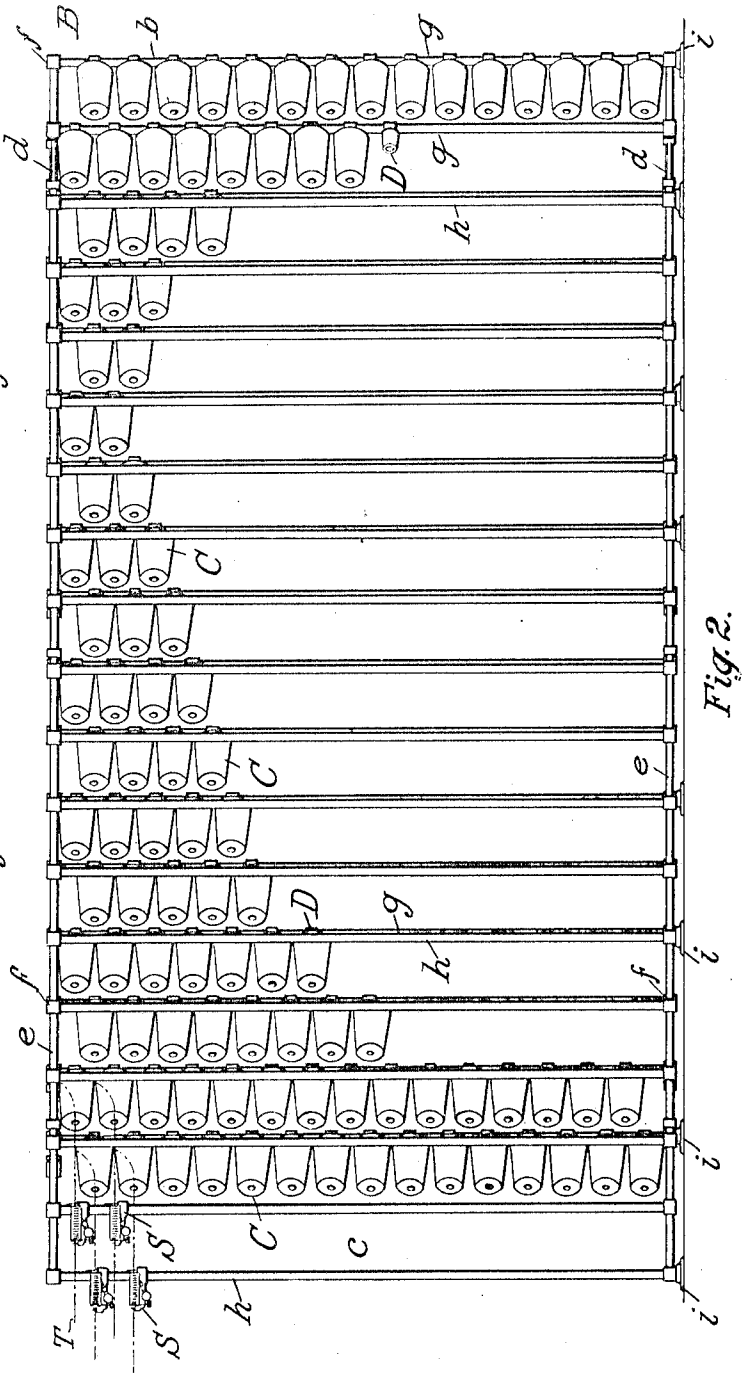

Fig. 2.

WITNESSES

H. M. Gillman, Jr.

Arthur L. Ryan

INVENTOR

Simon W. Wardwell

BY Foster, Freeman & Watson

ATTORNEYS

UNITED STATES PATENT OFFICE.

SIMON W. WARDWELL, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO UNIVERSAL WINDING COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

CREEL.

1,022,283. Specification of Letters Patent. Patented Apr. 2, 1912.

Application filed March 22, 1905. Serial No. 251,485.

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, a citizen of the United States, residing in Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Creels, of which the following is a specification.

My invention relates to improvements in creels for delivering yarn to warping or other machines.

The object of my invention is to increase the capacity of the creel within a minimum floor space, to increase the rate of delivery of the yarn, and to provide for a uniform tension of the yarn, eliminating all breakage and strain and unevenness of delivery.

