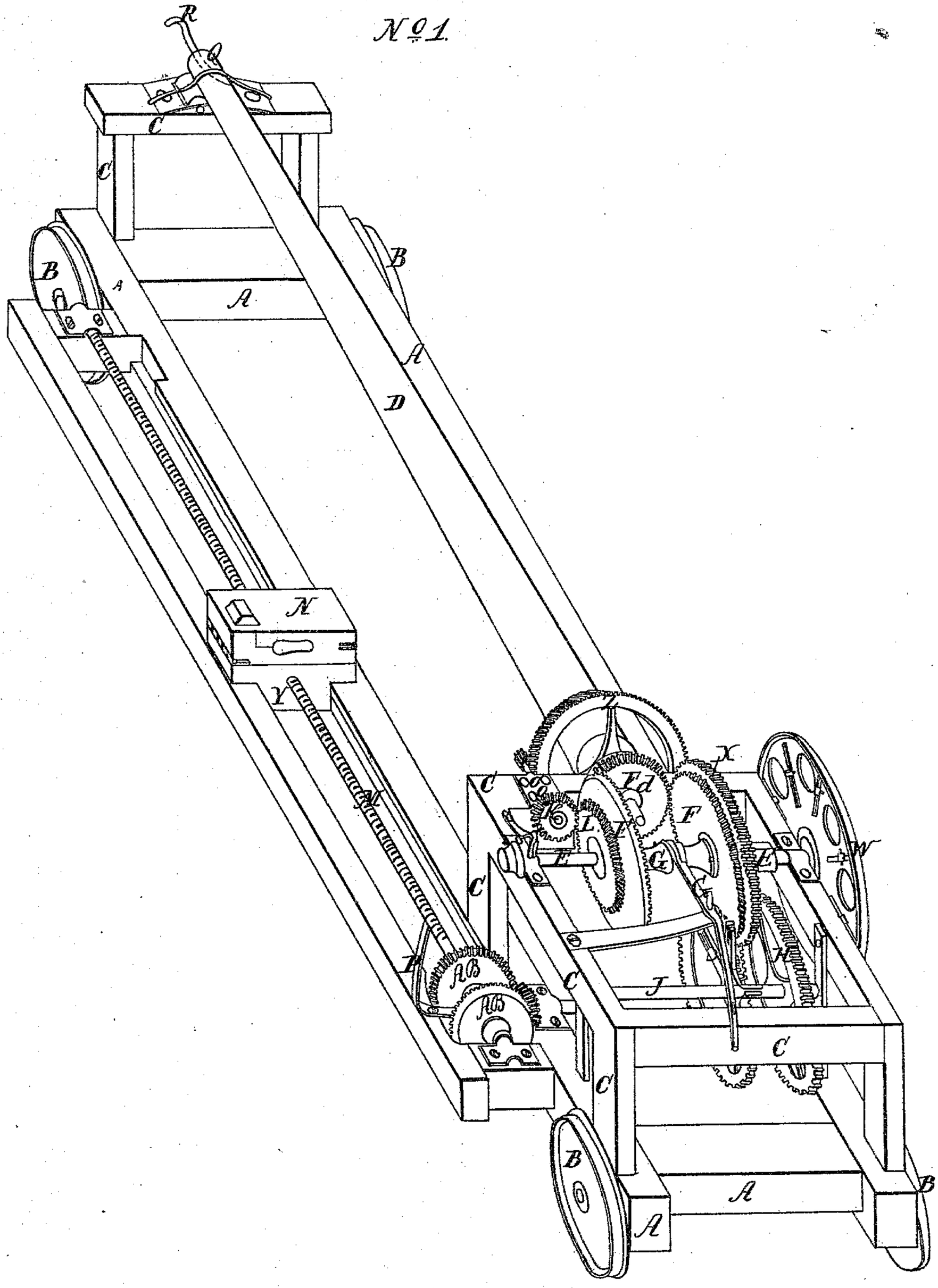
Sheet 1. 3 Sheets.

E. S. Townsend.

Rope Mach.

No. 3,934. Patented Feb. 28, 1845.

No 1.



