

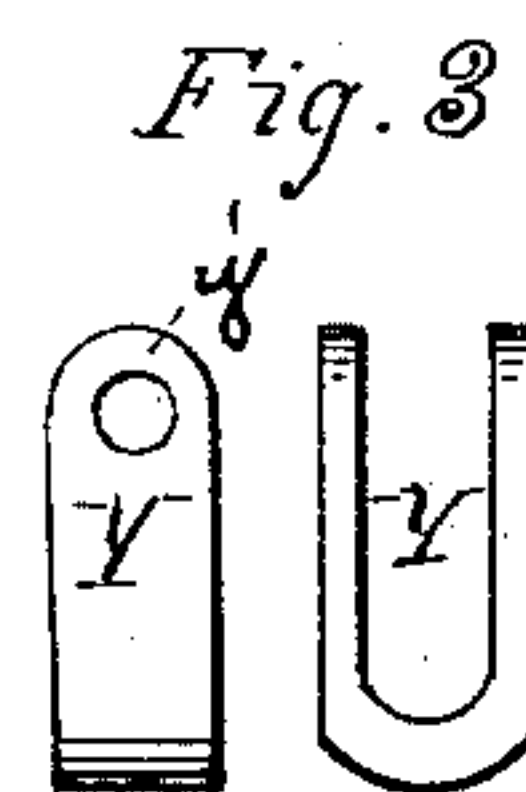
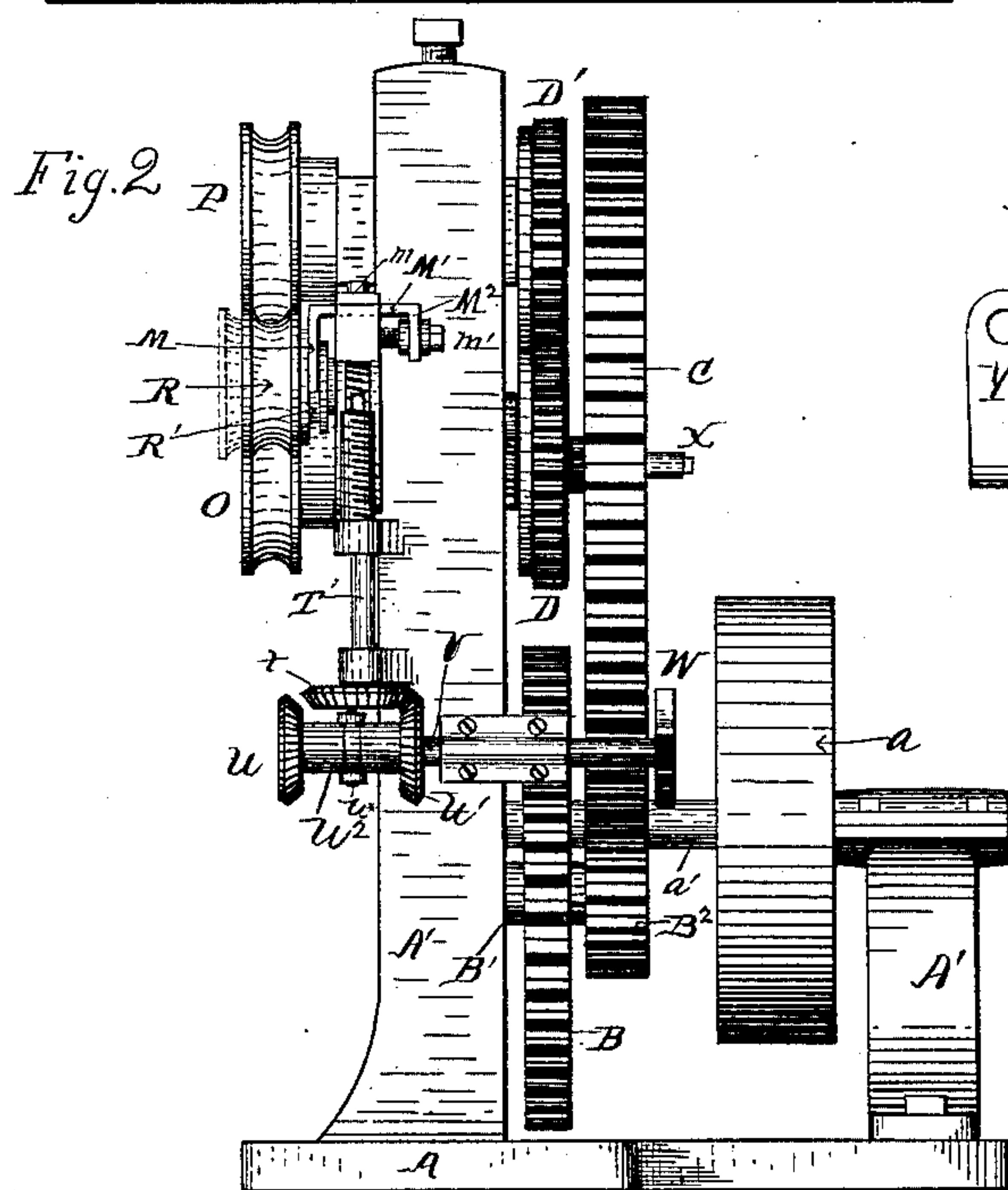
