

C. M. KINGMAN.
 ROPE MAKING MACHINE.
 APPLICATION FILED AUG. 15, 1911. Patented Aug. 20, 1912.
 1,036,261. 4 SHEETS—SHEET 1.

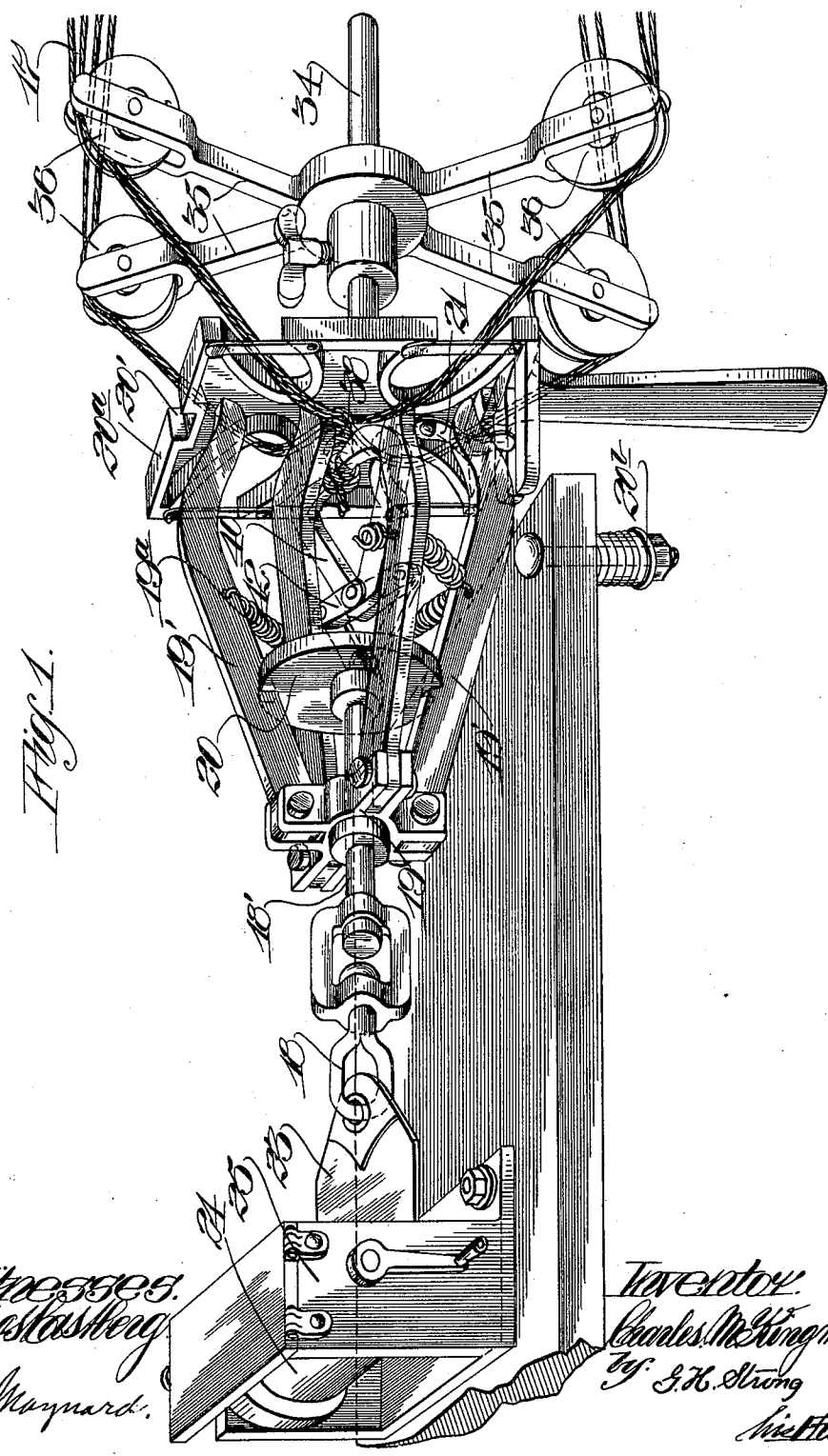


Fig. 1.

Witnesses.
W. S. Kashberg
G. E. Maynard.