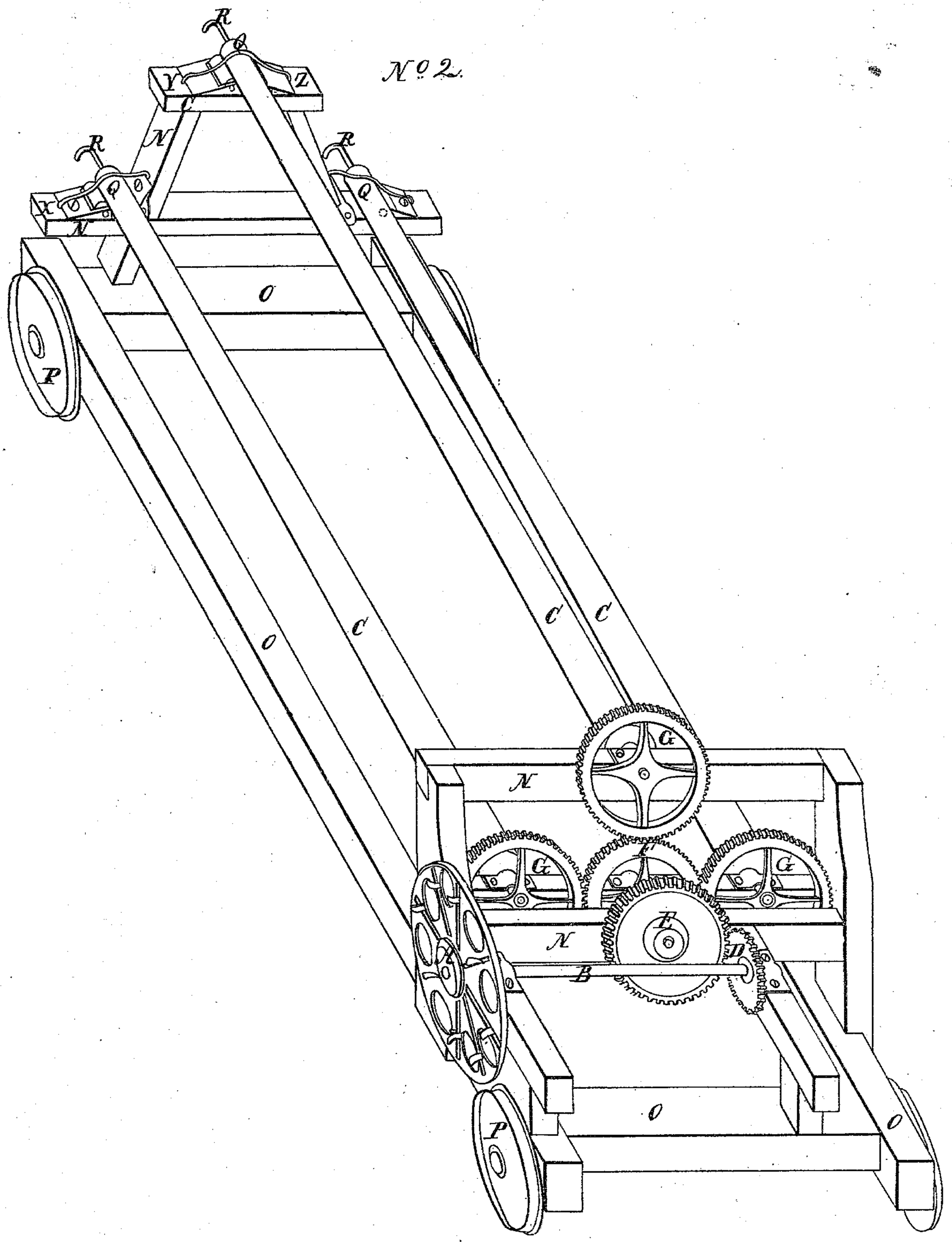
Sheet 2. 3 Sheets.

E. S. Townsend.

Rope Mach.

No. 3,934 Patented Feb. 28, 1845

No 2.



Sheet 3. 3 Sheets.

E S. Townsend.
Rope Mach.

