Oct. 14, 1941. W. REINERS ET AL 2,259,079

CREEL MECHANISM OF WARPING FRAMES

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Fig. 1.

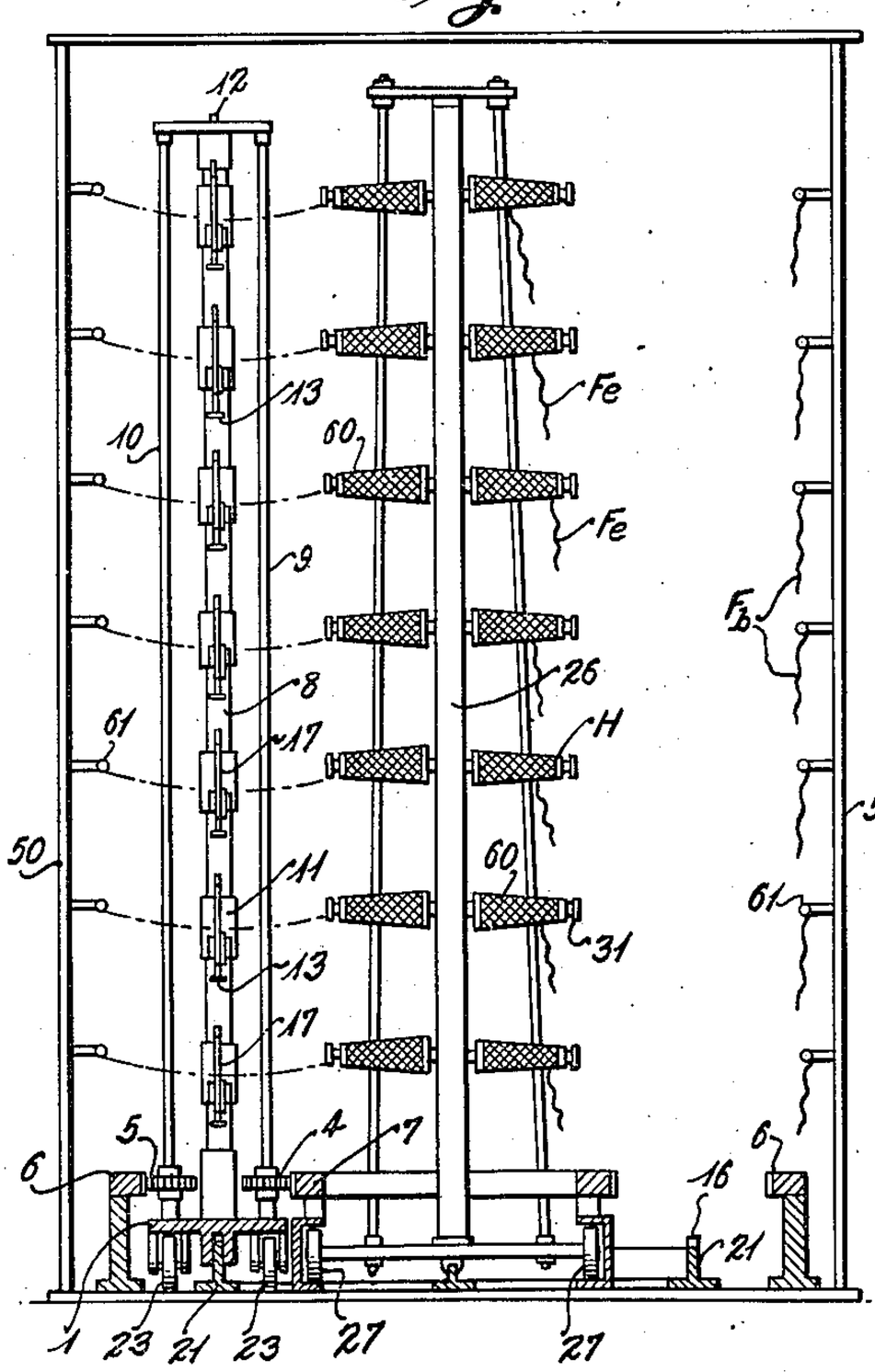

Fig. 3.

