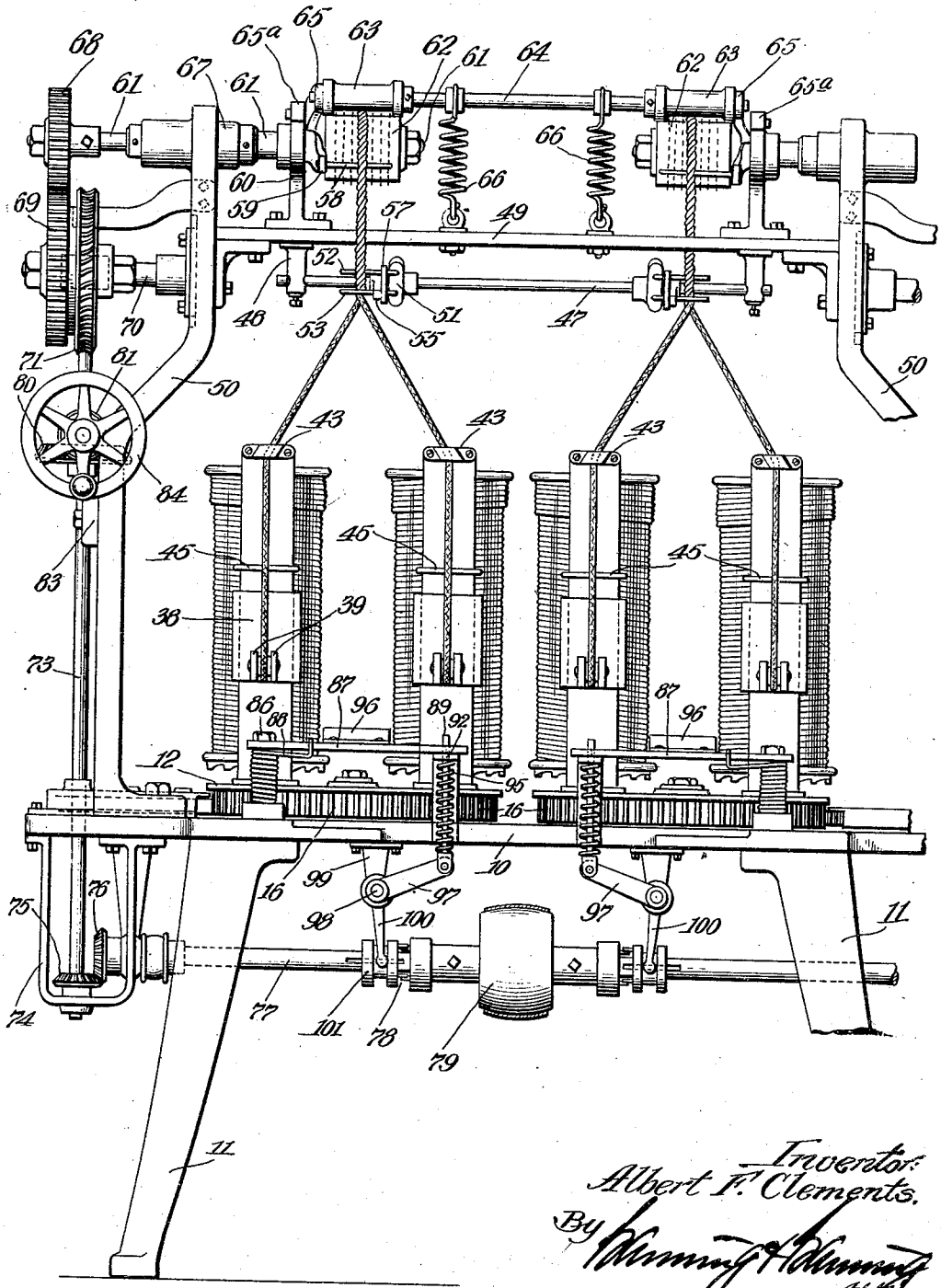
May 6, 1930. A. F. CLEMENTS 1,757,653

STRANDING MACHINE

Filed Sept. 13, 1927 4 Sheets-Sheet 1

Fig. 1.



