(No Model.) 4 Sheets—Sheet 1.

S. W. WARDWELL, Jr.

MULTIWOUND COP.

No. 533,934. Patented Feb. 12, 1895.

Fig. 9.

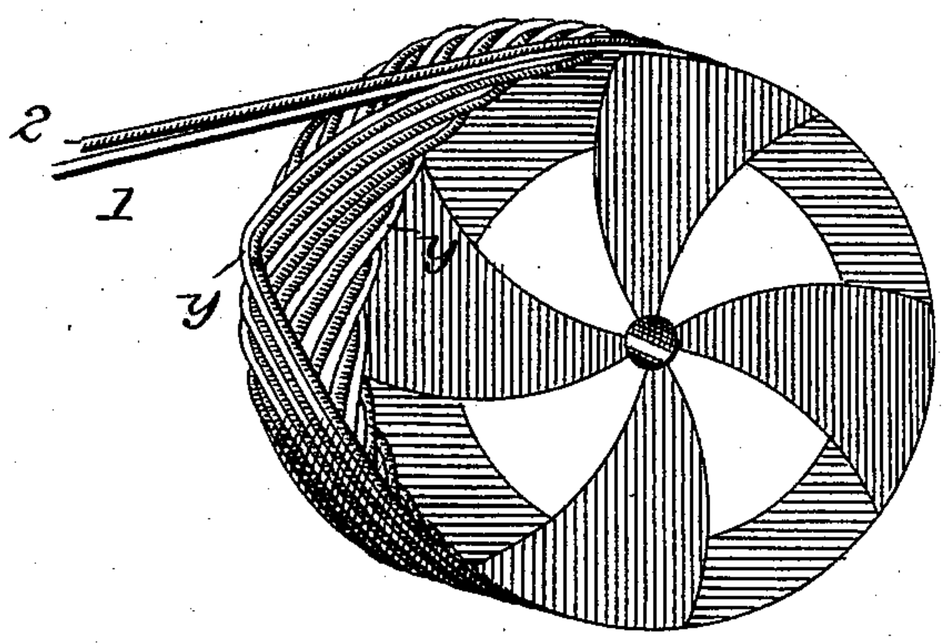


Fig. 5.

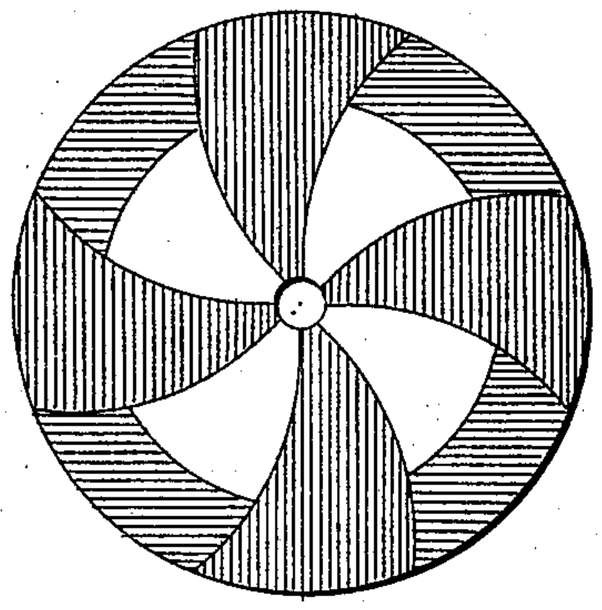


Fig. 6.

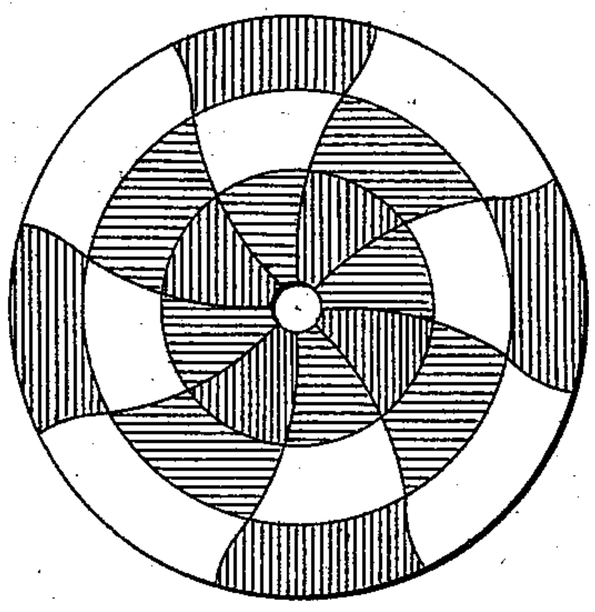


Fig. 7.

