# T. G. Boone,

## Imp.d Rope Machine,

No. 15326, Patented July 15, 1856.

Fig. 1

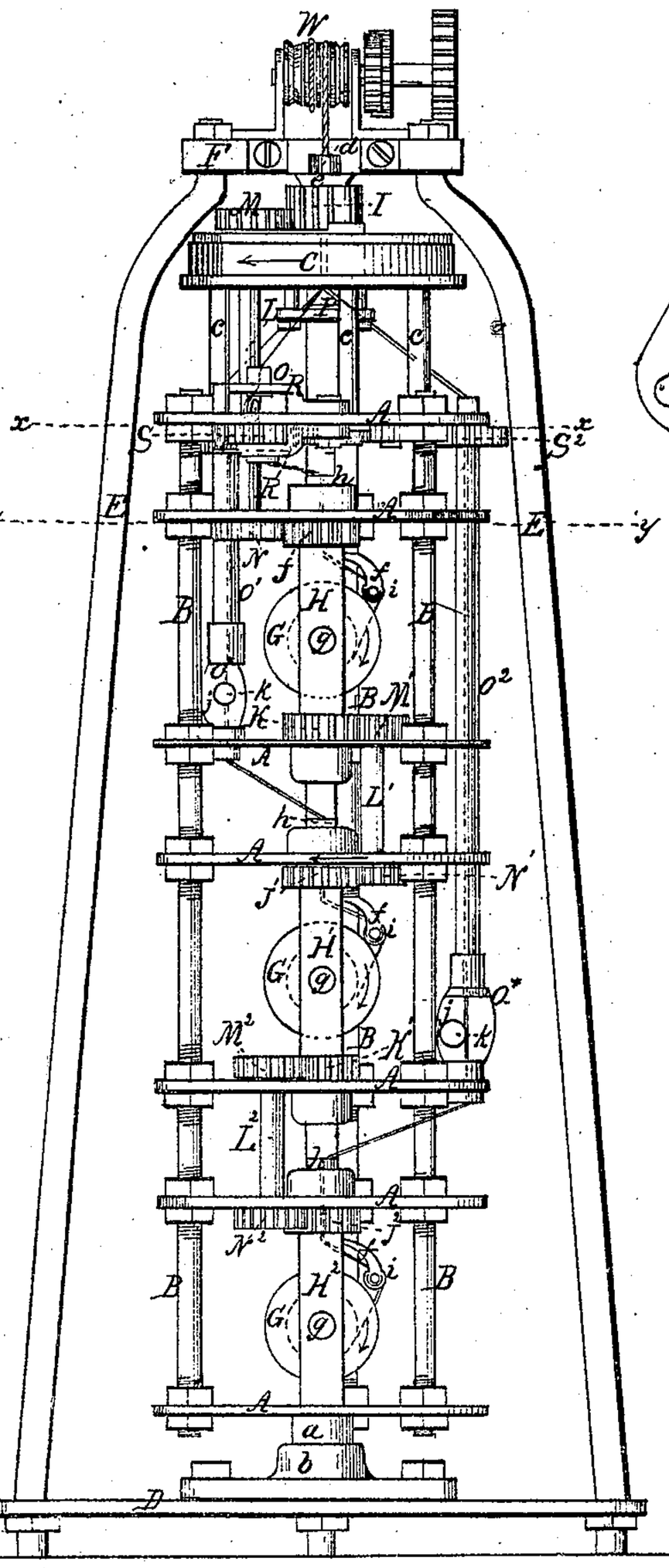



Fig. 2

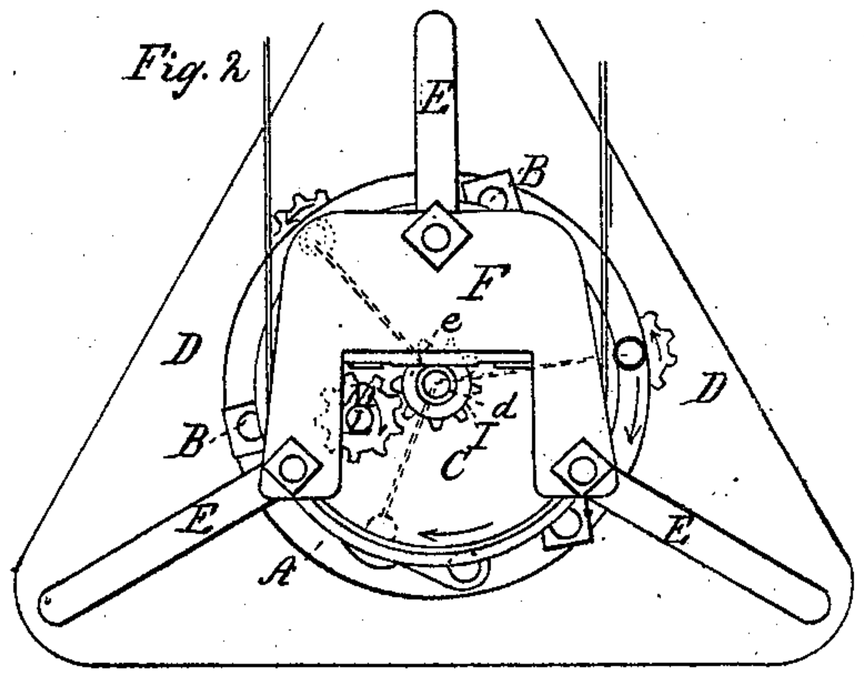



Fig. 3

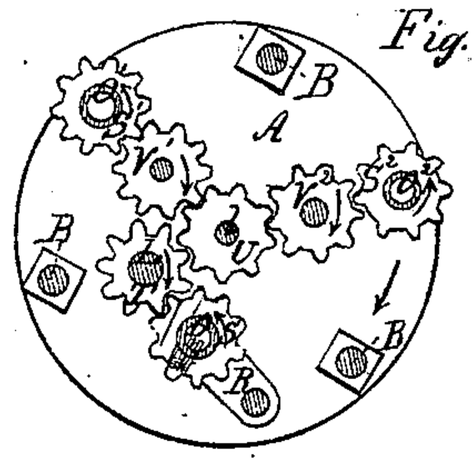
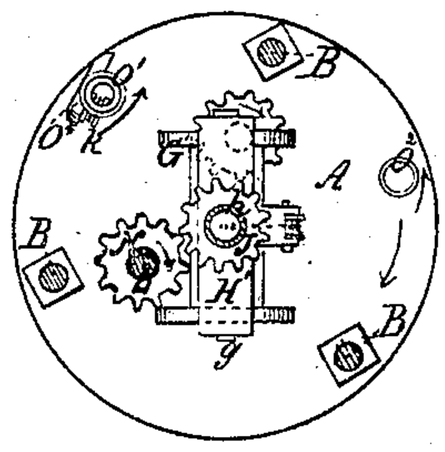



Fig. 4



# UNITED STATES PATENT OFFICE.

THOMAS G. BOONE, OF BROOKLYN, NEW YORK.

## IMPROVEMENT IN ROPE-MACHINES.

Specification forming part of Letters Patent No. **15,326**, dated July 15, 1856.

*To all whom it may concern:*

Be it known that I, THOMAS G. BOONE, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Machine for Making Rope; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, forming part of this specification, in which—

Figure 1 is an elevation of the machine. Fig. 2 is a plan of the same, with the capstans removed. Fig. 3 is a horizontal section taken in the plane indicated by the line *x x* in Fig. 1. Fig. 4 is a horizontal section in the plane indicated by the line *y y* in Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists, chiefly, in a certain arrangement of well-known parts, and in certain novel devices for twisting together the strands and laying them into rope, whereby the axes of the strand-spindles are brought to positions in line with the axis of the laying-spindle, and whereby when what is termed an even "forehard"—that is to say, forehard in the strand equal in turns to that of the lay—is desired, no rotary motion of the strand-spindles is required, thereby enabling the machine to be driven at a much higher velocity than is practicable for any of the other rope-machines now in general use and with much less power, and bringing the machine into a more compact form. By the term "forehard," which is well understood and commonly used by rope-makers, I mean the additional twist that, to make a good rope, requires to be put into the strands just as they run into rope to compensate for the twist that is unavoidably taken out by the act of laying or twisting the strands together in a contrary direction to their own twist. When this additional twist put into the strands equals the twist taken out by the act of laying, it is termed an "even forehard."