Inventor
Charles M. Kingman
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Att'y.

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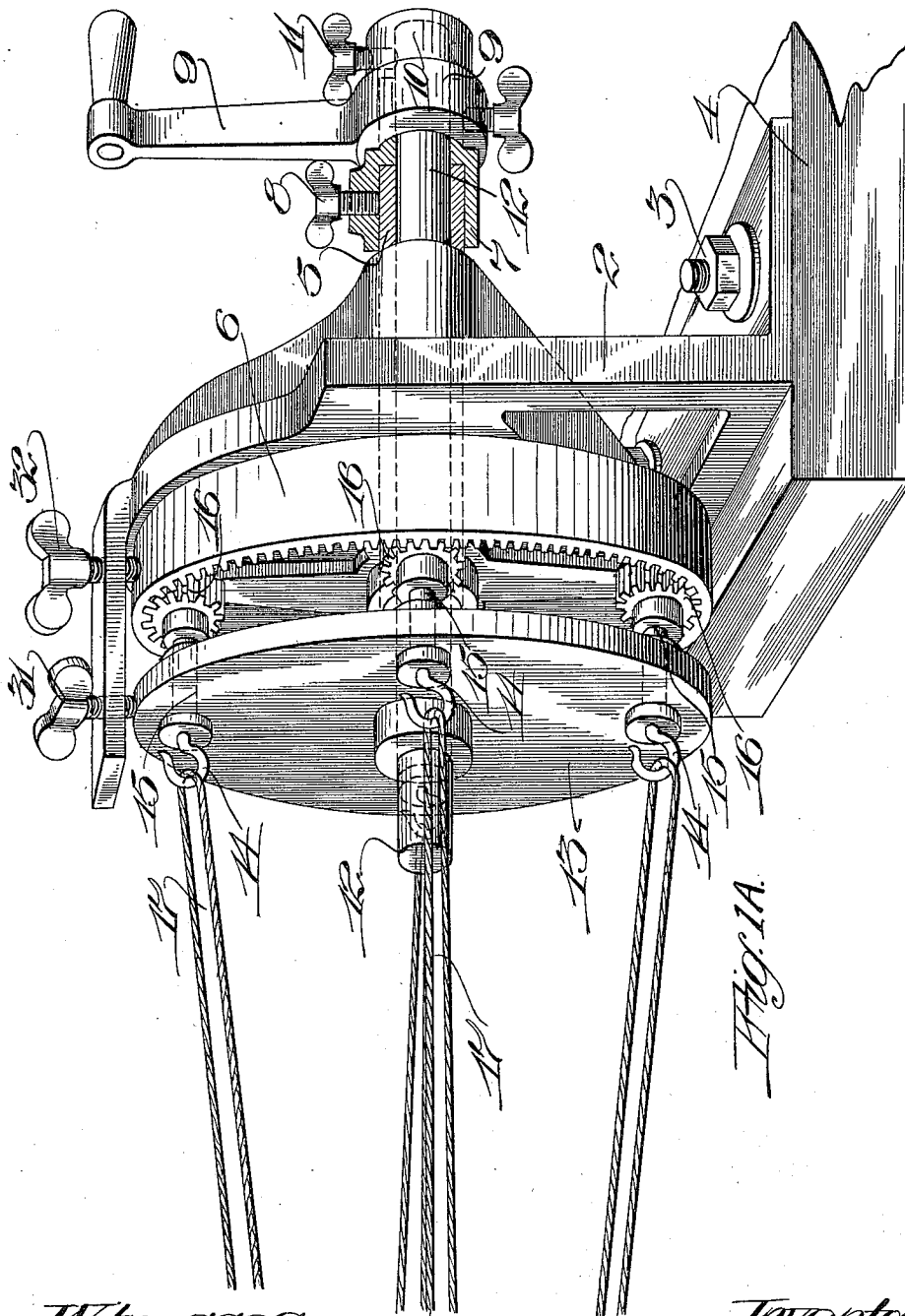


Fig. 1A.