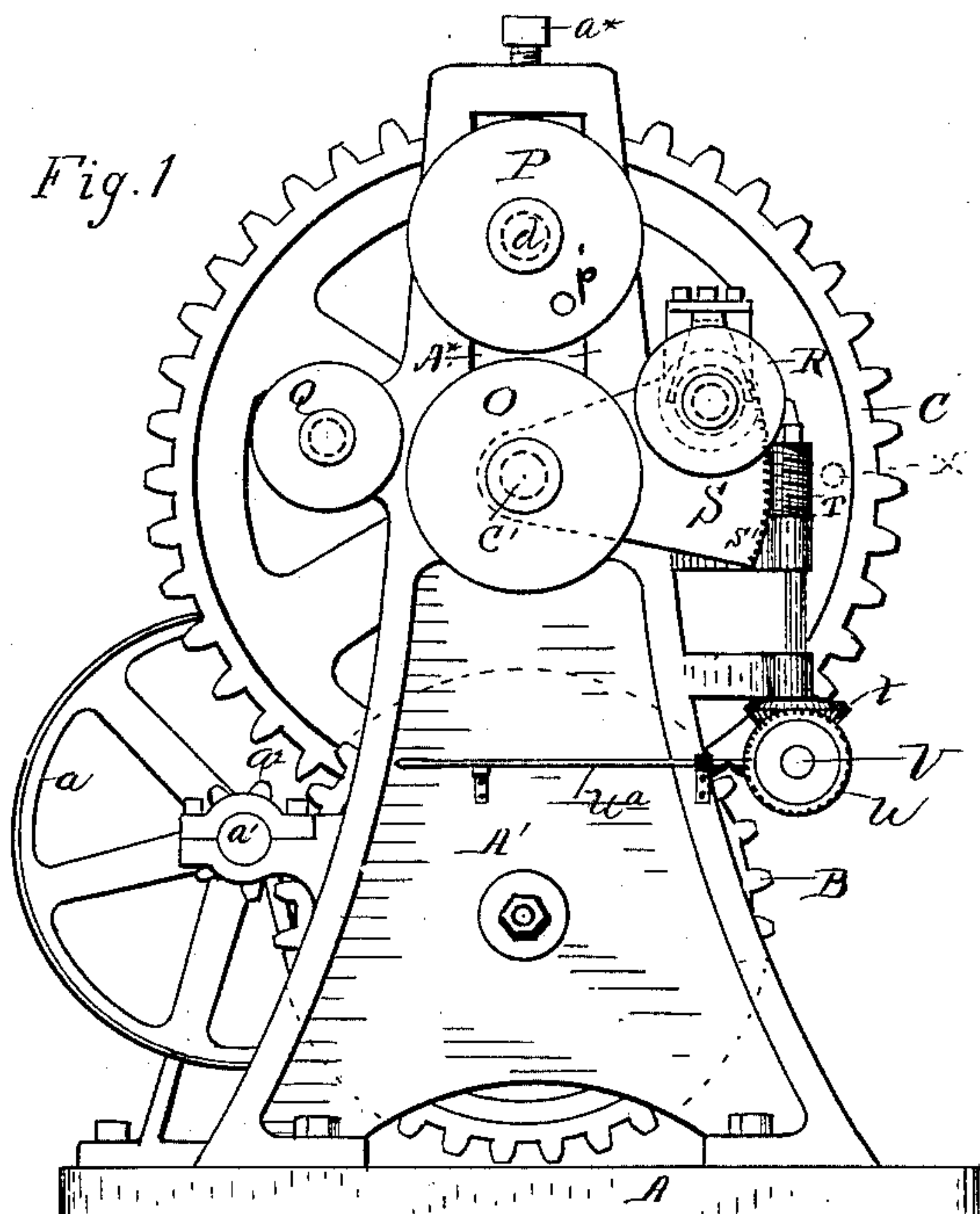
(No Model.)