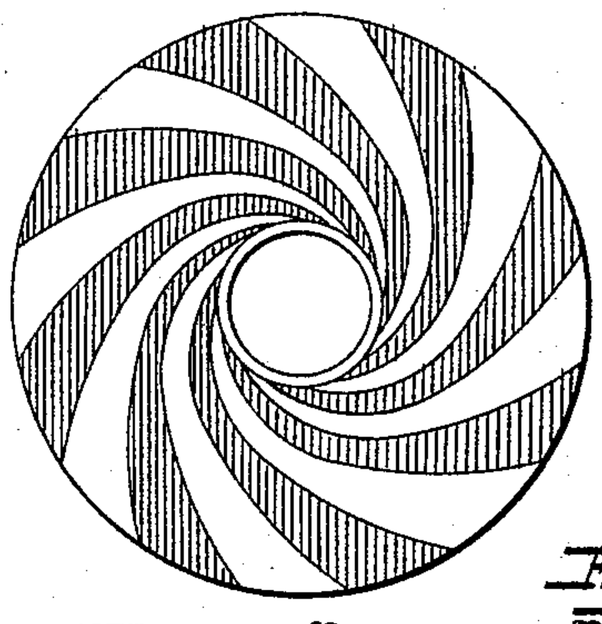


Fig. 8.

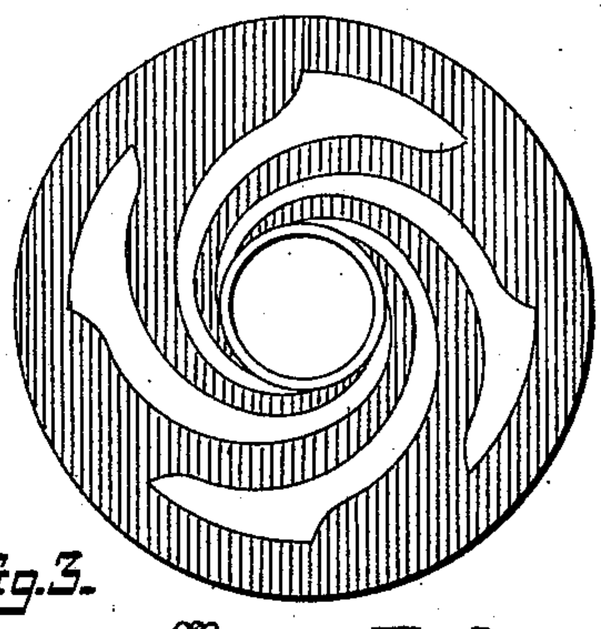


Fig. 2.

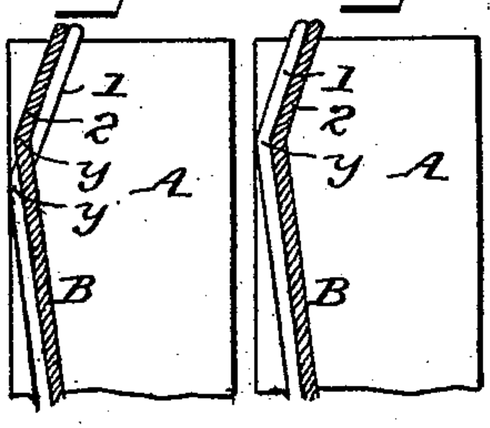


Fig. 3.

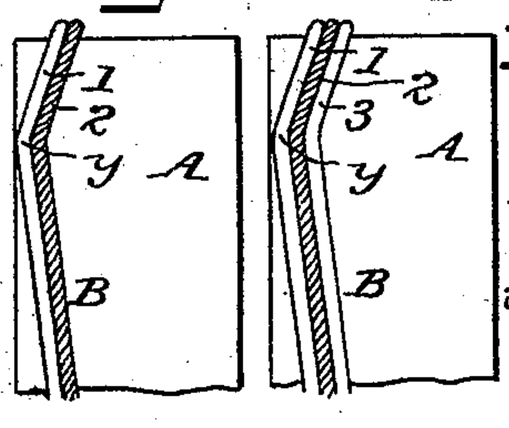


Fig. 1.