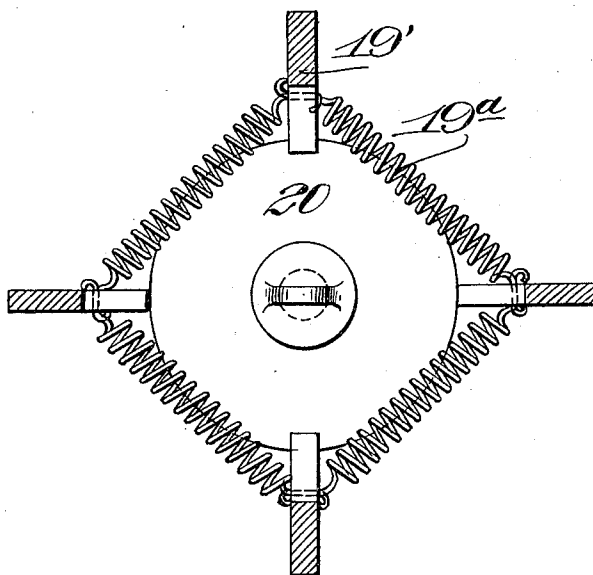
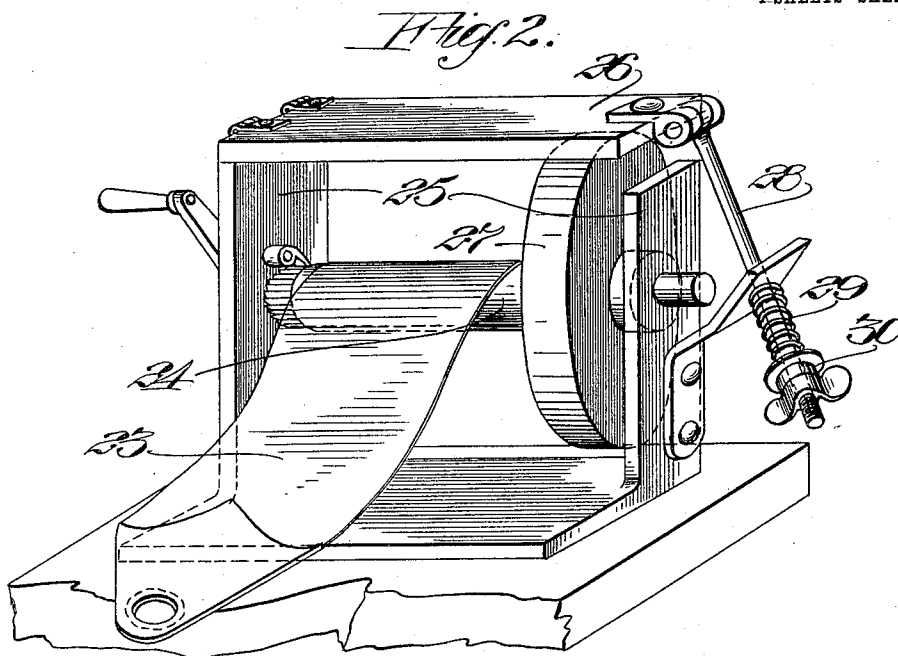
Witnesses:
Charles A. Berg
E. E. Maynard

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4 SHEETS—SHEET 3.



Witnesses:
Thos. Leisterberg.
J. E. Maynard.

Fig. 4.