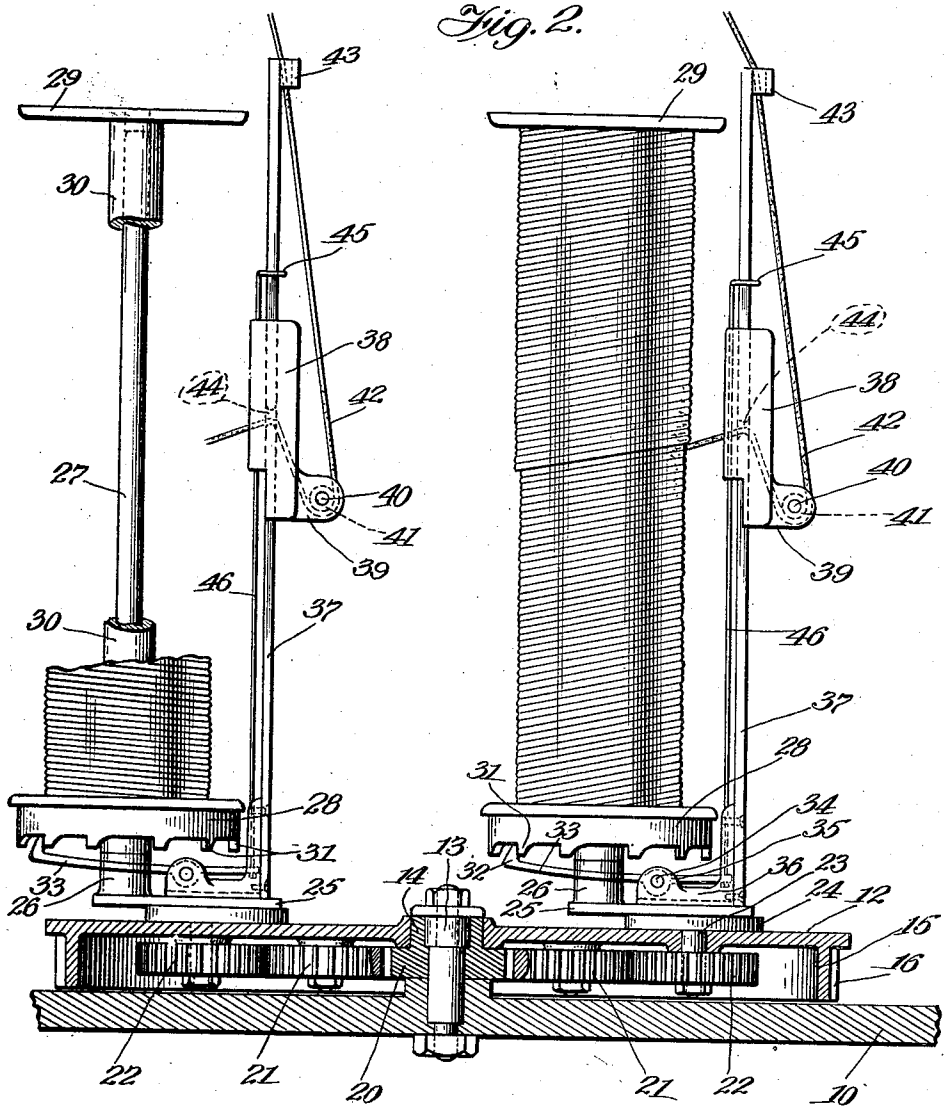
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STRANDING MACHINE

Filed Sept. 13, 1927 4 Sheets-Sheet 2

Fig. 2.