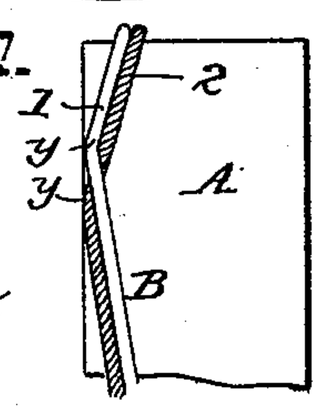


Fig. 4.

Witnesses
Jno. G. Hinkel
A. W. Dobson

Inventor
S. W. Wardwell Jr.
By
Foster & Freeman
Attorneys

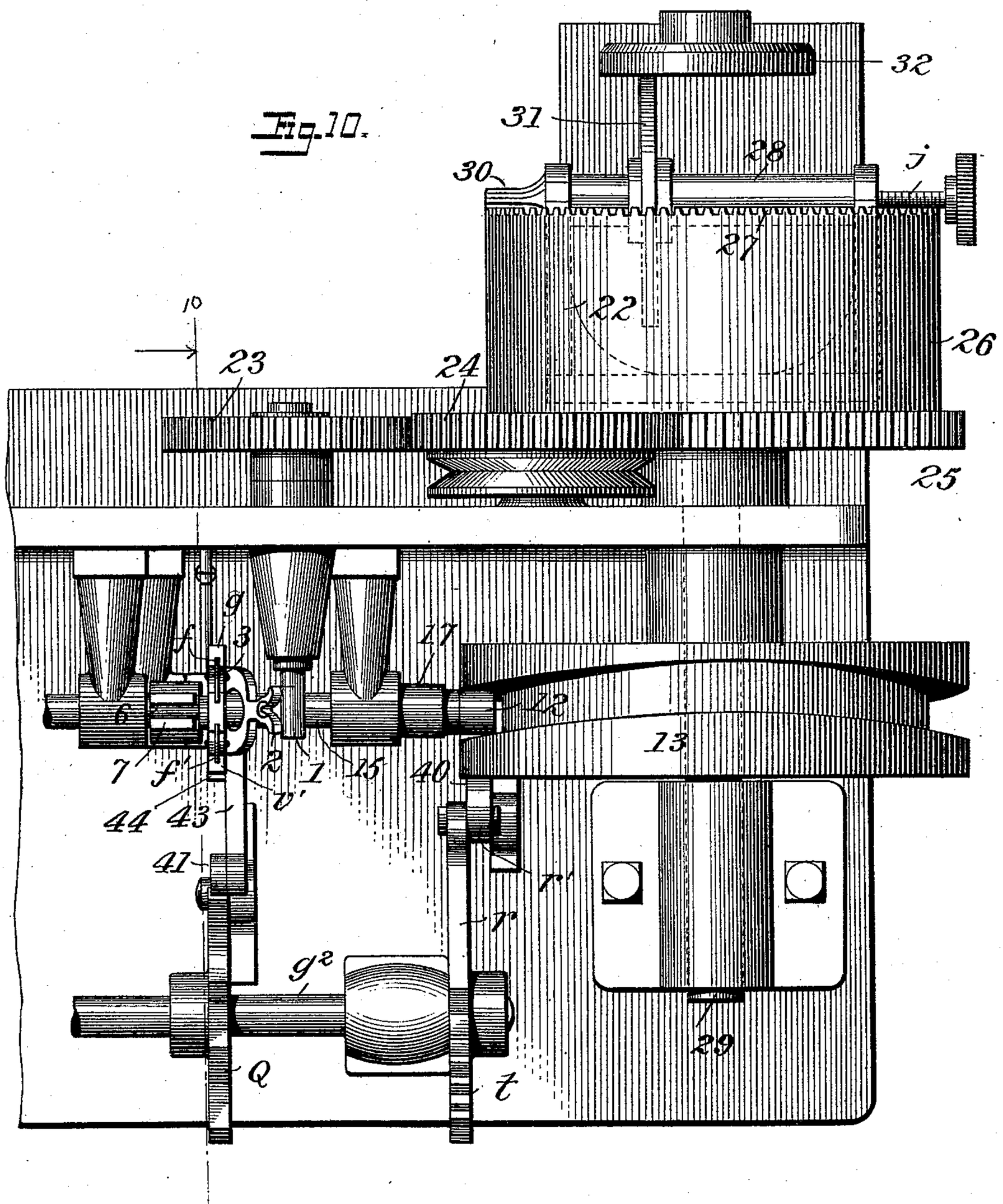
(No Model.) 4 Sheets—Sheet 2.