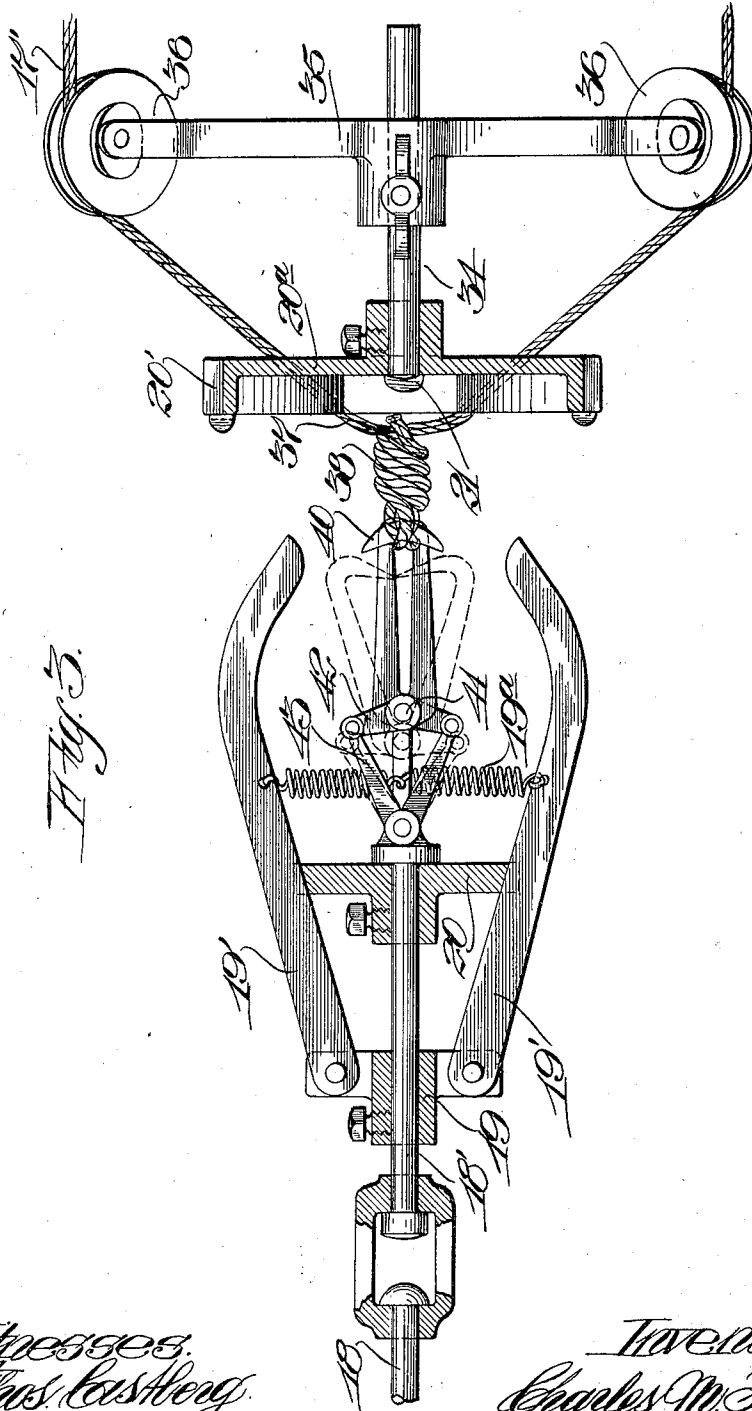
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4 SHEETS—SHEET 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES M. KINGMAN, OF SAN FRANCISCO, CALIFORNIA.

ROPE-MAKING MACHINE.

1,036,261.

Specification of Letters Patent.

Patented Aug. 20, 1912.

Application filed August 15, 1911. Serial No. 644,110.

To all whom it may concern:

Be it known that I, CHARLES M. KINGMAN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Rope-Making Machines, of which the following is a specification.

This invention relates to an apparatus for the manufacture of twisted strands.

The object of the present invention is to provide a very simple, inexpensive machine adapted for manual operation for the manufacture of rope, cables, or other twisted strands; and to provide a rope twisting machine involving an automatic, yieldable, tensioning device and an automatic pitch giving device or regulator; and particularly to provide a rope making machine in which may be twisted what would ordinarily be waste fibers, pieces of rope, cord or wire, and which machine may be operated by a single unassisted person.

The invention consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figures 1 and 1^a are perspective views of the apparatus. Fig. 2 is a front view of the automatic, yieldable, tensioning device. Fig. 3 is a perspective view of the twister or regulator. Fig. 4 is a perspective view of a guide plate.

In the illustrated embodiment of my invention 2 represents a suitably designed bearing or bracket adapted to be attached by appropriate means, as screws or bolts 3, to any convenient form of support, as, for instance, a fence 4 or other structure. Upon the bracket 2 is journaled a hollow shaft or sleeve 5, upon one end of which is secured an internal gear 6. The other end of the hollow shaft 5 is embraced by a cup or coupler 7, having a locking device, here shown as a set-screw 8, whereby the coupler 7 may be positively connected to the hollow shaft 5 upon which the internal gear 6 is secured. The coupler 7 is provided with a detachable handle or crank 9, and is also provided with a projecting tubular portion 10, having a set-screw or other locking device 11 adapted to be adjusted in positive engagement with a central spindle 12 which projects inwardly through the hollow shaft 5 extending somewhat beyond the face of the internal gear 6

and having rigidly secured to the projecting portion a carrier or plate 13. The plate 13 is provided with a number of loop receiving hooks or equivalent devices 14, which are connected to spindles 15, journaled transversely in the disk or carrier 13, and having secured upon their ends adjacent to the gear 6 pinions 16 which are in constant engagement with the teeth of the internal gear 6. The hooks 14 are adapted to receive and support loops, as 17, of the material of which it is desired to form rope or other strands.