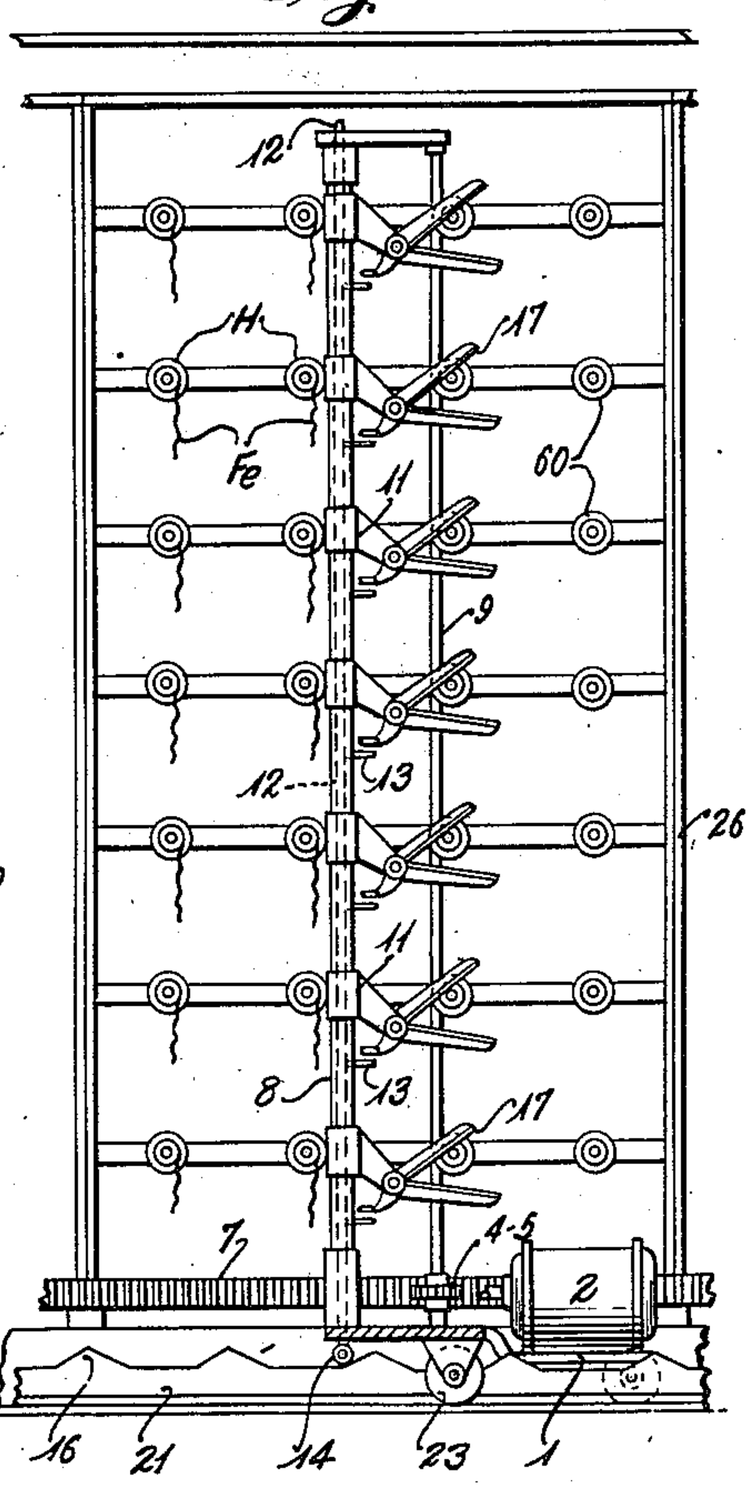

Fig. 2.

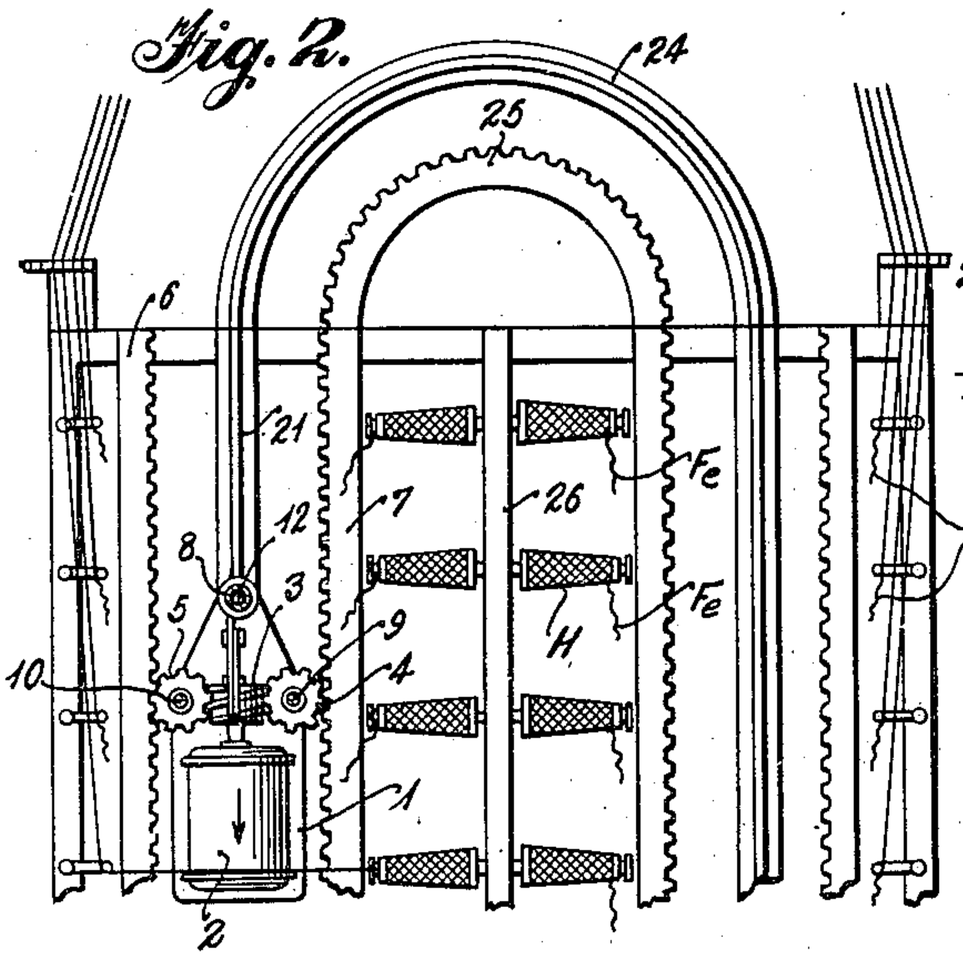

Fig. 9.

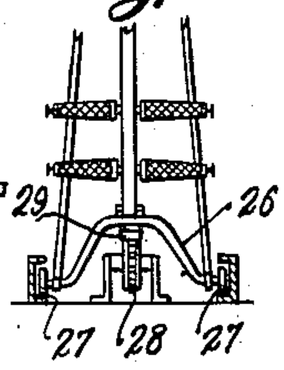

Fig. 10.