S. W. WARDWELL, Jr.

MULTIWOUND COP.

No. 533,934. Patented Feb. 12, 1895.

Fig. 10.



Witnesses.
Jno. G. Hinkel
A. F. Dobson

Inventor
S. W. Wardwell Jr.
By Foster & Freeman
Attorneys.

(No Model.) 4 Sheets—Sheet 3.

S. W. WARDWELL, Jr.

MULTIWOUND COP.

No. 533,934. Patented Feb. 12, 1895.

Fig. 11.

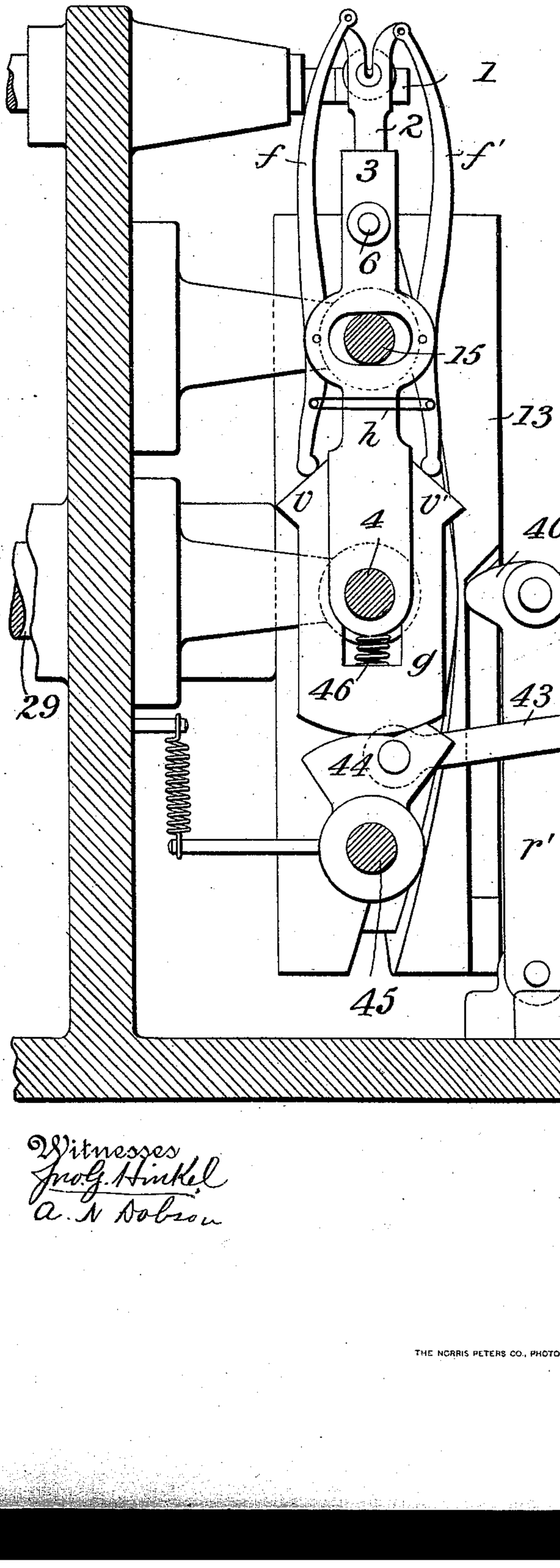
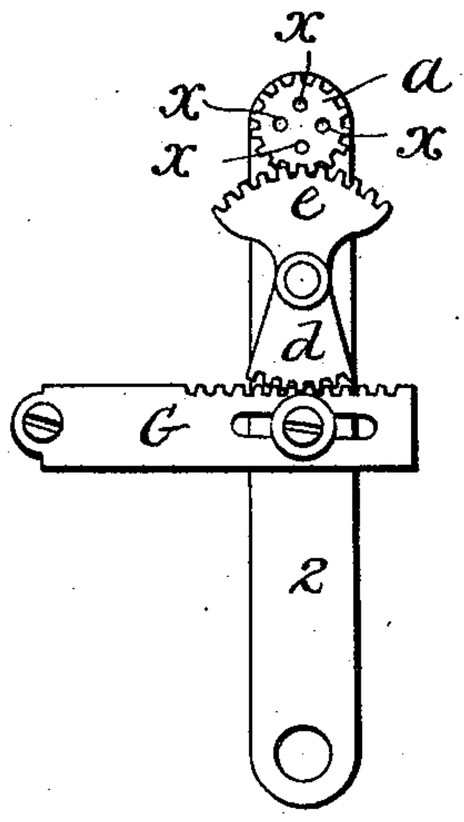