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STRANDING MACHINE

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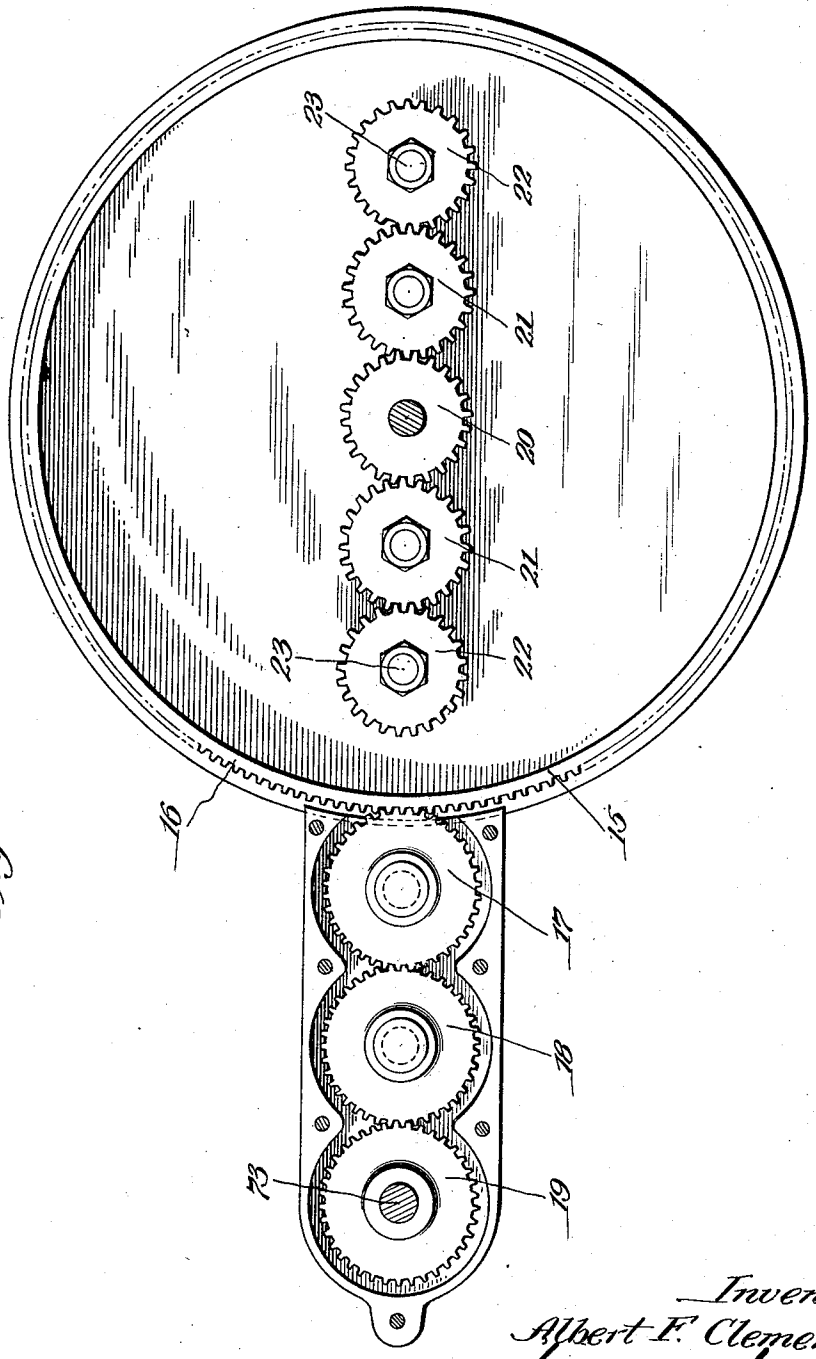


Fig. 3.

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STRANDING MACHINE

Filed Sept. 13, 1927 4 Sheets-Sheet 4

Fig. 4.

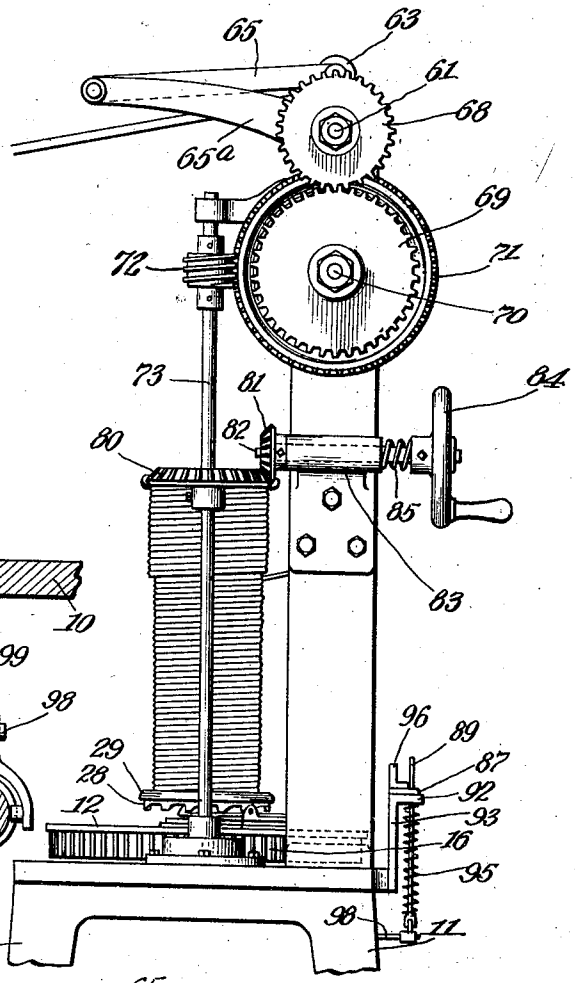
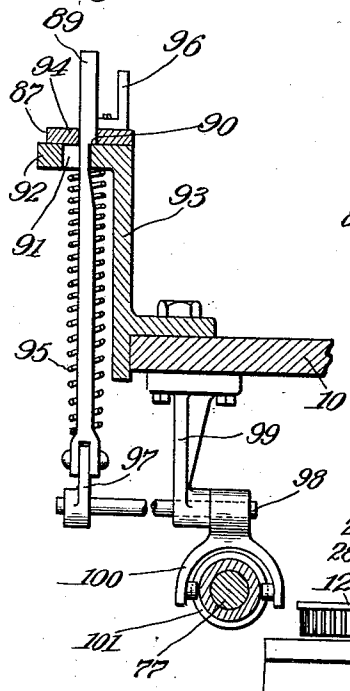


Fig. 6.