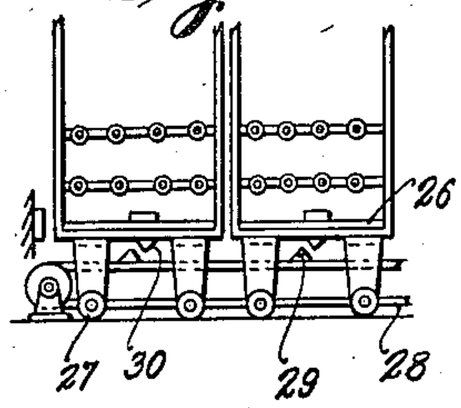

Fig. 8.

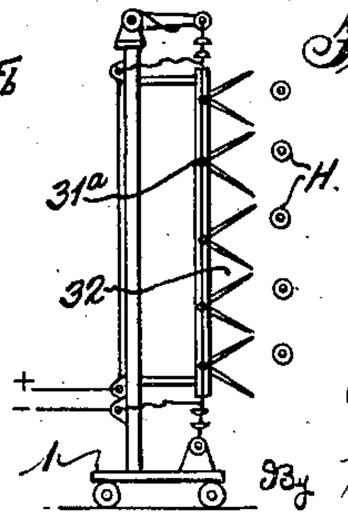

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Fig. 4.

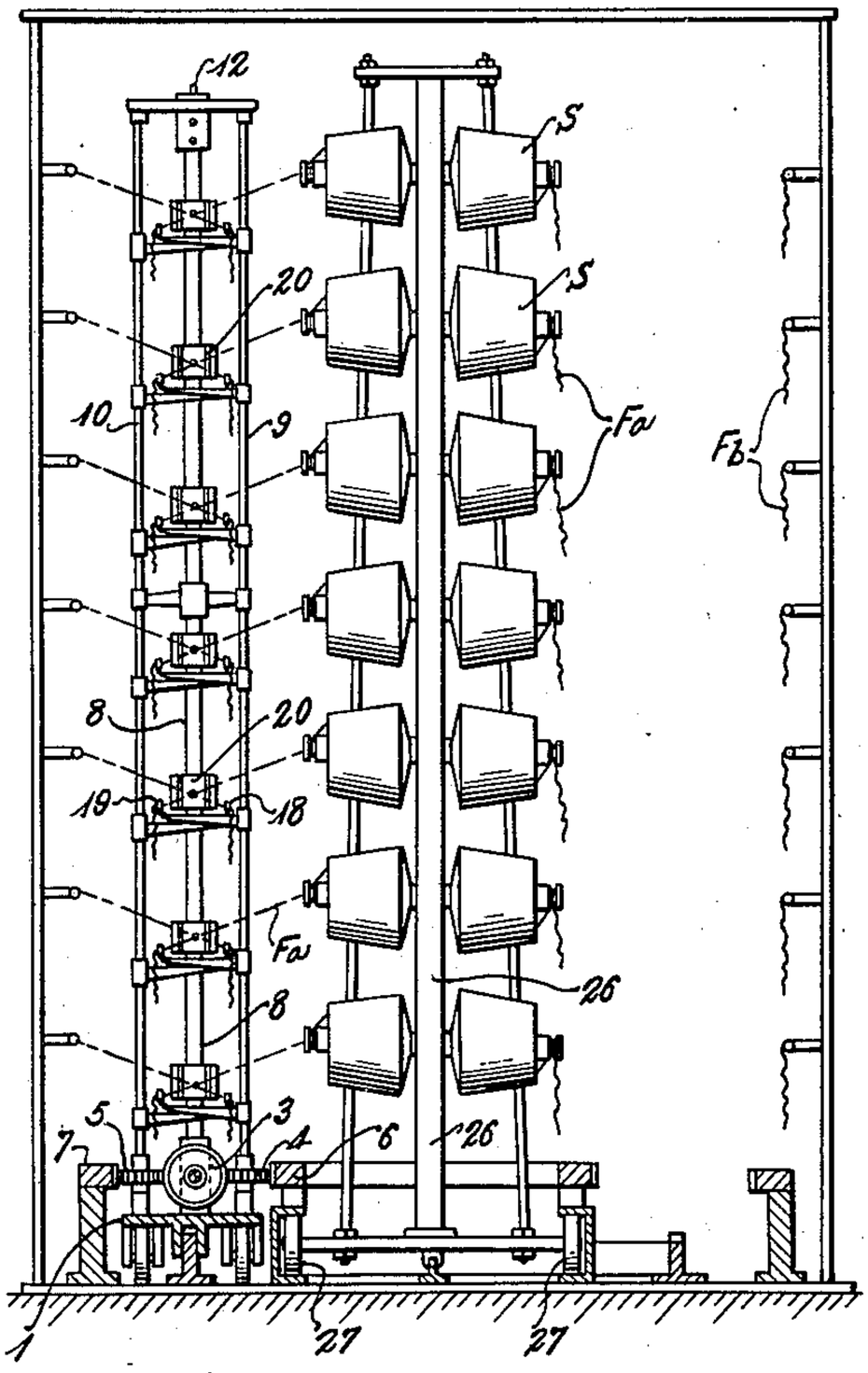


Fig. 6.