Fig. 13.



Witnesses
Jno. G. Hinkel
A. N. Dobson

Inventor
S. W. Wardwell Jr.
By Foster & Freeman
Attorneys

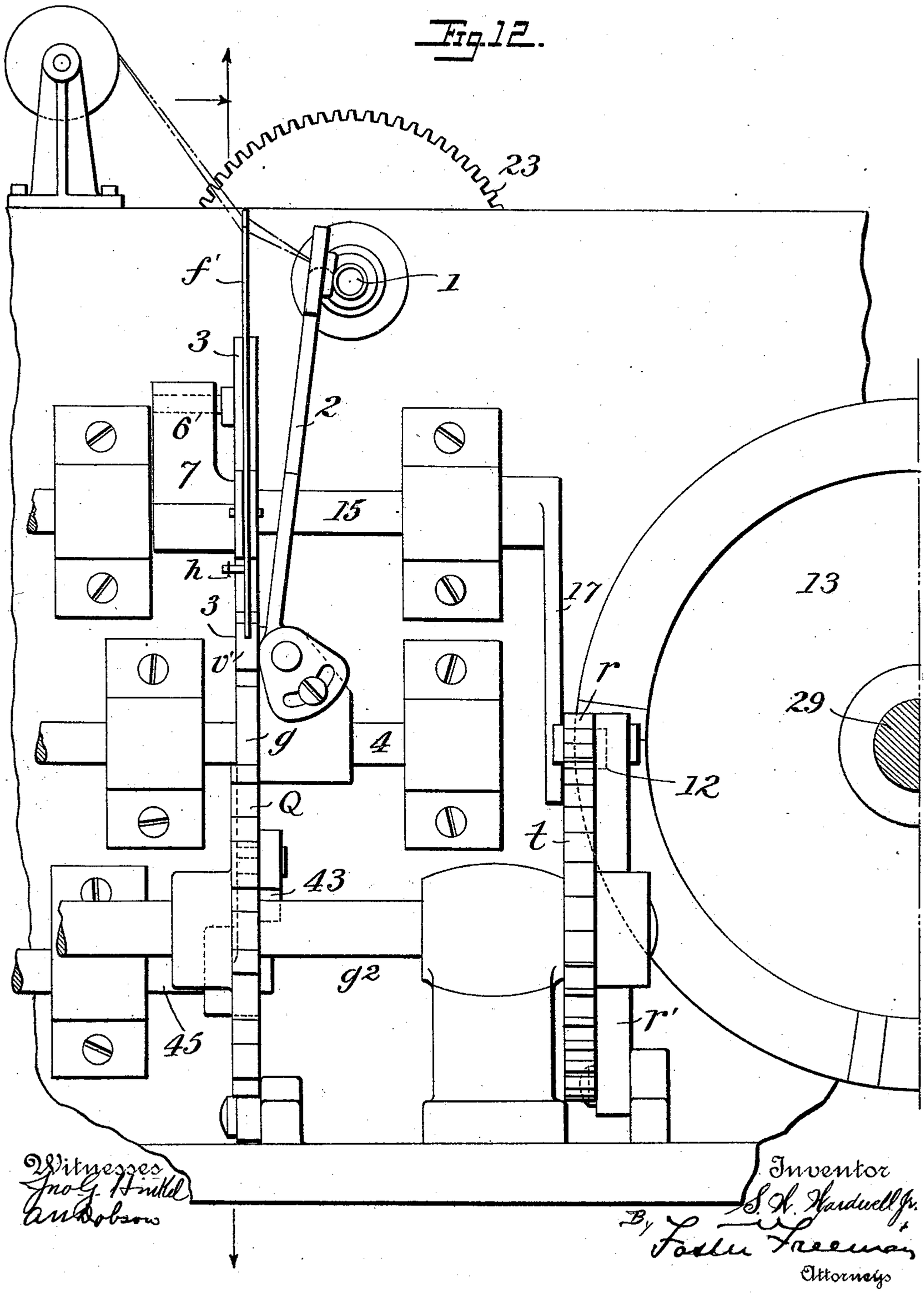
(No Model.) 4 Sheets—Sheet 4.