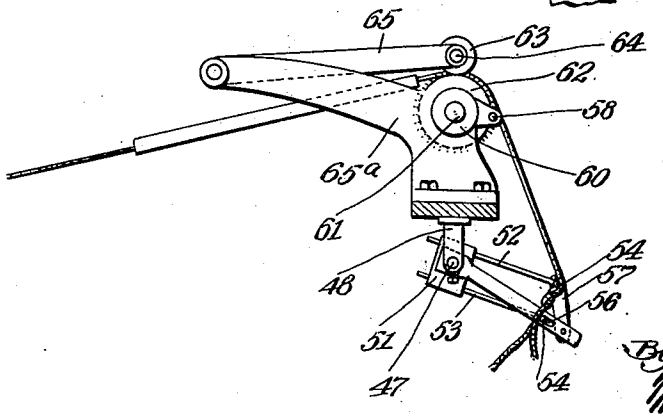


Fig. 5.

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UNITED STATES PATENT OFFICE

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STRANDING MACHINE

Application filed September 13, 1927. Serial No. 219,249.

The machine of the present invention is primarily constructed for the purpose of coiling together the two constituents of a broad, flat rug strand of special design employed in the building of a spirally wound rug. A strand of this special character comprises two constituent sections, each of which is preferably, though not necessarily, in the form of a broad flat section braided upon a double core, as shown and described in application Serial No. 174,503, filed March 11, 1927.

In the coiling together of flat strands of this character, it is necessary to impart a partial reverse twist to each of the constituents of the completed strand coincidental with the coiling of the constituent sections wound upon each other with the result that each strand section will continuously maintain the same side up, despite the orbital travel of the two strand sections through the openings in the coiler head. This results in a completed strand in which the sections are bent back and forth over and under each other without being themselves axially twisted, and the present invention is designed to provide means for imparting to the coiler heads a reverse rotation as compared with the orbital travel of the heads around a common center.

The invention also relates to the means provided for imparting the necessary tension to carry forward the completed strand and to compel the constituent portions thereof to assume the side to side and up and down undulations required to lay the constituent sections of the strand over and under one another without partaking of any axial twisting movement.

Further details will appear from a description of the invention in conjunction with the accompanying drawings wherein—

Figure 1 is a front elevation of a duplicate machine involving the features of the present invention;

Fig. 2 is a vertical sectional detail of one of the turntables with the two coiler heads mounted thereon;

Fig. 3 is a plan view of the turntable showing the driving gears for the turntable and the gearing for imparting reverse rotation to the coiler heads;

Fig. 4 is an end elevation of the machine showing the driving train for the turntable and for the tension feed;

Fig. 5 is a detail showing the tension feed and adjustable tension guides;

Fig. 6 is a detail showing the means for automatically stopping the turntable when the spools become empty.

The machine as shown in Fig. 1 is a duplicate machine comprising two stranding units of precisely similar construction, so that it will be understood that the description of one of the units applies equally to the other, although for purposes of convenience in operation and attendance, it is desired to mount the two duplicate units in the manner illustrated.

The machine comprises a bed plate 10 carried by four legs 11. The bed plate, as shown, provides a mounting for a pair of turntables 12, each of which rotates around an upstanding hub 14 of a fixed center pinion 20 clamped to the bed plate by a center bolt 13. Each of the turntables is provided with a circumferential rim 15 provided with exterior gear teeth 16 which are driven through spur gears 17, 18 and 19, as shown in detail in Fig. 3.

The fixed pinion 20 meshes on each side with an idler pinion 21, which in turn meshes with a coiler head pinion 22 fixedly mounted upon a stub shaft 23 which carries the coiler head 24. The arrangement shown constitutes a planetary gear system, and since the gears 22 and 21 are of equal diameter, and equal in number of teeth to the center pinion 20, it is evident that each complete forward rotation of the turntable, will result in a complete reverse rotation imparted to each of the coiler head pinions, so that the coiler heads will revolve around a common center without imparting any twist to the strand cables carried by the coiler heads.

Each coiler head 24 is provided with an inwardly extending arm 25 which carries a boss 26 which carries a spindle 27. The boss 26 affords a mounting for a spool platform 28 which is rotatably mounted upon the spindle

27, and the platform affords a base or support for the head 29 of a spool 30 which is rotatably mounted upon the spindle 27. The platform 28 must needs be rotatable in order to provide for the unwinding of the cable which imparts a slight intermediate rotation to the spool, and to this extent only modifies the effect of the reverse rotation provided for compensating the twisting effect of the orbital travel of the spool.