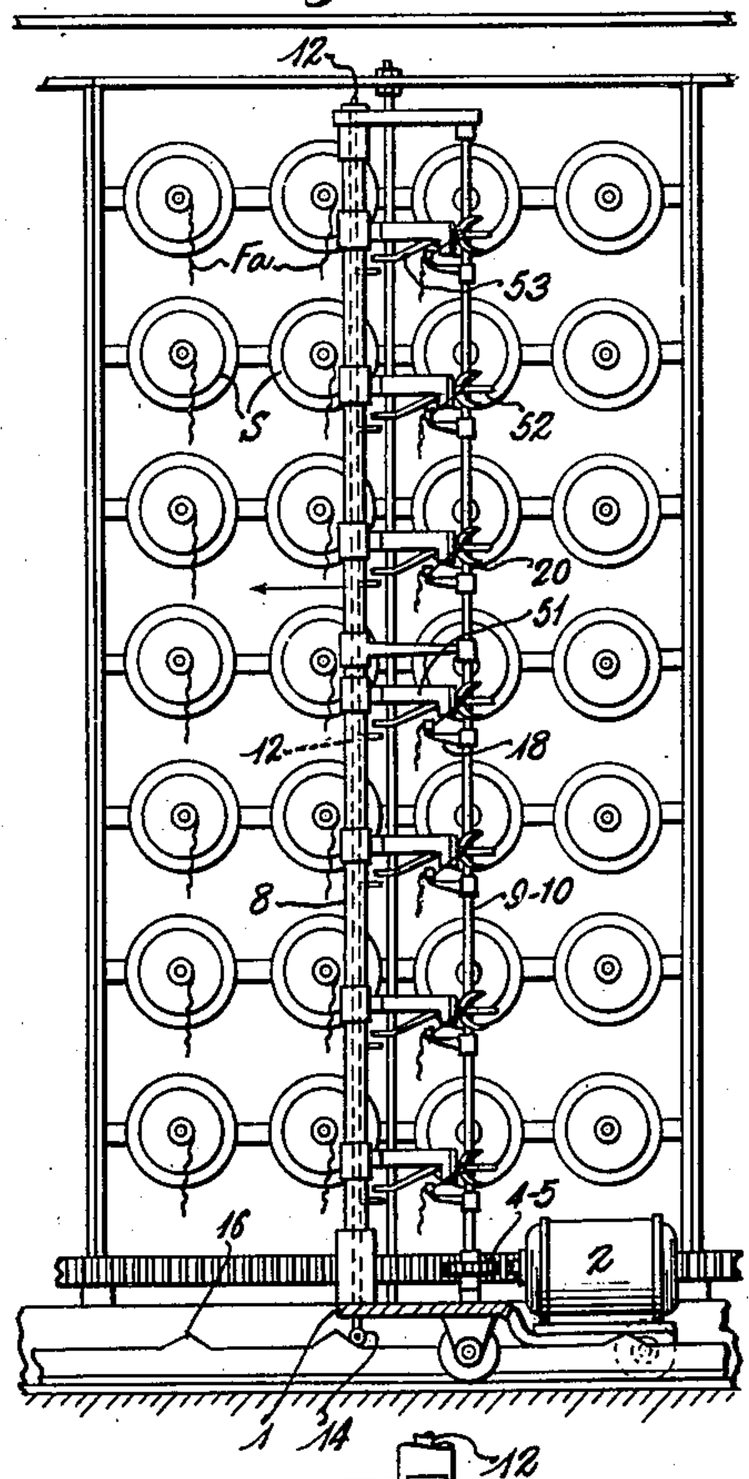


Fig. 5.