The operator, having gathered the material from which the rope is to be formed, secures the material in one continuous piece, if it should be in sections, and then determines the distance from the bracket 2 at which to erect or connect the tensioning device to be hereinafter described, and to which is connectible a swivel grab hook 18, as indicated in Fig. 3. The swivel hook is provided with a projecting rod 18', upon which is turnably and reciprocally mounted a hub 19, carrying a plurality of clutch arms 19' which are contracted by spring connections 19^a. Adjacent to the end of the rod 18' there is secured a notched plate 20, in which rest the arms 19'. Within the inwardly curved ends of the arms 19' is adapted to be temporarily restrained a threader plate 20^a, having a plurality of notches 20' into which the resilient arms 19' may rest. When the end of the material of which the rope is to be made is secured beneath a suitable retainer or clip spring 21, which is secured upon the rear depressed face of the plate 20^a, thereafter the cord or single strand is led forwardly and threaded over one of the turnable twisting hooks 14 at the twisting mechanism. The strand is then returned through the same recessed corner of the plate 20^a from which it was led, and thence across the rear of the plate and out of another recessed corner forwardly to another hook 14, and so on until there are as many loops passing forwardly from the plate 20^a as there are twisting hooks of the twisting mechanism; the terminal end of the strand being secured under the spring clip 21. The swivel hook 18 is adapted to be connected to a tensioning strap 23, which is secured to a reel 24, journaled in a frame 25. The frame 25 of the tensioning apparatus is set up at a distance from the bracket 2 so that all of the material of which the

rope is to be made is connected in a series of loops extending from the twisting hooks 14 to the threader plate 20^a on the regulator 34; that is, if the length of the cord or wire or other material of which the rope is to be formed aggregates a length of eight hundred feet when it has been passed back and forth from the twister apparatus to the tensioning apparatus. These strands, forming four loops, will indicate that the two restraining coöperative devices, that is, the twisting and tensioning appliances, must be adjusted apart approximately one hundred feet. This is merely an example to illustrate that the distance between the twisting and tensioning appliances will be determined according to the length of the several loops into which the continuous cord or wire is arranged.

Before the operator begins to twist the several loops to form the rope or cable, the degree of resistance which the tensioning strap 23 will offer to the twisting of the strands may be adjusted by drawing a brake-shoe 26 on the tensioning frame 25 downwardly into contact with a drum or wheel 27 which is secured to the strap reel 24. The brake 26 is maintained in frictional engagement with the periphery of the wheel 27 by a suitable hook or other device 28, which projects through a suitable guide in the frame 25, and is normally thrust downwardly by an expansible spring 29, resting against an adjustable thumb-nut 30 on the end of the restraining device 28, so that as the strap 23 is pulled from the reel 24 the resistance of the brake 26 determines the tension or necessary power which must be exerted to unwind a strap from the reel.

In operation, after the several loops 17 have been properly threaded from the plate 20^a to the twister hooks 14, the operator clamps or locks the carrier 13 against rotation by adjusting a clamping device or screw 31, mounted in the frame 2, upon the periphery of the carrier 13. This locks the carrier 13 so that it cannot revolve. Another locking device 32 in the frame 2 is adjusted so as to release the internal gear 6 so that it may be revolved in unison with the crank 9. The locking device 8 on the coupler 7 is operatively adjusted upon the shaft 5. Having locked the carrier 13 against rotation and released the driving gear 6 for rotation, when the operator moves the crank 9 the several pinions 16 and their respective hooks 14 will be turned in their several journals in the carrier 13 and the spread or spaced loops 17 will be twisted upon themselves. The revolutions of the twisting hooks 14, through the instrumentalities of their pinions and their driving gear 6, will be continued as the judgment of the operator determines, so that the loops 17 will have been twisted into several strands which

are then under tension and which are later intertwisted helically together to form the finished rope.