Each platform 28 is provided around its periphery with downwardly extending rearwardly facing teeth 31 which coact with the upturned tooth 32 of a dog 33 which is pivoted on a pin 34 carried between ears 35 upstanding from an angle plate 36 carried by the arm 25. The angle plate affords a mounting for an upstanding guide plate 37 which carries a slide weight 38 provided near its lower end with a pair of forwardly extending ears 39 carrying a pin 40 which journals a roller 41, around which is carried the cable 42 leading from the spool and passing upwardly through a guide lug 43 at the upper end of the guide bar 37.

The cable passes through an aperture 44 in the guide bar and thence is looped under the roller 41, so that the cable will be subjected to the tension of the weight which will be gradually drawn upwardly as the cable is stranded by the machine until the upper end of the weight is lifted to a point where it will engage with a loop 45 which surrounds the guide bar 37, which loop connects with a draw rod 46 leading to the forward end of the dog 33, so that as soon as the weight is drawn up sufficiently by the stranding of the cable to lift the loop 45 and exert a pull on the draw rod 46, the toothed rear end of the dog will be thrown down to release a tooth on the platform 31, thereby permitting the unspooling of a short length of the cable and a concurrent drawing down of the weight, so that a tension will be constantly maintained despite the intermediate feeding of the cable from the spool.

Each of the two spools is provided with this kind of a release or escapement mechanism, and the two cables fed from the companion spools are carried upwardly in converging relation, as in Fig. 1, and brought together immediately in front of a cross rod 47, which is carried by hangers 48 depending from a cross beam 49 supported upon uprights 50 which spring from the table 10 at opposite ends of the machine.

The cross rod 47 affords a mounting for a tension head 51 in the form of a flattened square block which carries a pair of forwardly extending tension rods 52 and 53, each of L-shaped formation, and having a laterally turned terminal portion 54 constituting lower and upper guide fingers between which the cables are united and tightly held by a severe tension imposed in a manner presently to be described. The tension rods 52 and 53 may be adjusted relatively in and out with respect to one another to afford an offset in the line of travel of the cabled strand, and in order to more firmly reinforce the tension fingers and hold them against displacement, a relatively stiff and rugged arm 55 is employed which is adjustably mounted upon the rod 47 and provided near its outer end with a slot 56 which receives the lower of the two tension fingers 54.

A link 57 connects the end of the arm 55 with the upper finger 54, so that by adjusting the tension rods 52 and 53 to the desired positions, and by tightening the arm 55 upon the rod 47, the tension fingers will be held rigidly in adjusted relation with respect to one another and in a manner adapted to withstand the heavy tension required to prevent any kinking of the strand in process of cabling. The cabled strand passes up and over a guide rod 58 carried by a forwardly extending arm 59 secured to a journal bracket 60, which journals a stub shaft 61 carrying a toothed roller 62 having rows of teeth or prongs which bite into the undersurface of the cable and serves to draw the same under heavy tension, which is resisted by the offset tension fingers 54 below which the stranding operation is going on.

In order to hold the strand in firm contact with the toothed roller 62, an idle roller 63 is provided which is mounted upon a shaft 64 carried at each end between swinging arms 65, the rear end of each arm being pivotally mounted upon a bracket arm 65a. The shaft is drawn down by heavy coil springs 66, the lower ends of which are secured to the cross plate 49.

The shaft 61 is carried through a journal box 67 formed on the upper end of the upright 50, and the outer end of the shaft carries a spur gear 68 in train with the spur gear 69, which latter is carried by a stub shaft 70 having thereon a worm gear 71 meshing with a worm 72 near the upper end of a vertical drive shaft 73, the lower end of which is journaled within a journal hanger bracket 74 and carries a bevel pinion 75 meshing with a driving bevel pinion 76 at the outer end of a horizontal drive shaft 77 which is adapted to be engaged by a clutch 78 with a constantly rotating pulley 79 located beneath the table 10.

The shaft 73 may be rotated by hand, if required, through the provision of bevel gears 80 and 81, the latter of which is mounted upon a shaft 82 journaled within a bracket 83 on the side of the upright 50, the shaft 82 being slidable within the bracket 83. A hand wheel 84 is provided at the outer end of the shaft 82 and a spring 85 is interposed between the hub of the hand wheel and the bracket 83 and serves normally to hold the bevel gears 80 and 81 out of mesh, but per-

mits intermeshing by an inward thrust upon the hand wheel, so that the tensioning devices may be operated by hand in the threading of the machine, or as occasion may require for any other purpose.

In order to stop the machine when the tension is released, and either of the weights 38 drops to its lowermost position, the following mechanism is provided:

The bed plate 10 is provided near one corner thereof with a post 86, to the upper end of which is pivoted a swinging bar 87, the free end of which is forced inwardly by the action of a coil spring 88 which encircles the post 86. The free end of the swinging arm bears against the upper end of a latch rod 89 (Fig. 6) provided with a latch tooth 90. The latch rod extends upwardly through a slot 91 in the upper flange 92 of a bracket 93 which is secured to the forward edge of the bed plate 10.