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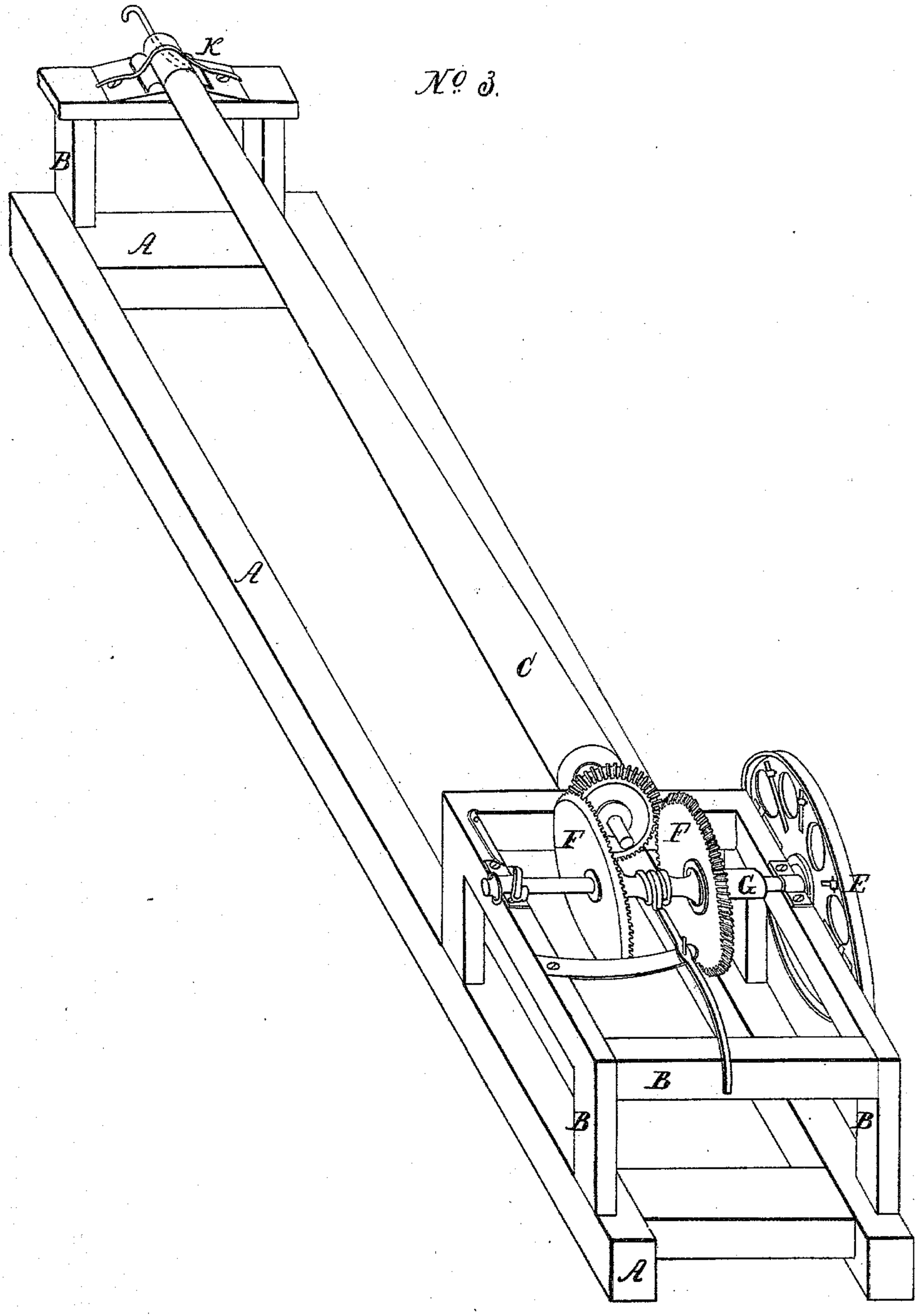

No. 3.

UNITED STATES PATENT OFFICE.

EDWARD S. TOWNSEND, OF PALMYRA, ASSIGNOR TO CHARLES DURFEE, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINERY FOR MAKING ROPES.

Specification forming part of Letters Patent No. **3,934**, dated February 28, 1845.

To all whom it may concern:

Be it known that I, EDWARD S. TOWNSEND, of Palmyra, in the county of Wayne and State of New York, have invented a new and useful set of machines for manufacturing of ropes of any length desired with formed strands, called "Townsend's Machines for Making Full-Length Railroad-Rope without Splicing or Lacing," of which the following is a full and exact description with drawings attached.