S. W. WARDWELL, Jr.

MULTIWOUND COP.

No. 533,934. Patented Feb. 12, 1895.

Fig. 12.



Witnesses
Jno. G. Hinkel
Ed. Dobson

Inventor
S. W. Wardwell Jr.
By Foster Freeman
Attorneys

UNITED STATES PATENT OFFICE.

SIMON W. WARDWELL, JR., OF BOSTON, MASSACHUSETTS.

MULTIWOUND COP.

SPECIFICATION forming part of Letters Patent No. 533,934, dated February 12, 1895.

Application filed November 7, 1893. Serial No. 490,319. (No model.)

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, Jr., a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Multiwound Cops, of which the following is a specification.

My invention is a cop consisting of a plurality of threads of different colors or characters wound as a single cord, and in the method and means of winding said cop as is fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figures 1 to 3 are diagrams illustrating the arrangement of the threads in the multiple cord when the latter consists of two threads. Fig. 4, is a diagram illustrating the arrangement of threads when the multiple cord consists of three threads. Figs. 5, 6, 7 and 8, are end views of cops wound in accordance with my improvement showing different ornamental patterns thereby produced. Fig. 9, is a perspective view illustrating a cop in the act of winding. Fig. 10, is a plan view illustrating the mechanism for winding the improved cops. Fig. 11, is an elevation enlarged in part section on the line 10, 10, Fig. 10. Fig. 12, is a side view enlarged, of part of the mechanism illustrated in Fig. 10. Fig. 13, is a detached view illustrating a different form and arrangement of thread carrier devices and operating appliances.

In Letters Patent No. 486,745, issued to me November 22, 1892, I set forth the winding of a cop wherein each coil of thread or cord is carried in a spiral from one end of the cop to the other and at the end of the cop is bent back forming another spiral or coil which is laid parallel to one of the coils previously laid, all of the said bends at each end of the cop being in substantially the same plane.

I have found that by arranging two or more threads of different colors or materials side by side and simultaneously winding these threads in the same manner as the single thread is wound in the before mentioned cop, and by shifting the positions of these threads so that one or other of the same is brought to the end of the cop to form the bend as before described, I am enabled to build up cops having variegated end faces of an extremely ornamental character and which may be used as medallions, panels, fillers for lockets, sleeve buttons, &c., and other ornamental and useful purposes, and that the said threads may be laid at will by suitable mechanism so that any desired pattern may be formed and duplicated. As illustrations of said ornamental cops and of the patterns which may be regularly and uniformly produced and duplicated I refer to Figs. 5 to 8, each of which illustrates a different character of ornamentation produced by the use of two different colored threads, while Figs. 1, 2, 3 and 4, illustrate diagrammatically the manner in which two or more threads may be shifted to vary the pattern at the end of the cop.

In the diagrams, Figs. 1, 2 and 3, A, represents the body of the cop, and B, what I term "the wind," as last laid thereon and consisting of two independent but parallel threads 1, 2, laid upon the body to build up the cop as set forth in the aforesaid Letters Patent No. 486,745. Inasmuch, however, as the wind B, in the present instance consists of a plurality of threads, it will be seen that when the threads are brought to one end of the cop as shown in the diagram Fig. 1, they may be crossed so that two bends *y*, *y*, are brought to the plane at the end of the cop, and there will be exposed on the end face of the latter two bends or knuckles of different colors. If the threads are crossed in one direction the knuckle *y*, of dark thread will succeed the knuckle *y*, of light thread, as shown in Fig. 1, while if it is crossed in the other direction the position of the threads will be reversed as shown in Fig. 2, and if the threads are not crossed at all, and kept parallel to each other, in any suitable manner, only one of them will be exposed at the end of the cop, as at *y*, Fig. 3, or Fig. 4, and the other thread will be thus exposed if the positions of the threads are reversed before they reach the end of the cop.