The rod also extends through an aperture 94 in the swinging arm 87, and when in normal position, the latch tooth 90 will engage the inner margin of the slot 91, so that the latch rod will remain elevated, as in Fig. 6, against the tension of a coil spring 95 which tends to force the latch rod downwardly. The arm 87 is provided with a flange 96 which is so disposed as to lie within the path of movement of the ears 39 on the tension weights 38 when in their lowermost positions, so that when either of the weights drops, through a release of the tension, the proximate ear 39, when the weight comes around, will engage the flange 96 on the swinging arm and force the arm outwardly against spring tension, thereby throwing back the latch rod 89 and releasing the tooth which permits the rod to drop downwardly.

The lower end of the rod is pivoted to an arm 97 on a rock shaft 98 carried by the hanger 99. The rock shaft is provided with a yoke 100, the arms of which engage with a clutch collar 101 on the shaft 77, so that when the latch rod is kicked off by the dropping of the tension weight, it will result in a swinging back of the yoke 100 which releases the clutch and stops the action of the machine.

In operation, a pair of spools each carrying one of the strand cables coiled thereon are mounted upon the spindles 27, which are normally held against rotation by the engagement of the dogs with the ratchet teeth on the rotatable platforms 28. The ends of the two cables are threaded through the apertures in the respective vertical guide bar 37 and through the weights and thence upwardly through guide lugs 43 and in converging relation to the point where the stranding operation takes place.

At this point, the cables are laid over and under one another to form the untwisted strand until a sufficient length has been stranded together to bring the end over the toothed tension feed wheel and under the spring pressed roller 63. The tension fingers will be adjusted to give a sufficient offset to the line of travel of the strand to strongly resist the pull of the toothed tension wheel 62, and in order to secure the desired rate of feeding, the gear wheels 68 and 69 are selected having a proper gear ratio to give the intended feeding rate in ratio to the revolving motion of the coiler heads. Thereafter, the latch rod 89 may be drawn upwardly and latched which will throw in the clutch and start the operation of the machine.

As the turntable rotates, the coiler heads in their revolutions will be subjected to a compensating reverse rotation through the action of the planetary gearing, which rotation will be commensurate with the revolution of the coiler head, so that the latter will constantly present the same side forwardly.

As the stranding operation proceeds, the weights will be gradually lifted by the uncoiling of the respective cables from the spools until the upper edge of a tension weight is brought into contact with the associated loop 45 which will lift the draw rod 46 and disengage the toothed end of the dog which will release the spool and allow it to turn sufficiently to feed forward a short length of cable, the slack in which will be immediately taken up by the weight, and this uncoiling is the only rotation which is imparted to the spool independently of the coiler head upon which it is mounted, but this unwinding rotation will not impart a twist to the flat cable, so that the two flat cables or engaged constituents of the strand will never be subjected to any axial twisting movement, but will be laid flatwise over and under one another, so that they will also present the same side outwardly which results in the formation of a flat two cabled strand which will retain its flat character, thereby exposing a maximum of flat surface, which would be impossible if the flat cables or strand constituents were subjected to the ordinary twisting effect which results from a stranding operation in which no provision is made for a reverse rotation of the coiler heads.

As a matter of convenience, in structure, the machine shown is arranged in duplicate, which to some extent simplifies the arrangement of the mountings for the working parts, and the arrangement of the drive mechanism, although it will be understood that everything which has been heretofore described is in duplicate, with the exception of certain of the mountings and feedings, which as shown in the figures, are common to the two machines.

In building up a strand of the flat character in question, it is necessary to subject the strand to a very heavy tension in order to cause a uniform back and forth bending of the flat cables, and this result is accomplished

by the means provided for securing a very strong or powerful feeding tension, which is restricted by the offset tension fingers so as to confine the cabling to the point of convergence below the lowermost of the tension fingers with the result that the constituents of the strands are compelled to weave in and out in front of and behind one another at this point which results in a smooth, uniform and perfect strand, the constituents of which lie in, flatwise relation in such a way as to present a maximum exposure of surface, thus enabling the building up of a definite or predetermined surface pattern in the completed rug.

I claim:

1. In a stranding machine, the combination of a turntable, rotating coiler heads carried by the turntable, spools mounted upon the coiler heads, escapement means carried by the coiler heads for intermittently releasing the spools to permit rotation thereof, means for rotating the turntable, and means for reversely rotating the coiler heads, substantially as described.