In order to cause the helical twist of the rope to be uniform, and also to spread the loops 17 while in the process of twisting, I provide a spacing device or regulator comprising a rod or bar 34, having adjustably mounted adjacent to one end a spider 35, in the outer ends of which are journaled guide sheaves or rollers 36 with their axes transverse the axis of the bar 34. There may be as many of the sheaves 36 mounted in the spider 35 as there are loops or several strands going to form the rope. From these sheaves 36 the strands are directed downwardly and converge, as at 37 Fig. 3, where they are twisted together to form the finished rope or cable, as at 38. The spider 35 is automatically sustained in a position at right angles to the ends of the rope 38, so that as the rope twisting proceeds the convergence of the several strands automatically forces the sheaves 36 forwardly in front of the finished rope portion 38 and constantly keeps the strands 17 in a given relative angle and distance and causes them as they converge at 37 to assume a constant, uniform, helical twist. When the operator has twisted the several loops 17 into strands, as indicated at 17', each having an individual tension and twist, he then locks the internal driving gear 6 by the screw 32, releases the carrier 13 from control of its locking screw 31, and also releases the coupler screw 8 from engagement with the hollow shaft 5, and sets up the locking device or screw 11 of the coupler so that it will positively engage the central shaft 12. Then, upon turning the crank clockwise, the carrier 13 will be carried in a similar direction, the several pinions 16 will move in a planetary orbit within the gear 6 in a clockwise direction and will be revolved upon their axes counter-clockwise. This rotary movement of the carrier 13 causes the several strands 17' to be twisted into rope at the intersection 37 Fig. 3; the finished rope portion 38 being permitted rotation by reason of its connection with the hook 18. As the interstrand twisting proceeds, the individual twist of each strand 17' is continued, due to the rotation of the pinions 16 and the twisting hooks 14 by reason of the engagement of the pinions with the stationary gear 6. The result of this combinative action is the formation of a tightly wound, uniformly twisted rope. Naturally as the rope forming proceeds, both when the loops are first twisted into strands and later when the strands are twisted into rope, there is a difference between the length of the inter-twisted loops and the partly formed rope during the operation. This decrease in the length of the material of which the rope is

formed causes a tension upon the strap 23 and this is gradually pulled from its reel 24, due to the shrinkage or decrease in the length of the strands. As the finished rope is formed behind the regulator it is forced forwardly, due to the convergence of the strands 17' behind the sheaves 36, meanwhile constantly and uniformly guiding the strands 17' as they approach the intersection 37 at which the formation of the rope 38 begins.

In Fig. 3 is clearly illustrated the regulating device and the threader plate; the latter being shown released from the clutch arms 19'. When in this position the several converging strands 17' lap each other over the rear depressed face of the threader plate 20^a and are adapted to be engaged by a set of gripping hooks 40 which are pivoted upon each other at 41, and have right angular extending arms 42 which are connected by links 43 to the contiguous end of the hook carrying rod 18'. After the operator has threaded the strands 17, as before described, at which time the threader plate 20^a is temporarily connected by reason of the clutch arms to the rod 18', then the hooks 40 are adapted to be squeezed together so as to retain the crossed strands behind the depressed face of the threader plate 20^a. Due to the tension of the springs 19^a, which draws the clutch arms 19' together, the threader plate 20^a will be restrained from advancing while the winding mechanism is being operated until the tension of the several loops or strands being twisted is sufficient to automatically force the spider 35 forwardly away from the rod 18', at which instant the clutch arms 19' will be opened and the plate 20^a released. After the release and forward advance of the plate 20^a, the selvage end of the rope is retained between the hooks 40, which automatically close under the tension of the rope, by reason of the fact that their short arms 42 are connected by the links 43 to the rod 18', and this is in turn restrained from advancing by the tensioning device 23. The clutch arms 19' are limited in their closing position, when cleared of the plate 20^a, by the disk or cam plate 20 which is secured upon the rod 18'. During the initial threading of the threader plate 20^a, this is restrained temporarily by any suitable form of locking device, as a thumb-nut or other device 20^b, which may be passed over a complementary screw secured in a projecting portion of the tension device frame 25. When the operator has succeeded in threading the several loops about the threader plate and the twisting hooks, he then releases the plate 20^a by taking off the thumb-nut 20^b. When the tension of the loops 17, due to their twisting, becomes sufficiently great, the plate 20^a will be cleared from the clutch arms 19' and may then advance freely