In Fig. 4, I illustrate diagrammatically a "wind" of three threads as laid in building up a cop so as to expose at the end of the cop the knuckle or bend *y*, of one of the threads only, but it will be evident that by twisting or shifting the threads of the cord, either may be brought outside of the others at the point where the bend occurs.

Different means may be employed for building up the cop and shifting the positions of

the threads. For instance in building up a cop I may make use of the apparatus described in my Letters Patent No. 480,158, or other apparatus wherein there is a revolving holder or shaft onto which the thread is wound and a reciprocating guide with its eye in close proximity to the surface of the cop, and means for imparting an added movement to, (or for decreasing the movement of) the shaft or cop at each rotation so that each wind of thread is laid along side of and parallel to one of the winds previously laid. In addition to these devices there must be means whereby the extent of the said variation, or added or decreased movement, can be varied to any degree at pleasure, as the extent of this variation will govern the position of the bends or knuckles *y*, within certain degrees, and the character of the pattern. In addition there must be means for shifting the positions of the threads in respect to each other, and to this end I provide thread carriers or controllers of any suitable character carried by or arranged in proximity to the guide, through the eye or notch of which the threads are carried. As an illustration of a machine embodying these features I refer to that shown in Figs. 10 to 12, and modification Fig. 13, in which 1, is the cop shaft, 2, the guide, supported by a carrier 3, which is an arm having a hub or block upon a rock-shaft 4. A shaft 15, carries a slotted arm 7, into which extends a pin 6, from the arm of the carrier 3, and from an arm 17, on the shaft 15, a pin 12, extends into a slot in a cam 13, on the shaft 29, so that the rotation of the cam vibrates the shaft 15, rocks the carrier 3, and the guide 2, imparting one reciprocation to the carrier at each revolution of the cam shaft 29. The shaft 1, is driven from the cam shaft through the intervention of gears 23, 24, 25. If these gears were all fixed upon their shafts the relation of the reciprocating guide driven by the cam, and the rotating spindle 1, driven from the cam shaft, would be constant, but in order to obtain an increment of movement, as is required in building up the aforesaid cop, one or other of the gears has a determinate increase or decrease of motion at each rotation of the cam shaft. Thus, the gear 25, instead of being fixed to the shaft 29, is driven therefrom by a pinion 30, on a shaft 28, carried by a bracket 22, on the shaft 29, said pinion 30, engaging a rack 27, on a flange 26, carried by the gear 25. If the shaft 28, is held stationary the gear 25, will be carried with the shaft 29, without variation, but by slowly revolving the shaft 28, the gear 25, is revolved to a slightly greater or less extent than the shaft 29. The slow movement of the shaft 28, is obtained by providing the shaft with a friction wheel 31, bearing and traveling upon a flat bearing block 32, the extent of the movement being regulated by carrying the wheel 31, to a greater or less distance from the axial line of the shaft 29. The shifting of the position of the wheel 31, on the shaft 28, is effected by means of a screw feeding shaft *j*, in a manner which need not be here described as the above described machine is fully illustrated in my Letters Patent No. 506,959, and is here referred to only as illustrating one mechanism for securing the desired movements of the cop shafts and guide and of varying to any desired extent and during the operation of the machine the extent of the added or decreased movement of the shaft in respect to the guide.

One means of shifting the threads that are simultaneously wound, is illustrated in Fig. 13, where the guide 2, is provided with a disk A, turning in a socket in the guide eye and having a number of openings *x*, for the passage of threads with means for turning the said disk to shift the positions of the openings, as for instance a segmental rack lever *e*, pivoted to the guide and engaging teeth on the thread carrier disk *a*, and being rocked by a reciprocating rack G, having teeth engaging with teeth upon said rack lever, the said rack G, being arrested from time to time by any suitable pattern mechanism of a character to permit the part G to move with the guide 2, except when the disk *a* is to be turned. A preferable construction, however, is that illustrated in Figs. 10 to 12, where the carrier 3, has pivoted to its opposite sides two thread-carrier arms *f*, *f'*, each with an eye at the upper end, and on the carrier 3, slides a cam yoke *g*, having reversely inclined faces *v*, *v'*, bearing on the lower ends of the carrier arms *f*, *f'*, so that when the yoke *g*, descends the upper ends of the arms *f*, *f'* will be thrown outward by a spring *h*, connected to both arms below their pivots. When the yoke *g*, is thrown upward the upper end of the arms will be thrown inward and crossed, shifting the positions of the threads.