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The strand-spindles, the laying-block, and all the operating parts of the machine, with the exception of the capstans for winding up the rope as it is made, are carried by a rotating frame composed of a series of plates A A A, arranged horizontally, one above another, concentric to a common axis, and connected together by three or more uprights B B B, the lowest plate having a journal *a*, to be received in a step-bearing *b*, and the upper one having rigidly attached to it by pillars *c c* a drum C, which is furnished with a hollow journal *d* to work in a guide-bearing *e*, that is arranged in the same vertical line with the step-bearing *b*. The bearings *b* and *e* may be attached to or form parts of a framing D E F, as shown in Fig. 1, or the bearing *b* may be secured to the floor of the factory and the upper bearing *e* carried by a framing of any suitable character.

The main rotating frame A A B B B may be considered as constituting the laying-spindle.

H H′ H² are the strand-spindles, consisting each of a square frame with journals *h h* at top and bottom, and with a pin *g* inserted transversely through it to form an axle for the spool G, carrying the strand. The journals *h h* of the several strand-spindles are fitted to bearings in the centers of certain of the plates A A of the main rotating frame, the several journals *h h* and the journals *a d* of the main rotating frame or laying-spindle being in line with each other, so that all have a common axis. The upper journal of each spool-spindle is hollow, in order that the strands may pass from the spools upward through the said journals, and an arm *f*, carrying a guide-roller *i*, is attached to each spindle for the strand to pass over on its way from the spool to the hollow journal.

I is a stationary spur-gear formed around the exterior of the upper bearing *d* of the main rotating frame concentric to the axis thereof. The uppermost strand-spindle H has two spur-gears J K of similar size to I secured to its upper and lower ends, and the middle strand-spindle H is provided in a similar manner with spur-gears J′ K′. The lowest strand-spindle H² has a similar spur-gear J² attached to its upper journal. L is an upright shaft working in bearings in the head of the drum C, and in the second plate A, counting from the top of the series of plates A. This shaft has a spur-wheel M at its top end of the same size as and gearing with the stationary spur-gear I, and another spur-gear N of the same size secured at the bottom end, gearing with the spur-gear J at the top of the

uppermost strand-spindle. By means of the four gears, arranged as above described, the strand-spindle H is kept stationary, while the main frame A A A B B B rotates the gear M′, causing the shaft L to rotate on its axis once during every rotation of the main frame by the motion it receives in revolving round the stationary gear I, and the gear N by rotating on its axis at the same time as it revolves round the gear J, keeping the latter stationary and consequently keeping the strand-spindle H stationary also. By means of a shaft L′ of similar character to L, carrying two gears M′ and N′, similar to M and N, the former gearing with the gear K of the strand-spindle H and the latter with the gear J′ of the strand-spindle H′, the last-named strand-spindle is compelled to remain stationary while the former one is so; and by means of a third shaft $L^2$ of similar character to L and L′, carrying gears $M^2$ and $N^2$ to gear with K′ and $J^2$, the lowest strand-spindle is compelled to be stationary while the two above it are so. Thus all the strand-spindles are kept stationary during the rotation of the main frame.

O O′ $O^2$ are three upright tubes, of which the first one O works in bearings in two plates R R bolted to the top and bottom of the uppermost of the plates A; but the other two O′ $O^2$ have their upper ends fitted to rotate in bearings in the uppermost plate A, while their lowest ends are respectively fitted to rotate in bearings in the two plates A A, which are next above the upper ends of the strand-spindles H′ $H^2$, so that the strands coming through the upper journals of the several strand-spindles may enter at the bottoms of the tubes and be conducted by them to the top of main rotating frame, where, immediately under the hollow journal *e*, a laying-block P, of the kind generally used in rope-machines, or of any suitable construction, (visible in Fig. 1,) is secured to the under side of the head of the drum C. Each of the conducting-tubes is constructed with an opening in one side, at a point near its bottom end, to receive a small roller *j*, which is fitted loosely to a stud or pin *k*, secured in the tube. The strand, in passing through the tube to be conducted to the laying-block, takes one turn round the roller, by which means it is caused to turn with its tube, and only as the tube turns.