J. M. EVARTS & J. H. GREENLEAF.

MACHINE FOR COILING PIPE.

No. 318,097.

Patented May 19, 1885.



WITNESSES:

Wm. A. Gray  
George S. Allen

INVENTOR

INVENTOR  
James M. Ewart  
Joseph H. Grimes  
BY  
George Perry  
ATTORNEY

ATTORNEY



# UNITED STATES PATENT OFFICE.

JAMES M. EVARTS AND JOSEPH H. GREENLEAF, OF NEW HAVEN, CONN.

## MACHINE FOR COILING PIPE.

SPECIFICATION forming part of Letters Patent No. 318,097, dated May 19, 1885.

Application filed May 1, 1884. (No model.)

*To all whom it may concern:*

Be it known that we, JAMES M. EVARTS and JOSEPH H. GREENLEAF, citizens of the United States, residing at New Haven, in the  
5 county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Machines for Bending Pipe, of which the following is a specification, reference being had therein to the accompanying  
10 drawings.

Our invention relates to machines for bending tubes or pipes into coils, and has for its object the provision of means for bending the pipe into a cone-shaped coil automatically.

15 In a patent issued to James M. Evarts, one of the present inventors, on the 3d day of April, 1883, No. 275,029, a machine was shown and claimed for bending pipes or tubes into coils, but not into cone-shaped coils. By the im-  
20 provements set forth in the present invention the pipe or tube is bent into the form of a cone.

In our invention a sector carrying one of the bending-rolls is operated by suitable mech-  
25 anism to cause the said roll to gradually diminish the size of the rings of pipe as they are bent, thus making a cone-shaped coil. A star-wheel, connected to the sector through a train of shafting and gearing, is engaged by a  
30 pin on the driving-wheel at each revolution of the latter and is partially turned, and thus the sector is affected by the revolution of the driving-wheel. Provision is made whereby the turning of the star-wheel will either ele-  
35 vate or lower the sector by changing some of the intermediate gear. More than one pin can be provided upon the driving-wheel to engage the star-wheel, and thereby the elevation or depression of the sector accelerated,  
40 and in consequence the inclination or taper of the coil is increased. The spread of the coil is affected by the lateral position of the adjustable roller which is carried by the sector.

The details of construction will be more  
45 fully understood by reference to the following description.

The accompanying drawings illustrate what we consider the best means for carrying our invention into practice.

50 Figure 1 is a side elevation of the machine,

taken from the side on which the bending-rolls are placed. Fig. 2 is a view of the machine at right angles to Fig. 1, and taken from the right-hand side thereof. Fig. 3 shows side and edge views of a staple or V-piece used  
55 in starting the bend of the pipe.