The following is a description of the invention, illustrated by the accompanying drawings, in which:

Figure 1 is a plan view of the creel; Fig. 2, an elevation of one wing of the creel taken at right angles thereto; Fig. 3, an enlarged sectional view of the cone support or holder; Fig. 4, an enlarged side view of the tension device; Fig. 5, an end view of the same, part sectional on the line 2—2, Fig. 4. Fig. 6, a modification of the cone holder.

The creel as shown has two wings A and B, preferably hinged together at *a*, so that they may be adjusted to set at different angles to vary the direction of the lead of the yarns. The creel is preferably made of gas-pipe or tubing to render it light and strong, and each wing comprises two connected frames *b* and *c*. Each frame is composed of two horizontal rods or pipes *e e* and vertical rods or pipes hereinafter referred to. On the horizontal rods are disposed at equal intervals the connections *f f*, etc., retained by set screws or other suitable means, and bored to receive the ends of the vertical pipes *g g*, *h h*, etc. The vertical pipes may be threaded and screwed into the connections or simply fitted to the bores and held by set screws. The frames or grids *b* and *c* are set parallel to each other, slightly apart, and braced by the brackets *d d* extending between the horizontal pipes. A suitable number of the vertical pipes of each frame extend through the connections *f f*, etc. at the bottom below the horizontal pipe; and screwed to the ends of these are flanges *i i*, etc., forming feet on which the frames rest on the floor. These flanges may be screwed to the floor or the frames may be braced to stand without fastening, through any suitable means. The inner frames or grids *b b* support the cones C C, etc., arranged each at an acute angle to the frame by means of holders D D, etc., shown in detail in Fig. 3, fastened to the vertical pipes *g g* and arranged one above the other just sufficiently apart to admit the full cones. The cones in alternate rows are preferably arranged in a staggered relation, as shown in Fig. 2, to give a more compact disposal while providing clearance for the yarns.

The cone holder is shown in its preferred form in Fig. 3, and consists essentially of a bracket portion *k*, forked or recessed to receive the rod or pipe *g*, and a conical mandrel *l*, adapted to receive the paper or fiber shell on which the cop is wound. The mandrel *l* preferably does not extend the whole length of the tube, but is just long enough to provide a firm bearing for the tube and is of hollow section to contain the holding device. The bracket *k* is clamped to the rod or pipe *g* by the set screw *n*, and I have found it best to provide suitable counterbores in the pipes to receive the pointed ends of the set screws, thus determining the proper positions of the holders. Any suitable means might be used to retain the cone on its holder, but I prefer to employ the improved device now described.

It will be obvious that where so great a number of supplies is used as here required a saving of time in placing the cones and in doffing the empty tubes will be of material advantage. With this object in mind, I have provided a simple and effective means whereby the cone is simply pushed onto its holder and by its own movement is engaged by a retaining device which secures it firmly in place. When the yarn on the tube is exhausted, the operator doffs it by simply drawing it off the holder. This is effected through the element of a yielding, swinging dog *o* preferably formed of flat spring metal having one end hinged on the pin *p*, the latter secured in the interior of the hollow mandrel *l*. The dog *o* is formed with a U-shaped bend *q* midway between its ends to give the required resiliency, and the free end projects through an opening or slot *r* in the shell of the mandrel, being sharpened to engage the inside of the cone tube *m*. The dog *o* is normally in the position indicated by dotted lines, so that when the cone is pushed

onto the mandrel, the dog projects into the tube m and is swung back past the pivot point so that it dogs and holds the tube firmly against jarring off or accidental displacement from other causes. When it is required to doff the tube, a sharp pull overcomes the pressure of the dog, and the tube is released, its movement carrying the dog forward into its original position, shown by dotted lines.

A modification of the cone holder is shown in Fig. 6, in which the dog o^2 is a thin piece of metal pointed at one end and mounted in a slot in the stud 3. A pin 4 fastened in the dog extends through a second transverse slot in the stud 3 and a coiled spring 5 surrounding the stud, bears on the pin to press the dog outward. The pointed end of the dog extends through an opening 6 in the mandrel l which limits the movement of the dog. The action of this device is essentially the same as that of the one previously described. The dog engages the inside of the tube, and is swung past the pivot point by the movement of the tube onto the holder, the pin 4 sliding in its slot and compressing the spring 5.