toward the twisting mechanism; the selvage end of the rope being meanwhile constantly retained by the hooks 40. As the rope finishing proceeds, too great a tension in the same is prevented by reason of the fact that the swivel hook 18 permits the rod 18', to which the hooks 40 are connected, to revolve, but at the same time a necessary amount of tension is reserved in the twisted portion of the rope by means of the tensioning device 23.

Preferably the threader 20^a is provided with a weighted side or some device to maintain the threader and the connected regulator in given positions during its automatic advance. A lever or handle 20^b shown in Fig. 1 at the bottom of the threader amply performs this function. As the rope making proceeds the member 23 feeds out to compensate the reduction in length of the loops.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is—

1. A rope-making machine, including a demountable twisting mechanism, a demountable compensating tension apparatus, a threader-plate, a strand and twist regulator having a plurality of projecting arms, connected to said plate, a plurality of clutch-hooks engageable with said threader-plate, and swivelly connectible to the aforementioned compensating apparatus, the whole unitable by material to be twisted, and operable by the twisting mechanism.

2. A rope making machine, including a demountable bracket, a twisting mechanism mounted thereon, a threader-plate adjustably combined with a strand and twist regulator, a plurality of clutch-hooks adapted to engage the threader plate, and a demountable compensating tension device having a flexible connection engaging and holding said clutch-hooks, the entire connectedly operable by the twisting mechanism in motion.

3. A rope-making machine, including a compensating tension device, a plurality of clutch-hooks attachable thereto, a combined adjustably connected threader and strand regulator, a demountable bracket, twisting mechanism mounted thereon, a plurality of loop receiving and twisting hooks included and operable in said mechanism, means for revolving said hooks to twist the loops, and an internally geared rotary driving member, the several devices united by material of which the rope is to be formed, threaded from the threader plate to said hooks on twisting mechanism, and automatically operable from and by said mechanism in motion.

4. A rope making apparatus, including a rotatable carrier, hooks journaled thereon, a shaft therefor, means for rotating said carrier and means for locking same against rotation, an internally geared rotary driving

member for twisting the hooks engageable with said carrier, means for locking said driving member against rotation while the carrier is in motion, a threader plate with strand regulator adjustably combined having a multiple of arms for holding and spreading the loops of material while being twisted, clutch-hooks engaging and holding threader-plate, automatic means for release of plate, and a compensating tension device with an extendible flexible connection attachable to said clutch hooks, the whole being automatically operable by and from the said twisting mechanism in motion.

5. The combination in a rope making machine of loop-twisting hooks, rotatable carrier for said hooks, means for holding the said carrier against rotation, instrumentalities for revolving the hooks while the carrier is in a stationary position, a threader and regulator adjustably combined toward which the loops converge and to which they are attached, a plurality of clutch-hooks, a demountable compensating tension apparatus with an extendible connection operating therefrom, the same adapted to compensate for the reductions of loop by reason of the twisting, said connection being engageable with, and adapted to control the advance of, the aforementioned clutch-hooks, the whole being unitable for action by means of material to be twisted extending from the threader and regulator to the loop-twisting device, and operable by and from said device in motion.

6. In a rope-making machine, a threader-plate and a strand-regulator connected to said plate, and positioned by same, adapted to receive and spread the several strands direct the twist and prevent kinking or tangling of material and capable of an advancing movement; a twisting mechanism adapted to be connected to said plate and regulator by threaded material to be twisted, a plurality of clutch-hooks engageable to a threader-plate, a compensating tension device having an extensible connection adapted to engage and control said clutch-hooks, the whole being operable by the twisting mechanism in motion.

7. In a rope making machine, a plurality of clutch hooks adapted to grasp the fiber or twisting material and hold same under tension, and extensible means automatically feeding as material is shortened by reason of twisting.