2. In a stranding machine, the combination of a turntable, rotating coiler heads carried by the turntable, spools mounted upon the coiler heads, escapement means carried by the coiler heads for intermittently releasing the spools to permit rotation thereof, means for rotating the turntable, and means for reversely rotating the coiler heads at a rotatorial speed equal to that of the turntable, said means including planetary gearing actuated by the rotation of the turntable, substantially as described.

3. In a stranding machine, the combination of a turntable, rotating coiler heads carried by the turntable, spools mounted upon the coiler heads, escapement means carried by the coiler heads for intermittently releasing the spools to permit rotation thereof, means for rotating the turntable, and means for reversely rotating the coiler heads at a rotatorial speed equal to that of the turntable, said means including a fixed center gear, a gear fixed to each of the coiler heads and journaled within the turntable, and intermediate gears journaled to the turntable and located respectively between the fixed center gear and each of the coiler head gears, all of said gears being of equal size, substantially as described.

4. In a stranding machine, the combination of a turntable, rotating coiler heads carried by the turntable, spools mounted upon the coiler heads, escapement means carried by said rotating coiler heads for intermittently releasing the spools to permit rotation thereof, a slidable weight carried by each of the coiler heads in proximate relation to the spool and adapted to be lifted by the out running cable delivered from the spool, means actuated by the lifting of the weight to a predetermined point for actuating the associated escapement mechanism, means for rotating the turntable, and means for reversely rotating the coiler heads, substantially as described.

5. In a stranding machine, the combination of a turntable, rotating coiler heads carried by the turntable, spools mounted upon the coiler heads, escapement means carried by said rotating coiler heads for intermittently releasing the spools to permit rotation thereof, a slidable weight carried by each of the coiler heads in proximate relation to the spool and adapted to be lifted by the out running cable delivered from the spool, means actuated by the lifting of the weight to a predetermined point for actuating the associated escapement mechanism, means for rotating the turntable, and means for reversely rotating the coiler heads, said means including planetary gearing actuated by the rotation of the turntable, substantially as described.

6. In a stranding machine, the combination of a turntable, rotating coiler heads carried by the turntable, spools mounted upon the coiler heads, escapement means carried by said rotating coiler heads for intermittently releasing the spools to permit rotation thereof, a slidable weight carried by each of the coiler heads in proximate relation to the spool and adapted to be lifted by the out running cable delivered from the spool, means actuated by the lifting of the weight to a predetermined point for actuating the associated escapement mechanism, means for rotating the turntable, and means for reversely rotating the coiler heads, said means including a fixed center gear, a gear fixed to each of the coiler heads and journaled within the turntable, and intermediate gears journaled to the turntable and located respectively between the fixed center gear and each of the coiler head gears, substantially as described.

7. In a stranding machine, the combination of a turntable, rotating coiler heads rotatably carried by the turntable, spools mounted on the coiler heads, an escapement device carried by each coiler head for the associated spool for permitting intermittent limited rotation thereof, a weight slidably mounted on each of the coiler heads in lateral proximity to the spool mounted thereon and adapted to be lifted by the out running cable delivered from the spool carried thereby, a connection for each of the escapement devices positioned to be lifted by the lifting of the associated weight beyond a predetermined point and adapted to release the escapement, means for rotating the turntable and means for rotating the coiler heads on their axes on the turntable, substantially as described.

8. In a stranding machine, the combination of a turntable, coiler heads rotatably carried by the turntable, spools mounted on the coiler heads, an escapement device carried by each coiler head for the associated spool for

permitting intermittent limited rotation thereof, a weight slidably mounted on each of the coiler heads in lateral proximity to the spool mounted thereon and adapted to be lifted by the out running cable delivered from the spool carried thereby, a connection for each of the escapement devices positioned to be lifted by the lifting of the associated weight beyond a predetermined point and adapted to release the escapement, means for rotating the turntable, means for reversely rotating the coiler heads on their axes on the turntable, tension guide members adapted to afford an offset passage for the strand cables, a feeding roller beyond the tension guide members for drawing forward the strand, and means for applying pressure to hold the strand against the feeding roller, substantially as described.

9. In a stranding machine, the combination of a turntable, coiler heads rotatably carried by the turntable, spools mounted on the coiler heads, an escapement device carried by each coiler head for the associated spool for permitting intermittent limited rotation thereof, a weight slidably mounted on each of the coiler heads in lateral proximity to the spool mounted thereon and adapted to be lifted by the out running cable delivered from the spool carried thereby, a connection for each of the escapement devices positioned to be lifted by the lifting of the associated weight beyond a predetermined point and adapted to release the escapement, means for rotating the turntable, means for reversely rotating the coiler heads on their axes on the turntable, tension guide members adapted to afford an offset passage for the strand cables, a feeding roller beyond the tension guide members for drawing forward the strand, and means for applying pressure to hold the strand against the feeding roller, substantially as described.