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

A is the base, and A' A' the uprights, of the fixed frame-work. Power is received from  
60 any convenient source upon the pulley *a*, secured upon the shaft *a'*, which also bears the spur-wheel *a*<sup>2</sup>, which meshes into the counter-wheel B, mounted upon the short shaft B', which also carries the gear B<sup>2</sup>, which engages  
65 the master-wheel C. The wheel C is mounted on the shaft C', which extends through the upright A', on the other side of which it receives one of the bending-rolls, and also supports and forms a center for the sector, as  
70 will hereinafter be more fully described. A set of cog-wheels, D D', &c., are turned by the revolution of the shaft C' and affect the revolution of the bending-rolls. The lower bending-roll, O, is secured upon shaft C', as  
75 already explained, and the upper bending-roll, P, is secured upon a short shaft, *d*, to which the gear D' is attached. The shaft *d* is held in an adjustable journal-box, which works in a way, A\*, in the upright A', and  
80 is adjusted up and down by a screw, *a*\*. The roll Q is secured upon a short shaft held in the upright A' at a point to the left and a little above the shaft C'. The roll Q is preferably smaller  
85 than the rolls O and P. The fourth bending-roll R is the one upon which the action and efficiency of the machine largely depend. It is carried upon the sector S, which is centered on the shaft C', or on any other convenient point. The outer edge of the sector is equipped with  
90 cogs *s'*, which gear into a worm, T, secured upon the upright shaft T'. By the turning of the worm the sector is moved up or down, according to the direction of the revolution of the worm. The lower end of the shaft T is pro-  
95 vided with a bevel-gear, *t*, which is engaged by a shipping-gear, U U', held upon the horizontal shaft V, which bears the star-wheel W on one end. The shaft V is so located  
100 as to bring the star-wheel W into line with



a pin, X, provided on the wheel C, so that as the wheel C is revolved the pin X will at each of its revolutions engage the star-wheel and give it a partial revolution. This partial turn of the star-wheel will, through the connection already described, raise or lower the sector which carries the roll R, and thereby gradually increase or diminish the size of the rings into which the pipe is being bent. The roll R mounted upon the sector bears somewhat the same relation to the roll O as does the roll Q already described, but is upon the opposite side, and by its constant adjustment, as the machine is moved or worked, is of course constantly varied and changed in its position with relation to the other rolls. This vertical adjustment of the roll R by the movement of the sector causes the rings of pipe being formed by passing around the rolls to be constantly increased or diminished in size, thereby enabling the machine to form the coils into a cone-shape. When the gear U engages the gear *t*, as shown in the drawings, Fig. 2, the sector will be moved in one direction, but when the gear U' is caused to engage the gear *t* the sector will be moved in the opposite direction. The two gears U and U' are mounted upon a sleeve, U<sup>2</sup>, which is feathered upon the shaft V, so that it can move longitudinally thereon but will turn with the shaft. A shipping-yoke, *u*<sup>\*</sup>, takes hold of the sleeve U<sup>2</sup>, and has connected to it an operating-lever, U<sup>a</sup>, by which it is moved to ship the gears U U' as may be desired. Several pins, X, may be employed upon the wheel C to engage the star-wheel, and the more employed the quicker will be the movement of the sector, and the greater the inclination of the cone. In order to give the coils the necessary spread, the roll R is movable on its shaft and may be made to occupy different lateral positions, as indicated in full and dotted lines, Fig. 2. Any amount of spread may be given to the coils by properly adjusting this roll laterally. For this purpose it is provided with a grooved collar, R', in the groove of which a fork, M, rests. This fork M is held upon the sector and is provided with an adjusting means, as will be described. The fork has a horizontal portion, M', which passes through a way upon the sector, where it is provided with a pinching-screw, *m*, and also have a downwardly-extending vertical portion, M<sup>2</sup>, through which a set-screw, *m*', passes and bears against the sector by means of which the fork can be accurately adjusted, and then, by turning down the pinching-screw, will be securely held. As the fork is moved forward or backward, the lateral position of the roll R is changed and the amount of spread varied.