8. The combination in a rope making machine of a twisting mechanism, having a rotatable carrier, rotary hooks mounted upon the carrier, means for locking the carrier against rotation, a rotary driving member for operating said hooks, and means for locking the driving member against rotation.

9. In a rope-making machine, a threader-

plate having an automatic advancing movement during the process of rope-making, means for automatically maintaining same in an upright position while in operation, a device for holding the plate while being threaded, means automatically operable to release said plate during the process of twisting, a keeper for retaining the threaded material in place on threader plate while in operation, and a strand-spreader and twist-regulator adjustably attached to said plate.

10. In a rope-making machine, a threader, plate, a strand and twist-regulator, adjustable connections between said plate and regulator, the whole having a uniform advancing movement and working automatically during the process of twisting, a compensating device with an extensible connection, clutch-hooks uniting said connection to threader-plate, and a twisting mechanism connected by threaded material.

11. In a rope making machine, a plurality of loop-receiving hooks, a threader toward which the loops converge and to which they are attached, a rotatable carrier for said devices, and means to revolve said devices while the carrier is in a stationary position to twist the loops, said means being operative to revolve the aforementioned devices when the carrier is revolved.

12. A loop twisting and rope making apparatus, including a rotatable carrier, loop-receiving devices journaled in said carrier, means for revolving said devices operative when the carrier is idle or in motion to revolve said devices in the same direction, locking means whereby the carrier and the operating means may be separately controlled, a manually operable crank, and a coupling device whereby power may be transmitted from said crank either to the rotatable carrier or to the operating means.

13. A rope making machine, including rope twisting devices, means for revolving said devices, a carrier for said devices, and means to revolve said carrier, said devices being revolved in the carrier while the carrier is in motion.

14. In a rope-making machine, a combined threader, strand spreader, and twist-regulator, having anti-frictional bearings adapted to receive, spread and prevent tangling or kinking of material, and having an automatic advancing movement during the operation of twisting.

15. In a rope-making machine, an automatically operable strand-spreader and twist regulator having a plurality of arms projecting outwardly and carrying anti-frictional bearings for the twisting strands and over which the strands may freely run, a threader plate connected thereto, the whole having an automatic advancing movement in conjunction and in unison during the operation of twisting.

16. In a rope making machine, a strand regulator adapted to receive and spread the several strands, and having a loop through which the twisted portion of the rope may pass, and which is automatically advanced as the rope twisting proceeds.

17. In a rope-making machine, a twisting mechanism, a combined threader and regulating device adapted to hold and regulate the twisting strands while forming rope and having an automatic advancing movement in the operation, clutch-hooks for holding same in starting, automatic means for releasing said hooks, means for balancing and maintaining the device in an upright position automatically coöperable with the twisting mechanism, to which a threadable material may be threaded or skeined from back of threader over and around regulator back and forth to the twisting mechanism.

18. In a rope-making machine, a compensator having a variable length, flexible connection, means for restraining and feeding same, a tension device adapted to regulate said connection, a plurality of clutch-hooks swiveled to said connection, an automatic threader and regulator adapted to be engaged by said clutch-hooks, a twisting mechanism connectible to the latter by means of strands of fiber, twine or other material threaded from the threader and regulator back and forth to the twisting mechanism.

19. A rope-making machine having a demountable twisting mechanism, a demountable compensating tension apparatus, a connected threader and strand and twist regu-

lator, and clutch-hooks in combination co-operative and automatically operable with and by the twisting mechanism.

20. A rope making machine, having a twisting mechanism, clutch-hooks adapted to be held by augmentable connection or by the hand, a threader-plate engageable by said clutch-hooks, a strand-spreader connected to said threader-plate, and in combination coöperative and automatically operable by the twisting mechanism.

21. A rope-making machine having a twisting mechanism, an automatically advancing and self balancing threader and regulator, means for holding threader while being threaded, automatic means for liberation of same to advance, and means to engage and hold fiber or twisting material at rear of threader after liberation of same, and while in operation with and by the twisting mechanism.

22. A rope-making machine, having a self balancing and automatically advancing threader and regulator.

23. A rope-making machine, having an automatically advancing threader and regulator, and means to hold the twisting material while said threader and regulator are in operation.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES M. KINGMAN.

Witnesses:

CHARLES EDELMAN,
C. C. COOK.