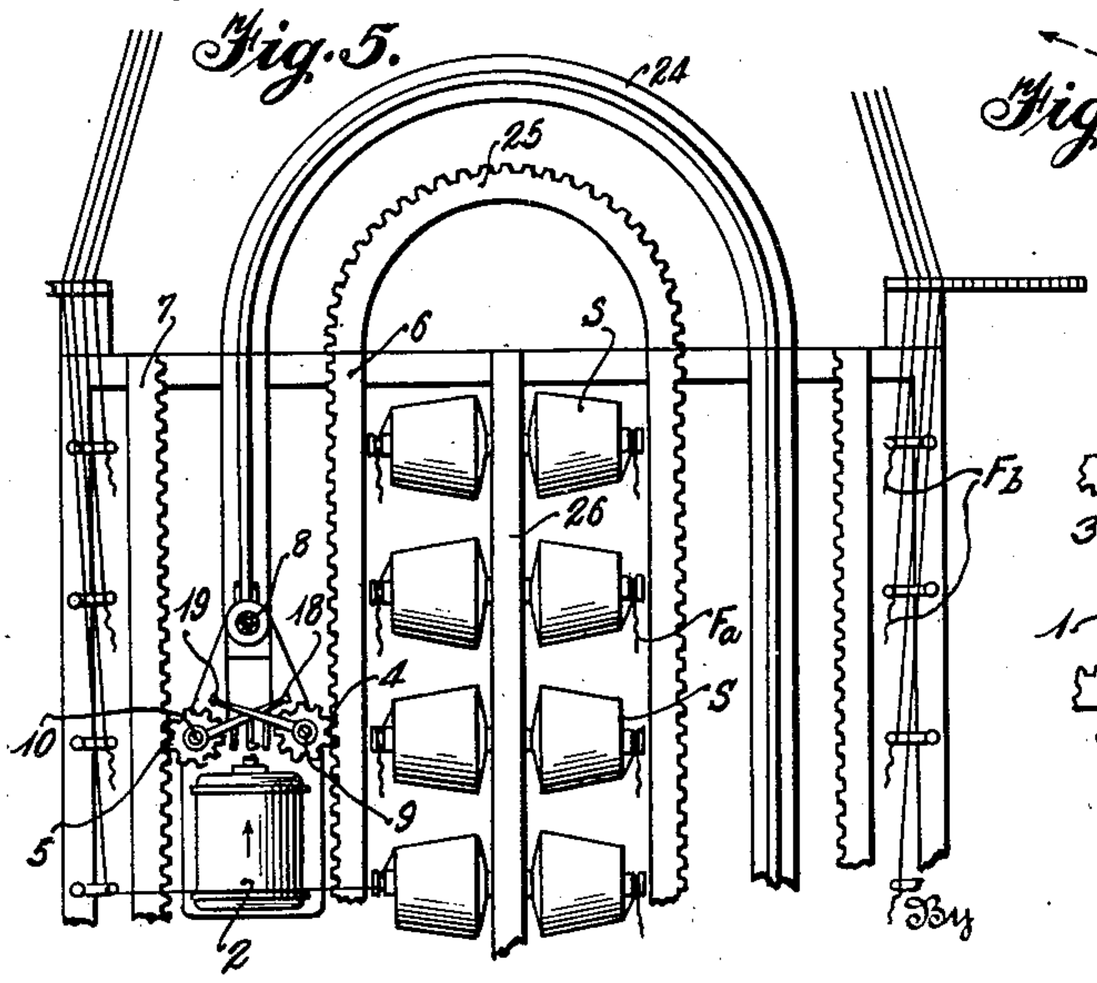


Fig. 4a

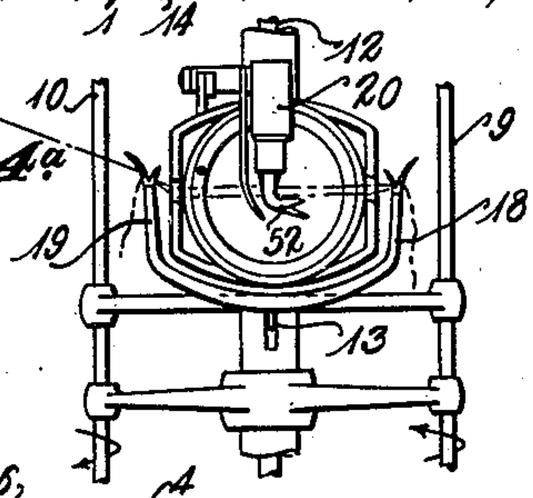
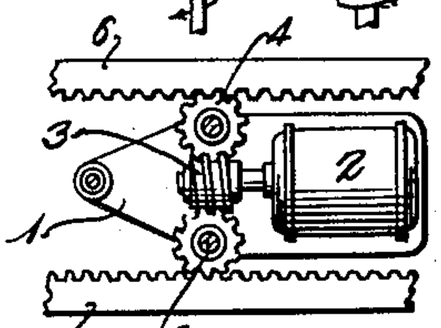


Fig. 7.



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CREEL MECHANISM OF WARPING FRAMES

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Fig. 11.