As already explained, the wheel C may have any number of pins X around it to engage the star-wheel W, so that when two pins X are used the star-wheel will be turned twice as fast as when one pin X is used, and the sector, with its wheel R, will be moved with twice the rapidity up or down, and the inclination

or taper of the conical coil will be likewise increased; so any number of pins may be used and any inclination of cone attained without the use of any former and without the addition of any parts to the machine except the pins X on the wheel C. For the purpose of thus increasing or diminishing the number of pins and having them at equidistant points around the wheel, a line of holes may be provided around said wheel and the pins be made removable so as to readily be taken out of one hole and placed in another.

Y is a yoke, Fig. 3, which is placed upon roll P by having a pin inserted through holes *y* *p*' in yoke and roller, respectively. This is done when it is desired to start a coil; and this yoke, when the pipe is run through it from between rolls P and O, and the machine is moved a little by hand, will start the bend of the pipe so that it will ride up over roll R. As soon as the pipe has received bend sufficient to carry it up over said roll R, the pin can be withdrawn from yoke and roll, and the former will drop off and the machine is in readiness to start to make the coil. It is evident that if the roll R be left stationary during the operation of bending a plane non-conical coil will be made upon this machine, and provision is made for this by having the gears U U' far enough apart to allow them to be placed so that neither of them will engage with gear *t*, and thus the sector S is not affected by the movement of the star-wheel. The same effect may be produced by removing all the pins X from the wheel C.

The pipe is fed into the machine by any of the well-known feeding devices for pipes or rods; or it could be passed in by hand. In any case it is drawn by the rolls O P over roll Q and fed by said rolls O P over roll R, which gives it the desired curvature, turning it back past the three rolls O P Q in a plane nearly parallel to the plane of said rolls, the obliquity of the coils depending on the lateral adjustment of roll R, and the diameter thereof to the vertical adjustment of said roll. The former adjustment is usually made once for all by hand before the machine begins to operate, and unless changed in the same manner the obliquity or "spread" is a constant quantity. The vertical adjustment of the said roll R for varying the diameter of the coils is automatically and regularly changed by the segment S and the devices acting thereon, so as to produce a taper or flare, as hereinbefore described. The tube while thus being coiled is supported by the bending-rolls aforesaid. When the connections are set so as to gradually raise the sector, the taper of the cone is run from the base to point or from large to smaller portion; but when the sector occupies its highest position at the beginning of the operation and is gradually lowered the effect is reversed and the point or small end of the cone is begun first and gradually enlarged as long as the sector descends.

Having thus described our invention, what



we desire to claim and secure by Letters Patent is—

1. In a machine for bending pipes or rods into coils, a set of bending-rolls, one of which is vertically adjustable for varying the diameter of the coils and also laterally adjustable for varying the spread thereof.

2. In a pipe-bending machine, the combination, with the rolls P O, of the roll R, which is laterally movable on its shaft, and the adjusting devices M' m', whereby this movement is effected for the purpose of varying the spread of the coils, substantially as set forth.

3. The combination, with the bending-rolls, of the adjustable roll R, and toothed sector S, upon which it is carried, and connections to raise or lower said sector.

4. The detachable yoke y for guiding the pipe until it acquires sufficient curvature, in combination with the roll P, to which said yoke is attached at will, and the remaining rolls of the set, substantially as set forth.

5. The combination, with the bending-rolls

and adjustable roll R, of the fork M, having the adjusting-screw m', and the pinching-screw m, substantially as set forth.

6. The combination, in a pipe or tube bending machine, of the wheel C, provided with either one or more pins X, the star-wheel W, connections to the worm T, and sector S, which carries the roll R, substantially as set forth.

7. The combination, with the shaft V, of the gears U and U', sleeve U<sup>2</sup>, longitudinally movable upon shaft V, and means for moving it, and of connections to the sector S, whereby the same may be raised or lowered, as desired, by the rotation of the shaft V, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JAMES M. EVARTS.

JOSEPH H. GREENLEAF.

Witnesses:

GEORGE TERRY,

DANIEL S. GLENNEY, Jr.