In order to give strength where the opening is made in the tube to receive the roller, I propose generally to make the lower part of the long tubes O′ $O^2$ of a separate piece O*, of cast-iron, and give the part which receives the stud or pin *k* the form of a flat plate, but the upper tube, being very short, may be made in one piece. The conducting-tubes have severally secured to their upper ends spur-gears S S′ $S^2$, corresponding in size with all the other gears previously described. The gear S of the tube O gears, as is shown in Fig. 3, with a gear T of similar size on the shaft L, before described, the effect of which is to cause the tube to rotate once on its axis for every rotation of the main revolving frame of the machine, but in the opposite direction to the frame. The gear T also gears with a gear U of similar size that is fitted loosely on a stud *l*, secured in the center of the top plate A, and between this gear U and the gears S′ and $S^2$, respectively, there are interposed gears V′ and $V^2$, fitted to studs, by which means all the conducting-tubes are caused to rotate in a corresponding manner in the opposite direction to the main frame.

W W is one of the two capstans which are mounted upon the top part F of the stationary framing of the machine.

The operation of the machine is as follows: The strands from the several spindles H H′ $H^2$ having been led by the attendant through their respective conducting tubes O O′ $O^2$ over the laying-block and through the hollow upper journal *d* of the laying-spindle or main rotating frame to the capstans W, rotary motion is imparted to the laying-spindle or main rotating frame by a band running from any convenient motor round the drum C, or by other suitable means, and at the same time a rotary motion at suitable speed to take up the laid rope is imparted by convenient means to the capstans W. The laying is performed by the revolution of the conducting-tubes O O′ $O^2$ around the axis of the laying-spindle, and when a forehard in the strand equal in turns to that of the lay is desired, is performed without any revolution of the laid portions of the strands in the finished rope or of the unlaid ends of the strands or the spindles which carry them, and in this particular the operation of the machine differs from that of all other rope-machines known to me. The revolution of the strands to produce the lay of the rope being effected between the unlaid ends and the laid portions while those parts are stationary involves the necessity of the strands receiving each a separate rotary motion in a direction contrary to the lay as imparted by the rotation of the tubes O O′ $O^2$ on their own axes; otherwise the parts of the strands between where the revolution to perform the lay takes place and the unlaid ends would receive an additional twist and the parts above between that and the laid portions would receive a diminution of twist, but by the revolution of the strands as imparted by the rotation of the tubes on their own axes while the strands pass around the rollers *j j j* or their equivalents, the additional twist first received by the strands is carried forward through the tubes for a forehard.

I will here observe that any amount of tension that may be required on the strands may be obtained by producing friction on the strand-spools by means of springs or other devices attached to the strand-spindles.

I will further remark that a forehard in the strand less or greater than that of the lay may be produced by varying the relative sizes of

the gears I and M without varying any of the other gears, so as to produce a slight rotary motion of the strand-spindles either in the same or a contrary direction to the rotation of the laying-spindle.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The arrangement of the strand-spindles with their axes all in the same line with each other and with the axis of the laying-spindle, substantially as herein described, or in an equivalent manner, whereby I am enabled to put in a forehard equal in turn to that of the lay without rotating the strand-spindles.

2. The arrangement of gearing whereby during the rotation of the laying-spindle the strand-spindles may be kept stationary or have a slight rotary motion imparted to them either in the same or in a contrary direction with the laying-spindle, consisting of the stationary gear I, the shafts L L′ $L^2$, with their gears M M′ $M^2$ and N N′ $N^2$, and the gears J J′ $J^2$ and K K′ on the strand-spindles, all operating substantially as herein described.

3. The conducting-tubes O O′ $O^2$, furnished with rollers *j j j* or their equivalents revolving around the axis of the laying-spindle and spool-spindles and rotating at the same time on their own axes, operating in combination with the above-described arrangement of strand-spindles to take out the first additional twist received by the strand and carry it forward to produce a forehard in the rope.

THOMAS G. BOONE.

Witnesses:
WM. TUSCH,
JAMES F. BUCKLEY.