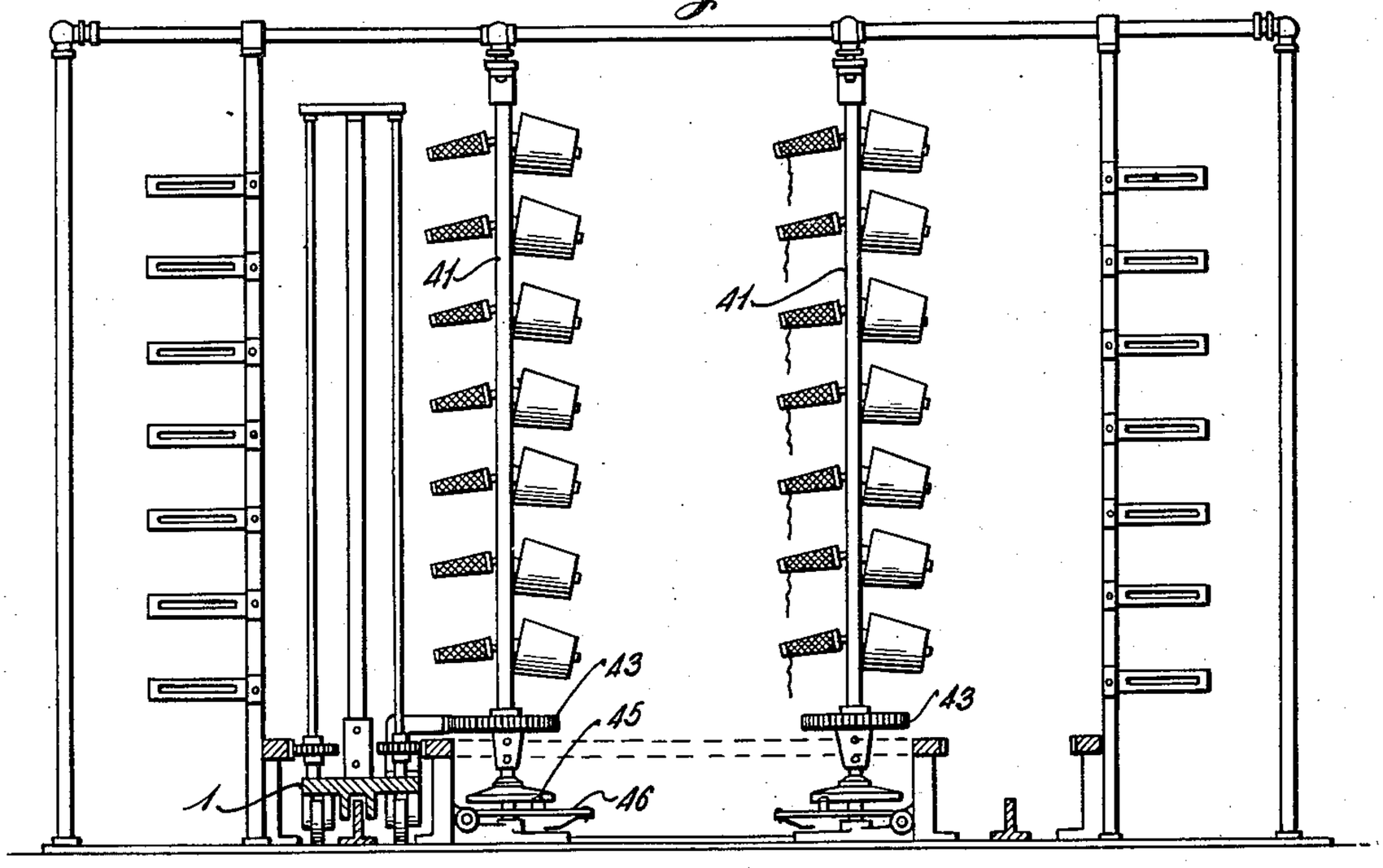
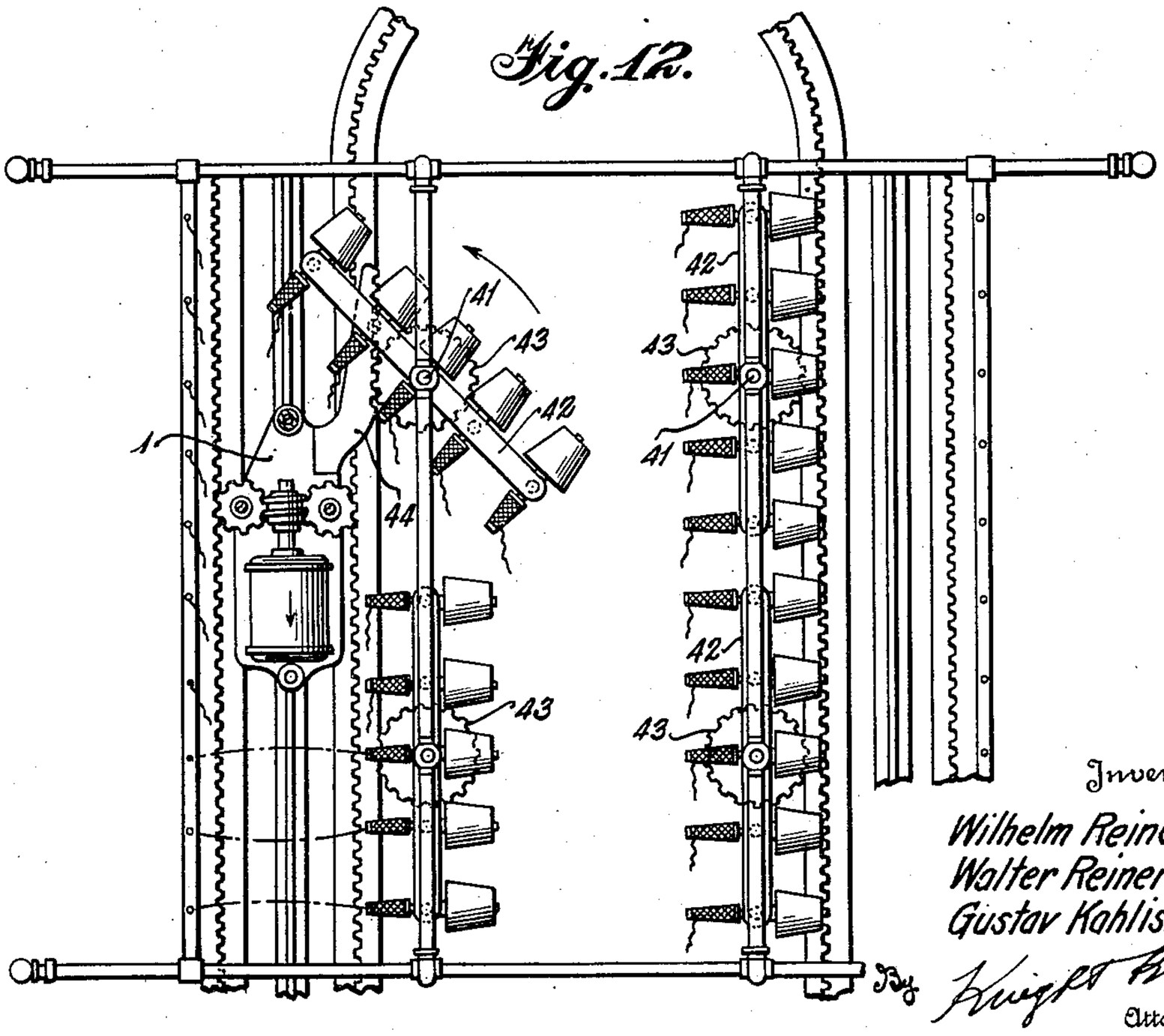


Fig. 12.



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UNITED STATES PATENT OFFICE

2,259,079

CREEL MECHANISM OF WARPING FRAMES

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Application November 26, 1938, Serial No. 242,520
In Germany January 14, 1938

10 Claims. (Cl. 242—131)

For speeding up the work of warping machines the usual expedients adopted are to increase the velocity of the yarn or thread as much as possible and to reduce the time required for removing empty tubes from the creel, and putting full tubes on the pegs, the creel being in some cases made portable for this purpose, so that it can be removed when empty, and replaced by a full one. Much time is, however, expended for severing the yarn between the tubes and the tensioners, each time the supply of yarn on the creel has become exhausted, and subsequently in tying the loose ends of the yarn when fresh yarn packages have become available. In some cases the time expended on making the change over may amount to a third of the working time. Our invention enables it to be reduced to a few minutes.

For this purpose we provide for automatic severance of the yarn extending from the creel to the tensioner of the warping machine, when the supply of yarn is exhausted, and for automatic tying of the loose yarn ends, when the creel has been re-filled or a fresh creel has been placed in position. Automatic severing and knotting is not broadly novel in connection with creels, but the arrangements heretofore proposed have been confined to providing a single cutter and a single knotter, moved from peg to peg, whereas we simultaneously sever and simultaneously knot the yarn between a series or group of pegs and the tensioners facing the same.

We may mount the severing devices and knotters on a carriage or on separate carriages which travel lengthwise of the creel, or up and down it, and where the creel is portable and electrically operated mechanism for removal thereof is provided we may arrange that the carriage automatically closes a circuit, for removal of the creel, when the yarn off the last group of pegs has been cut. Similarly, the knotters may be automatically started by the arrival of a fresh creel.