The cam yoke *g*, may be shifted in any suitable manner from a pattern wheel or other pattern surface Q, operated from any moving part of the machine. Thus a pawl *r*, carried by an arm *r'* pivoted to the base engages a ratchet wheel *t*, on the shaft g^2, carrying the pattern wheel Q. A lug 40, on the arm *r'*, bears on a cam edge of the cam 13, which reciprocates the arm and the pattern wheel is fed with a step by step motion. The pattern wheel bears on a lug 41, on an arm 42, pivoted to the base and connected by a rod 43, to a lifting cam 44, on a shaft 45, and on which bears a cam yoke *g*, a spring 46, pushing the yoke downward.

It will be seen that by the mechanism above described and by the use of a pattern wheel, or chain or surface of any desired character, the thread carriers may be thrown at any point of the revolution of the cop to one or other of their positions so as to shift the positions of the threads and produce a pattern of any desired character at the end of the cop.

While I have referred to a cop built up of a plurality of threads simultaneously laid as being specially serviceable for purposes of

ornament, it is further useful in those cases where two colored threads of different colors are used with a single needle in the ornamental stitching of corsets and other articles. For this purpose it will be evident that the cop may be wound in any suitable manner.

Without limiting myself to any special number or arrangement of threads in the multiple strand or to the use of the special mechanism described for winding the same, I claim as my invention—

1. A cop in which a plurality of threads of independent colors or characters are laid side by side in coils extending from end to end of the cop, different threads being outside of the others at different points at the ends of the cop to form patterns at said ends, substantially as set forth.

2. A cop in which independent threads of different colors or characters are laid in coils extending from end to end of the cop, each coil parallel to the adjacent coil, with the bends of the external threads at each end all substantially in the same plane, but with different threads carried to the outside at such bends at different points to form patterns at the ends of the cop, substantially as set forth.

3. The within described mode of winding to produce cops with pattern surfaces at the ends, the same consisting in simultaneously winding a plurality of independent threads spirally in successive coils, carrying the threads at each end of the cop over those of a coil previously laid, forming bends at said end, and changing the positions of the different threads so as to bring different threads to the outside or end surface at different points, substantially as set forth.

4. A thread winding machine provided with a winding shaft, reciprocating carriers for two or more threads and means for reciprocating the same opposite the shaft and means for shifting the positions of the carriers to and from each other during the operation of the machine, substantially as set forth.

5. The combination in a thread winding machine, of a winding shaft, a reciprocating guide, two or more thread carriers, a pattern surface, and connections between the pattern surface and the carriers to shift the positions of the latter to and from each other to reverse the positions of the threads during the operations of the machine, substantially as set forth.

6. A thread winding machine provided with a revolving holder, reciprocating thread guide, means for varying the relative movements of the holder and guide at each rotation, adjusting devices for regulating the extent of the varying movement, carriers for a plurality of threads, and means for shifting the positions of the carriers to and from each other automatically during the operation of the machine, substantially as set forth.

7. The combination in a thread winding machine and with the winding shaft thereof, of a plurality of thread carriers through which the thread passes to said winding shaft and a pattern surface and connections between the pattern surface and carriers for automatically shifting the relative positions of the carriers during the winding operations, substantially as set forth.

8. The combination in a thread winding machine a revolving winding shaft, reciprocating guide, a plurality of thread carriers, devices for automatically varying the relative movements of the winding shaft and guide, and devices for automatically shifting the relative positions of the carriers, substantially as set forth.

9. The combination with the winding shaft of a winding machine, of a reciprocating guide having an eye or notch and a plurality of thread carriers with eyes arranged adjacent to said eye or notch, and means for automatically shifting the relative positions of the said carriers, substantially as set forth.

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

SIMON W. WARDWELL, JR.

Witnesses:
CARL CHRISTENSEN,
MILFORD C. BLISS.