It will be realized that the placing of the cones on the creel requires no skill or care on the part of the operator. Other cop holding devices known in the art depend upon some manual operation other than the mere placing of the cop to secure it in position, as, for instance, twisting it on its seat or screwing it onto the mandrel, or fastening it by manipulating levers, springs or dogs. In my device it is only necessary to place the cop in position and the securing is effected automatically, so that there is no danger of the cone becoming loose and falling off through carelessness of the operator in fastening it. Besides this, a considerable saving in time is accomplished.

It will be understood from the drawing, see Fig. 1, that the frame or rack which supports the cones is positioned back of the frame supporting the tension devices. The cones are set with their axes in line with the receiving points of the tensions, and the latter are so adjusted that the yarns from one wing are directed to converge toward those of the other, to meet at the warping or other machine. By adjusting the angle of the wings of the creel, the yarns may be laid in different widths to adapt them for different lengths of beams, suitable rolls or guides, not here shown, being provided on the warping machine to direct the yarn onto the beam.

An important feature of my invention is the improved tension device whereby a constant tension is maintained upon the separate yarns despite the irregularities of delivery of the cop. Experience and extended practice have determined that there is but one correct method of applying tension to delivering yarns. This is the system whereby the applied tension automatically compensates for variations in the resistance to delivery of the cop. This method is only applicable through the agency of the means now described, and the essential feature of this means is the arrangement of elements or members to close onto the yarn running between the members. It will be recognized that the resistance to delivery of the yarn is subject to varying conditions in the cop. When the cop is full, the yarn delivers with comparatively little resistance, owing to its large diameter and the considerable amount of yarn contained in each coil, but when the cop is reduced in diameter, the coils contain much less yarn and, consequently, must uncoil much faster. This increase in the speed of unwrapping of the coils throws the yarn outward from centrifugal force, producing what is termed ballooning. The ballooning of the yarn is met by an atmospheric pressure which sets up a considerable resistance to the delivery of the yarn. In this way the resistance to delivery of the yarn from start to finish of the cop is increased materially, and it will be seen that the tension device must be very sensitive to this change and must adjust itself to maintain an ultimate uniform tension on the yarn. But, with the usual tension devices known in the art, this effect cannot be reached. When the yarn is carried over a pad or interlaced over fingers, hooks or equivalent devices, every increase in resistance to delivery in the cop is added to or multiplied by the tension device. That is, if a yarn is being drawn from the cop with a given resistance on the cop, and a given tension is being applied, the instant the resistance of delivery increases, from the causes before mentioned, the applied tension also increases so that there is not only the added resistance of the cop but, besides this, there is the added resistance of the tension device. Again, when the yarn is delivering from the cop with comparatively little resistance, it passes through the tension device with proportionately small resistance so that it must be obvious that all variations in the incidental or primary resistance of the yarn being delivered from the supply cop are magnified after the yarn has passed through the tension device. In my device, the opposite of this is true. As before mentioned, the tension is maintained on the yarn by applying pressure to carry the two members between which the yarn runs toward each other. The tension members are formed with parallel bars, the bars of one alternating with those of the other, and are supported to be moved toward each other. The preferable mode of accomplishing this is to support one member fixedly and to hinge the other to swing toward the

fixed member. By this arrangement, the bars of one member may be adapted to pass by the bars of the other member slightly so that a sinuous course is imparted to the thread passing between the bars, and the amount of tension to be applied may be regulated by adjusting the amount of weight or other force acting to swing the movable tension. When the yarn passing between the tension members receives a check to its delivery at the cop, it tends to straighten its course, reducing the sinuosity. The tension members open to accommodate the straightening of the yarn, and their pressure on the yarn is decreased because the yarn, passing through the tensions straight, meets with less resistance owing to the less contacting surface. In this way the applied tension is decreased to correspond with the increase of the incidental resistance in the cop, and when the initial resistance of the cop decreases, the tensions close again to compensate for this change. It will be seen that the ultimate tension on the yarn remains practically uniform throughout the delivery notwithstanding the variation set up by the cop.