The tubes on which the yarn or thread is wound may with advantage have circumferential grooves near one end for engaging the ends of the filament and holding it in position for the knotter.

The invention is illustrated in the accompanying drawings, showing examples.

Fig. 1 is a vertical cross-section of the creel and the shearing mechanism, for an apparatus in which the knotters are on a separate carriage.

Fig. 2, a partial plan view.

Fig. 3 is a side elevation thereof, and

Figs. 4, 5 and 6 are views similar to Figs. 1, 2 and 3 but showing a knotter carriage in place of the shearing mechanism carriage.

Fig. 4*a* is an enlarged view of a portion of the knotter assembly shown in Fig. 4.

Fig. 7 is a horizontal sectional view of the carriage, showing the motor and driving gear.

Fig. 8 is a side elevation of a thread-severing mechanism of another form.

Figs. 9 and 10 are respectively front and side elevations of the lower part of creel panels with a conveyor for moving them.

Figs. 11 and 12 are respectively a vertical cross-section and a plan view of another form of creel frame with revoluble panels.

Referring first to the construction shown in Figs. 1 to 7, a carriage 1 (Fig. 7) with wheels 23 and an electromotor 2 travels along the passages between the double-sided creel frame 26 and the tensioner frames 50 facing the same on both sides. The creel frame 26 is in the form of a panel on which pegs 60, to hold supply packages of thread, are arranged butt to butt in horizontal tiers and vertical rows. On the tensioner frames tensioners 61 are similarly arranged, each opposite a peg. The motor 2 drives a worm 3, and this drives two worm wheels 4, 5 engaged with racks 6, 7, for moving the carriage in either direction. Upon the carriage there is a vertical support in the form of a tube 8 carrying a series of shears 11, 17 spaced according to the spacing of the tiers of creel pegs, and in the tubes there is a vertically movable rod 12 with tappets 13 projecting through slots in the tube, so that by lifting the rod the shear legs 17 are actuated for cutting the yarn or thread between the tensioners and the cheeses on the pegs. The rod is actuated for this purpose by deflecting surfaces, in this case elevations 16 on a cam rail 21, on which a roller 14 at the lower end of the rod 12 runs. The elevations 16 are spaced in accordance with the spacing of the vertical rows of pegs. After the cutting the loose exhaust ends F*b* of yarn hang down from the tensioners, and the loose ends F*e* are pulled off the pegs, with the tubes H. The tubes have necks 31 for holding the leading ends of the yarn wound thereon. At the ends of the passages curved rails 24 connect the ends of the rails 21, and a curved rack 25 connects the ends of the two racks 7, so that the carriage can travel from one passage to the other.

The creel frame has wheels 27, so that when the tubes H are empty it can easily be removed for re-charging, a fresh frame with charged pegs being moved into its place, to save time.

When a creel with fresh cheeses S thereon has

been moved into position for delivery of yarn, as shown in Figs. 4, 5 and 6 the loose ends F*a* of the yarn hanging from the necks **31** of the tubes are automatically tied with the exhaust ends F*b* hanging from the tensioners. These figures show a second carriage of a construction similar to the one first described, but with the shearing unit replaced by a knotter unit. The knotters **20** are mounted upon arms **51** projecting from the vertical tube **8**. This mechanism will not be described in detail, since such devices are well known. Such mechanisms, for example, are disclosed in the United States patents to Abbott, Nos. 1,868,682, July 26, 1932; and 1,965,023, July 3, 1934. The knotting bills shown in these patents resemble the knotting bills **52** disclosed herein which are controlled by triggers **53**. While the knotting bills in Patent No. 1,868,682 are actuated by an operating lever **13** (page 1, line 84) and in Patent No. 1,965,023 by a conventional lever **28** (page 2, line 56), the triggers **53** in the present arrangement corresponding to these actuating levers are adapted to be actuated by the pins **13** on the vertical shaft **12** operated by the cam rail **16**, on which rides the roller **14** of the shaft **12**. Cooperating with each knotter are two retrieving arms **19** and **18** fixed on vertical shafts **9** and **10**, respectively, which project upward from, and are rotated by, the worm wheels **4** and **5**. The retrieving arms are revolved in synchronism with the movement of the carriage along the passage and are adapted to grasp the hanging yarn ends F*a* and F*b* and draw them into the crossed position shown at the left side of Figs. 4 and 5, where they are engaged by the bills **52** of the knotters (Fig. 4*a*). The elevations of the cam rail **16** are arranged to actuate the knotters shortly after the yarn ends of each vertical row have been brought to the position shown at the left side of Figs. 4 and 5.

Instead of providing separate carriages for the shears and knotters, both devices may be mounted upon the tube **8** of a single carriage, arranged at an angle of 90° with respect to each other, so that either set of devices can be brought to operative position by swinging the tube through a corresponding arc. Alternatively, the shears and knotters may be mounted upon separate tubes or posts **8** of the same carriage. In the case of either of the two forms last described the general procedure would be to operate the shears while the carriage travels in one direction and the knotters while it travels back.

It will also be understood that the carriers of the shearing and knotting devices may move vertically from tier to tier, instead of horizontally.

Instead of shears we may use any other suitable device for severing or breaking the yarn, e. g. electrically heated burners **31***a* (Fig. 8), towards which the yarn is guided by converging guide arms **32**. For breaking the yarn, instead of cutting it, a mechanical device exerting a pull may be used. We may use stationary severing devices, one for each peg, which are automatically moved into operative position, and actuated, by moving the creel frame from its delivery position to position for re-filling. Clips may then be provided, for the ends of the yarn on its way to the warp beam, so that this is not dragged by the creel.