The forming-machine is marked in the drawings No. 1, and is designed to form the yarns into strands and to reel them upon the spindle. It is built upon the frame A, with wheels B fitted to travel on a railway. This frame has raised upon it uprights and bearings C, upon which rest the spindle D and shafts. The power to give motion to the machine is applied by a band on the extension-drum W on the end of shaft E. On the shaft E on each side the center are two bevel-wheels F F, working into a bevel-wheel F*d* on the end of spindle D, and giving right-and-left motion to said spindle for twisting or forming the strand by the application of clutch-box and lever G, which works on shaft E between bevel-wheels F F, and flings into gear or out F*d*, as is necessary; also, a shaft J, on which is a drum for a ground-rope to pass round, which hauls the machine when forming the strand, and is put in motion by spur-wheel on shaft E working into wheel H on shaft J. On the end of this ground-rope shaft J is a bevel-wheel which connects and works into the two bevel-wheels A B A B on the screw-shaft, which cause the screw M to revolve with lever P and clutch-box to give right or left motion to said screw or fling it out of gear. The screw M passes through the nut Y, to which nut Y a snatch-block N is made fast, so that when the screw revolves the block N moves right or left, as is wanted, and is intended to guide the strand in being reeled on spindle D. There is also a revolution given to spindle D for reeling strands by the wheel on shaft E and the short shaft O O with the wheels K and Z. The screw and gearing last described are for reeling the strands as they are formed, and are fitted to fling out of motion, and are not used in forming the strand. The thread of the screw being three-fourths of an inch, in revolving twice while the spindle D revolves but once, it lays a strand of one and a half inch in diameter on spindle with accuracy. The spindle D which contains the strand rests at the forward end on friction-rollers, has a metal cap Q with spiral groove to admit the strand without interfering with its bearings in its revolutions, and has a projection R forward, to which to attach the strand when hauling up when forming.

Manner of using.—The wheels F F F*d*, in motion by the aid of drum W on shaft E, give the twist for forming strand, and are in use with the ground-rope drum, by which the machine is hauled up the railroad. When as far as is wished, this motion is flung out of gear by lever and clutch G. Then the end of the strand is passed through the snatch-block N, and the wheels marked L, K, and Z are flung into gear by moving the short shaft marked O O, also the gearing of the screw M, and the forming-machine returns to its starting-point, reeling up the formed strand as it returns. This motion is again flung out, and the strand taken from the snatch-block is laid down in the groove and made fast to forward projection marked R, when another portion of the strand is formed, which is again reeled in like manner with the former. When these processes have been repeated until the desired length is formed and reeled, the strand so formed is ready to be transferred to one of the spindles in drawing No. 2, preparatory to the process of laying into rope.

Drawing No. 2, hereunto annexed, represents a laying-machine used to give the fore-turn to the strands when laying into rope. It is built upon a frame O, with wheels P to run upon a railway. It is propelled by extension-drum A on the end of shaft B, contains three spindles C on proper supports N, with metal caps Q, with a spiral groove to admit strands, with projection forward R to attach when laying into rope, with bevel-wheels on the shaft B to convey the motion to the three spindles C, which is done by bevel-wheel E and spur-wheel F working with wheels G G G. These are fitted with clutch-box and lever, so that each spindle C can be flung out of gear when required.

Manner of using.—The strands as they are formed on No. 1 are transferred to spindle C. They are laid into rope in such lengths as railway permits at a time, a part of the strand being left on the spindle while part is being laid into rope. Before laying, the strands are hauled up and attached to machine No. 3, the spindle which is to contain the rope and which gives the after-turn in laying into rope. The length of the strands so attached to machine No. 3 is next laid into rope, each strand having been made fast to projection R, as represented in Drawing No. 2, and the three strands united, having been made fast to the corresponding projection on machine No. 3. After this length is laid into rope each strand is detached from its fastening and the rope is reeled on machine No. 3, the spindle C on machine No. 2 running off another length of the strands, and so on until the whole rope is finished, being laid in portions, yet of continuous length.