The arrangement in general is similar to that described in my Letters Patent No. 792,093, granted June 13, 1905. A bracket S, see Fig. 4, is adapted to be clamped to the rod or pipe h by the screw s, the point of the screw entering a counterbore in the pipe to locate the bracket in its proper position. The fixed tension member in the form of a plate or grid t is supported opposite the similarly formed movable member t^2, both plates having ears at either end, through which the rod u extends, the latter held in lugs at the ends of the bracket S. The ear t^3 of the plate t^2 overhangs the bracket S and a rod w hooks into it, the rod having a double bend allowing it to enter a hole in the ear and then engaging the ear with its shoulder when the rod hangs vertically. The rod w is adapted to support the weights w^2, their number being varied at will to adjust the tension on the yarn. The fixed tension is held rigid by the ear t^4 fastened to the bracket S. Both tension plates flare outward along their outer edges, providing a trough for the ready entrance of the yarn T; and a finger t^5 at one end of the movable plate extends obliquely downward, and then, returning, crosses the plate at substantially right angles. This finger serves two purposes: When the yarn T is drawn across it in entering the tensions, it acts as a wedge to open the tensions to admit the thread, and after the yarn is carried down beyond it and the tensions close again, the cross-bar acts as a guard to prevent the yarn from whipping or flying out. The fixed tension plate is held by a stud x passing through the ear t^4 into the bracket, and this stud serves the additional purpose of a bearing for the weighted lever v. This lever has a weight on one side of the fulcrum, and an arm v^2 at the opposite end which normally engages the under side of the rod u to limit the movement of the lever. When the movable tension plate t^2 is swung clear open by the yarn acting on the finger t^5, the lower edge of the plate engages the lug v^3 on the arm v^2 and rocks the lever v, lifting its weighted end. After the yarn has been drawn down beyond the finger t^5, the plate t^2 is released, and the weight on the lever v acts to swing it back to the perpendicular, where the pressure of the weights w^2 then acts to close it onto the yarn. This is an important feature, for with light yarns it is only required to use so light a weight on the rod w that it would not be sufficient to overcome the weight of the plate when the latter had been swung open beyond the perpendicular. It is pointed out that the lever v does not bear on the plate t^2 when the latter is in operative position, being limited by the rod u, but only serves to bring the plate close to the yarn, all the pressure being applied through the weights w^2 attached to the arm t^3. Besides operating to automatically close the tensions, the lever v serves another purpose: that of preventing undue chattering or vibration of the movable plate. Yarns vary in size and have bunches, slubs or knots, and when these enlarged portions pass through the tensions, the latter open to accommodate them. The sudden impact of the bunch on the movable plate is apt to swing the plate open too far, relieving the yarn of all tension, and when the plate returns, its momentum increases the effect of the normal pressure unless some means is provided to limit such undue movement of the plate t^2. The lug v^3 on the lever v permits the tension plate to swing open just far enough to pass the bunches or knots in the yarn, but excessive movement is prevented by the inertia of the lever v when the plate strikes the lug v^3.

It will be evident that there may be different arrangements of pressure devices whereby one acts to apply tension to the thread under general conditions and the other to move into normal position the movable element of the tension device when said element has been displaced or carried to an extreme position.

At the receiving end of the tension device is a guide y formed of wire bent in a loop having a narrow opening in line with the opening between the tension members. From this loop the wire extends outward in a V-shaped opening, the ends being then bent back and driven into holes in the bracket S. At the opposite or delivery end of the tensions, a suitable pig-tail or eye z is provided to guide the yarn.

The operation of threading the tensions is very simple, it being only necessary to carry the yarn down into the guide *y* and across the finger t^5. The pressure of the yarn on the finger opens the tensions and admits the thread which is then passed through the guide *z* to the take-up device which may be the warping or other machine. It will be appreciated that this provision for ease and despatch in threading the tensions is most important, for, in manipulating the yarns from several hundred supply cops, considerable time is saved. Other arrangements where the yarns must be passed through or around several eyes or hooks require the expenditure of much time and pains on the part of the operator, and are not adapted for the use here described, it being obvious that, should one of the yarns become broken or snarled, it would be a difficult, almost impossible task to find and thread it up again among such a mass of yarns.