Where the creel frame is of such design that the loose ends of the yarn cannot readily be picked up by the knotters or by rotating arms or the like co-operating therewith the knotters may have suction devices or the like for picking up the yarn.

For automatically removing the creel, for refilling, we may provide an endless, mechanically driven belt or chain **28**, as shown in Figs. 9 and 10, with lugs **29**, the creel being provided with corresponding lugs **30**, which can be moved into the path of the lugs **29**, either directly by hand or by means of remote-controlled mechanism, so that the creel is pushed away when empty.

The electric circuit feeding the carriage motor may be controlled by means of switch mechanism near the warping machine.

Where the panels of the creel frame are pivoted, so that they can be rotated, the rotation of the panels may be utilized for effecting severance of the yarn, e. g. by providing grippers which hold the yarn fast while it is broken by the pull of the arms.

Figs. 11 and 12 show a construction in which the creel panels **42** are fixed to vertical shafts **41** having thereon gear wheels **43** adapted to be engaged with a rack **44** on the carriage **1**, so that the panels are rotated by passage of the carriage. The rotation of the shaft **41** is checked, when the rack has cleared the gear wheel, by a spring loaded catch **46**, which engages a notched disc on the shaft.

What we claim as our invention and desire to secure by Letters Patent of the United States is:

1. In a knotter for use with a creel having supply packages of thread arranged in a panel of tiers and rows, and tensioners to guide and tension the thread feeding from the supply packages and to hold the exhaust end of said thread, the tensioners being opposite the packages in similar arrangement and spaced therefrom to form a passage; a knotter unit comprising knotters mounted in a row in spaced relation on a support, the number and spacing of the knotters corresponding to the number and spacing of the tiers of packages and tensioners; means mounting said knotter support to travel sideways through the passage across the rows of packages and tensioners, in such position and direction that each knotter passes along a corresponding tier of the packages and tensioners; means for bringing together at each knotter, as it reaches in its travel a new row of packages and tensioners, the ends of the exhaust thread and supply thread of its tier; and means for actuating said knotters to tie said thread ends.

2. In a device of the class described, a creel having pegs to hold supply packages of thread arranged in a panel of tiers and rows, and tensioners to guide and tension the thread feeding from the supply packages and to hold the exhaust end of the thread, the tensioners being arranged opposite the packages and spaced therefrom to form a passage; a carriage adapted to travel through said passage; a vertical support on said carriage; knotters mounted in a row on said support spaced according to the spacing of the tiers of packages; a cam rail extending along said passage having deflecting surfaces at intervals corresponding to the spacing of the rows of packages; actuating means for said knotters including a cam follower riding said cam rail, and retrieving means for gathering the exhaust and supply thread ends to said knotters.

3. A knotter as described in claim 1, wherein said means for bringing together the ends of the exhaust thread and the supply thread comprises a pair of retrievers, each having a set of grasping arms located, respectively, at the levels of the tiers of packages and tensioners; and means for operating said arms in synchronism with the

travel of said carriage to cause them to engage the thread ends of each row and to move them to the respective knotters.

4. Creel apparatus comprising a frame on which are mounted a plurality of coplanar panels mounted to revolve on individual parallel axes lying in the plane of the panels, each panel having on both faces pegs to hold packages of thread, thread tensioners mounted on said frame on one side of said panel each located opposite a corresponding one of said pegs and all spaced from said panel to leave a passage between them, and a carriage adapted to travel through the passage, said carriage and each panel having interengaging means whereby each panel is revolved 180° during the travel of the carriage through the passage.

5. Apparatus as described in claim 4, wherein said carriage is provided with means to sever threads extending from said tensioners to the packages facing them.

6. Apparatus as described in claim 4, wherein said carriage is provided with means operated synchronously with the travel of the carriage to sever threads extending from said tensioners to the packages facing them.

7. Creel apparatus comprising panels of pegs to hold packages of supply thread, the pegs being arranged in rows and tiers and placed butt to butt so as to extend outward in opposite directions; panels of tensioners similarly arranged in rows and tiers opposite said pegs and spaced therefrom to provide two passages; a carriage adapted to travel through said passages; tracks for said carriage extending through said passages and in a semicircle joining the tracks of each passage at the end; and a knotter unit mounted on said carriage having knotters arranged in a vertical row at a spacing corresponding to that of the tiers of packages and tensioners; means for bringing thread ends from the supply packages and the tensioners to said knotters as said carriage progresses along said passages, and means for actuating said knotters to tie the thread ends so brought to them.

8. In a shearing device for use with a creel having supply packages of thread arranged in a panel of tiers and rows and tensioners to guide and tension the thread feeding from the supply packages and to hold the exhaust end of the thread, the tensioners being opposite the packages in similar arrangement and spaced therefrom to form a passage; a shearing unit comprising shears mounted in a row in spaced relation on a support, the number and spacing of the shears corresponding to the number and spacing of the tiers of packages and tensioners; means mounting said shear support to travel sideways through the passage across the rows of packages and tensioners, in such position and direction that each pair of shears passes along a corresponding tier of packages and tensioners; and means for actuating said shears to sever the threads between the supply packages and the tensioners.

9. Shearing apparatus as described in claim 8, wherein the means for actuating the shears comprises a cam rail extending along the path of said carriage and shear-actuating means on said carriage having a follower to engage said cam rail.

10. In a shearing device for use with a creel having supply packages of thread arranged in a panel of tiers and rows and tensioners to guide and tension the thread feeding from the supply packages and to hold the exhaust end of the thread, the tensioners being opposite the packages in similar arrangement and spaced therefrom to form a passage; a thread-severing unit comprising severing means on a support mounted to travel through the passage, parallel to the tiers of packages and tensioners, said severing means being adapted to sever all the threads from a row of supply packages as said support travels once through the passage.

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