Machine No. 3 is built upon bearings A, with upright timbers B for support of spindle C, and drum E, with bevel-wheels F F on shaft G. This machine is to contain the rope as laid and works in connection with machine No. 2, giving the after-turn by a band passing around the drum E, in laying into rope, which band receives its motion from steam-engine or whatever is used as the motive power. The spindle C in No. 3 is made with spiral groove at forward bearings R to admit rope without any interference in revolving, with a forward projection to fasten rope in laying. After a length of rope is laid, this machine giving the after-turn, the rope is taken from its spiral groove, detached from the projection, and is brought at right angles with spindle and passed through a snatch-block to the spindle. The spindle revolving by the drum winds it upon itself, the snatch-block moving backward and forward parallel with spindle by adopting the screw-gearing similar to No. 1. As the rope laid is thus reeled a new length of strands runs off of No. 2 and is hauled up the walk ready for laying. The rope near unlaid strand is again laid in the groove forward and fastened and another length is laid, and so on until all is finished.

This invention differs from Townsend and Durfee's reel, patented in 1830 or 1831, in the following particulars: In the use of that reel it was necessary when a single length of the walk or building was spun in yarns to lay the same into rope and reel the same before spinning a second length. In spinning a second length the threads or yarns were united to the several threads or yarns already finished by splicing or spinning into them, and so a second part of the rope was made and reeled as before. By this process being repeated the rope was made of the desired length, but could not be made patent-formed without lacing or splicing in the strands of the threads or yarns.

This invention differs from the ordinary forming-jacks in use in the spindle to receive the portions of the strand when formed, and in the gearing to guide the strand when reeled upon the spindles. It also differs from the laying-jacks in common use in having spindles to carry the indefinite length of strand, which at the same time give the fore-turn for laying, and a spindle to carry the indefinite length of rope as it is finished, at the same time giving the after-turn for laying.

The term "formed rope" sometimes called "patent formed," implies that the yarns or threads of the several strands receive their relative place and bearing in the strand by the following process: A certain number of threads or yarns are passed through the center of a gage-plate, forming the center of the strand, while all the other threads or yarns forming the entire strand are arranged in circles around the center, each passing through the plate separately and receiving its exact and similar place in the strand, which is retained by the strand so formed being passed through a close tube and followed by twist from the forming-jack. This is what is called "forming rope," and by the machinery hitherto used ropes could not be formed to exceed the length of the building in which they were made.

In making laced rope it was customary to form the strands the length of the walk, and cutting them off lay the part so formed into a rope. The part so finished was then reeled upon Townsend and Durfee's reel and a new set of strands formed, which were joined to its corresponding strand on the reel by knotting the yarns two and two in each strand and hauling them together by lacing a yarn through the bends of yarn. This lacing occupied some six to eighteen inches, and the yarns in twisting in this place lost their bearings in the strand, as the outside yarns were drawn tight by winding round the centers, which became proportionately loose and made a weak spot.

The forming of full-length strands could not have been done by any forming-jack constructed on the principle involved in the reel of Townsend and Durfee hitherto patented, since in the use of that reel the rope or strand was passed through a hole or aperture in the forward bearing of the spindle and could not have been reeled smoothly or without displacing the form of the strand. In the use of the new machinery, on the contrary, the most powerful stretch both of the strand and rope is maintained through every part of the process of the manufacture, which, adding greatly to the hardness and solidity of the rope, is altogether essential for railroad purposes.

The inventions in use in Europe by which twine and small cordage are made of great length in a square room, it is believed would utterly fail when introduced for the manufacture of railroad-rope for reason of the immense power that is necessary in the manu-

facturing of a rope of the great length and size, often weighing twenty thousand pounds, in a single length of hard and solid rope.

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

1. The combination of the spindle D, the end of which is adapted to the reception of the strand for forming, with the sliding block or guide for winding on after the strand is formed, as described.

2. The combination of the spindle C in the machine for laying the rope, the end of which is adapted for receiving the rope while giving the after-turn, with the sliding block for winding on the rope after it is laid, as described.

In testimony whereof I have hereunto set my hand and seal, this 29th day of April, in the year of our Lord 1844.

EDWARD S. TOWNSEND.

In presence of—
JOSEPH STRONG,
A. W. HUNTINGTON.