Having described my invention in detail, I will now state briefly the method of operation. The creel is adjusted with the tensions directed toward the beam of the warping mechanism and the cone-holders or mandrels pointing toward the receiving points of the tensions. Starting with the row of mandrels nearest the front of the creel, the operator places the cones onto their holders, and the latter are automatically gripped and held in place. The yarn is passed from each cone through its appropriate tension devise, disposed directly in line with the axis of the cone, and the end is then ready to deliver to the warping or other machine. This operation is continued until the proper number of cones are placed on each wing of the creel, and the ends are then gathered up and carried over suitable guiding rolls to the beam.

It will be appreciated from the foregoing description that the form and arrangement of my creel renders the manipulation of the supplies exceedingly convenient. The frame is low enough to bring the upper row of cones within the easy reach of operators of small stature, and by passing along the sides of the creel every cone is accessible, both from the inside or outside. Besides this, the arrangement shown provides for compacting the maximum amount of yarn within a given space, and the saving of floor space is considerable. The yarn can be drawn off the cones at a practically unlimited speed, and the efficiency of the tension device provides for a constant tension on all the yarns.

While I have shown the preferred arrangement of the creel with the cops C C mounted on the rear frames *b b* and the tension devices supported on the forward frames *c c*, this arrangement might be reversed. That is, the cops C C could be mounted on the frames *c c*, and the tension devices on the frames *b b* so that the creel would face in the opposite direction with its open end toward the warping machine. Again, one set of frames might be dispensed with by supporting the cops on the frames *b b* constituting the rear support and mounting the tension devices on arms extending from the rods of said frames and constituting the outer support; but with this arrangement it would be necessary to dispose the cones farther apart to provide room for the tension holding arms to extend between them, and the creel would not be nearly so compact. Besides, it would not be so convenient to place the cops on the creel and to manipulate the yarns, because the arms would be in the way. The creel would not be so firmly supported either; so, considering all points, the arrangement first described and illustrated is considered preferable.

While creels have been used consisting of frames arranged at an acute angle, the yarn has passed directly from spools on said frames and not through tension devices forward of the spools, the tension being applied to the spools; and while cops have been arranged in creels and the yarn conducted to tension devices forward of the cops, the yarn in such cases has passed in lines at right angles to the frames.

By the arrangement which I have adopted with the tension devices forward of the spools in a V-shaped creel, I secure the advantages of applying tension to the yarn by setting the cops at an acute angle to the frame, and by carrying the yarn from the cop at an acute angle to the frame to the tension device set opposite the end of, or in line with the axis of, the inclined cop, I secure a greater space between the cop and tension device, and a greater length of yarn between the two to allow of the proper ballooning of the thread, which, when the yarn passes in lines at right angles to the frame, would require the tension supports and cops to be placed a much greater distance apart and require a much greater floor space, necessitating also the placing of the creel frames at right angles to the lines of thread delivery.

I do not here claim the construction of the tension device by itself, but only the arrangement of an automatically adjustable tension device in combination with a creel of the form here shown.

What I claim is:—

1. The combination in a V-shaped creel, of two sets of parallel frames, each frame comprising two horizontal rods and a plurality of vertical rods arranged parallel to each other and supported on the horizontal rods, of cop holders supported on the vertical rods of the rear frames and adjustable

up and down and around the rods, and tension devices supported on the rods of the forward frame and adjustable up and down and around said rods to aline them with the cop holders.

2. A knock-down creel having wings arranged at an acute angle to each other, each wing consisting of two frames and each frame comprising two horizontal rods and a series of parallel vertical rods, means on the horizontal rods to secure them to the ends of the vertical rods, brackets secured to the horizontal rods of one frame to support it in relation to the opposite frame, hinged joints to connect the adjacent ends of the two wings, cop supports having brackets adapted to be removably secured to the vertical rods of one frame, and tension devices having brackets adapted to be removably secured to the vertical rods of the opposite frame.

3. A creel having two sets of parallel frames, holders arranged to support cops to deliver over their ends, means for securing each holder to adapt it to be adjusted at an acute angle to the rear frame, tension devices supported by the front frames and means to adapt the tension devices to be adjusted to aline with the axes of the cops supported on the holders.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON W. WARDWELL.

Witnesses:
THOMAS M. CHILDS,
ARTHUR I. HARVEY.