10. In a stranding machine, the combination of a rotatably mounted turntable, rotating coiler heads carried by the turntable, a spool carried by each of the coiler heads, a guide plate upstanding from each of the coiler heads, a weight slidably mounted upon the guide plate and adapted to afford a passage for the cable delivered from the spool and to be lifted by the tension on the out running cable, clutch controlled driving elements for imparting rotation to the turntable, and means adapted to be actuated by the rotation of the turntable and the individual rotation of either of the weights when lowered by release of tension thereon for disconnecting the clutch to stop the rotation of the turntable, substantially as described.

11. In a stranding machine, the combination of a rotatably mounted turntable, rotating coiler heads carried by the turntable, a spool carried by each of the coiler heads, a guide plate upstanding from each of the coiler heads, a weight slidably mounted upon the guide plate and adapted to afford a passage for the cable delivered from the spool and to be lifted by the tension on the out running cable, clutch controlled driving elements for imparting rotation to the turntable, means adapted to be actuated by the rotation of the turntable and the individual rotation of either of the weights when lowered by release of tension thereon for disconnecting the clutch to stop the rotation of the turntable, said means including a spring pressed swinging arm provided with a member adapted to be engaged by either weight when lowered, a latch rod associated with said arm and adapted to be held in latched relation thereby and to be unlatched when the arm is swung outwardly by engagement of the weight, and connections actuated by the unlatching of the latch rod for unclutching the driving mechanism, substantially as described.

12. In a stranding machine, the combination of a rotatably mounted turntable, clutch controlled driving means for rotating the turntable, a yoke member adapted to actuate the clutch, a rock shaft by which the yoke is carried, an arm outstanding from the rock shaft, a spring actuated latch rod upstanding from said arm, a swinging arm adapted to hold said latch rod in latched relation to maintain the clutch in driving relation, rotating coiler heads carried by the turntable, a slidably mounted tension weight carried by each of the coiler heads and adapted to be lifted by tension on the out running cable delivered from the coiler head, the weights occupying a position when lowered to engage with the swinging arm and move the latter outwardly to unlatch the latch rod and effect an unclutching of the driving mechanism, substantially as described.

13. In a stranding machine, the combination of a bed plate, a rotatably mounted turntable thereon provided with a down-turned marginal flange having gear teeth around its periphery, gear elements in mesh with said gear teeth for rotating the turntable, a fixed center gear around which the turntable rotates, a pair of equally spaced coiler heads rotatably mounted on the turntable, a gear fixedly carried by each of the coiler heads, and intermediate gears interposed respectively between the center gear and each of the coiler head gears for imparting reverse rotation to each of the coiler heads, said gears being of equal size and contained in the space between the bed plate and turntable, substantially as described.

14. In a stranding machine, the combination of a rotatably mounted turntable provided wth gear teeth around its periphery, gear elements in mesh with said gear teeth for rotating the turntable, a fixed center gear around which the turntable rotates, a pair

of equally spaced rotating coiler heads rotatably mounted on the turntable, a gear fixedly carried by each of the coiler heads, intermediate gears interposed respectively between the center gear and each of the coiler head gears for imparting reverse rotation to each of the coiler heads, said gears being of equal size, a boss carried by each of the rotating coiler heads, a toothed platform rotatably mounted on each of said bosses, a dog pivoted above each of said coiler heads and provided with a tooth engaging with the teeth thereof, a guide member upstanding from each of the rotating coiler heads in proximate relation to the dog, a weight slidably mounted upon said guide member, and a connection for each dog extending upwardly along the guide member and adapted to be engaged by the weight when lifted to a predetermined degree to effect a release of the dog and an escapement of the platform, substantially as described.

15. In a stranding machine, the combination of a rotatably mounted turntable, coiler heads rotatably mounted thereon and spools carried by said coiler heads and means for convergingly guiding a pair of strand constituent cables delivered from the spools, said guiding means including a pair of spaced tension fingers in offset relation to one another as respects the line of feed of the strand, said fingers being relatively adjustable to vary the degree to which they are offset with respect to the feeding line, and means located above said fingers for exerting a tension on the completed strand, substantially as described.

16. In a stranding machine, the combination of a rotatably mounted turntable, coiler heads rotatably mounted thereon and spools carried by said coiler heads and means for convergingly guiding a pair of strand constituent cables delivered from the spools, said guiding means including a pair of spaced tension fingers in offset relation to one another as respects the line of feed of the strand, said fingers being relatively adjustable to vary the degree to which they are offset with respect to the feeding line, and means located above said fingers for exerting a tension on the completed strand, said means including a toothed roller and a spring pressed roller for exerting pressure against said toothed roller, and means for positively rotating the toothed roller, substantially as described.

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