

(No Model.)

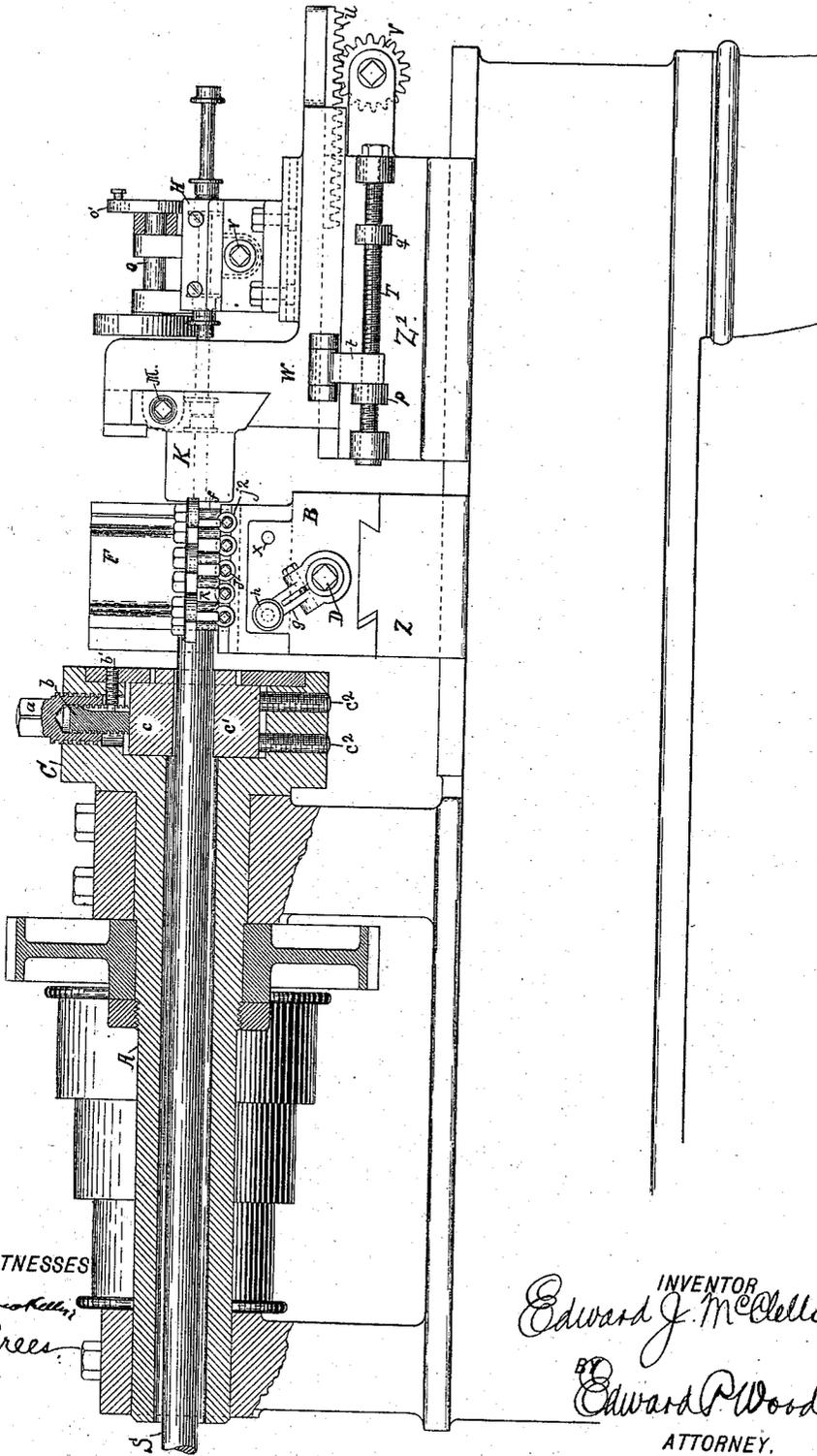
3 Sheets—Sheet 1.

E. J. McCLELLAN.  
FORM TURNING MACHINE.

No. 552,717.

Patented Jan. 7, 1896.

Fig. 1



WITNESSES  
*Chas. S. ...*  
*John F. ...*

INVENTOR  
*Edward J. McClellan*  
*Edward P. Wood*  
 ATTORNEY.

(No Model.)

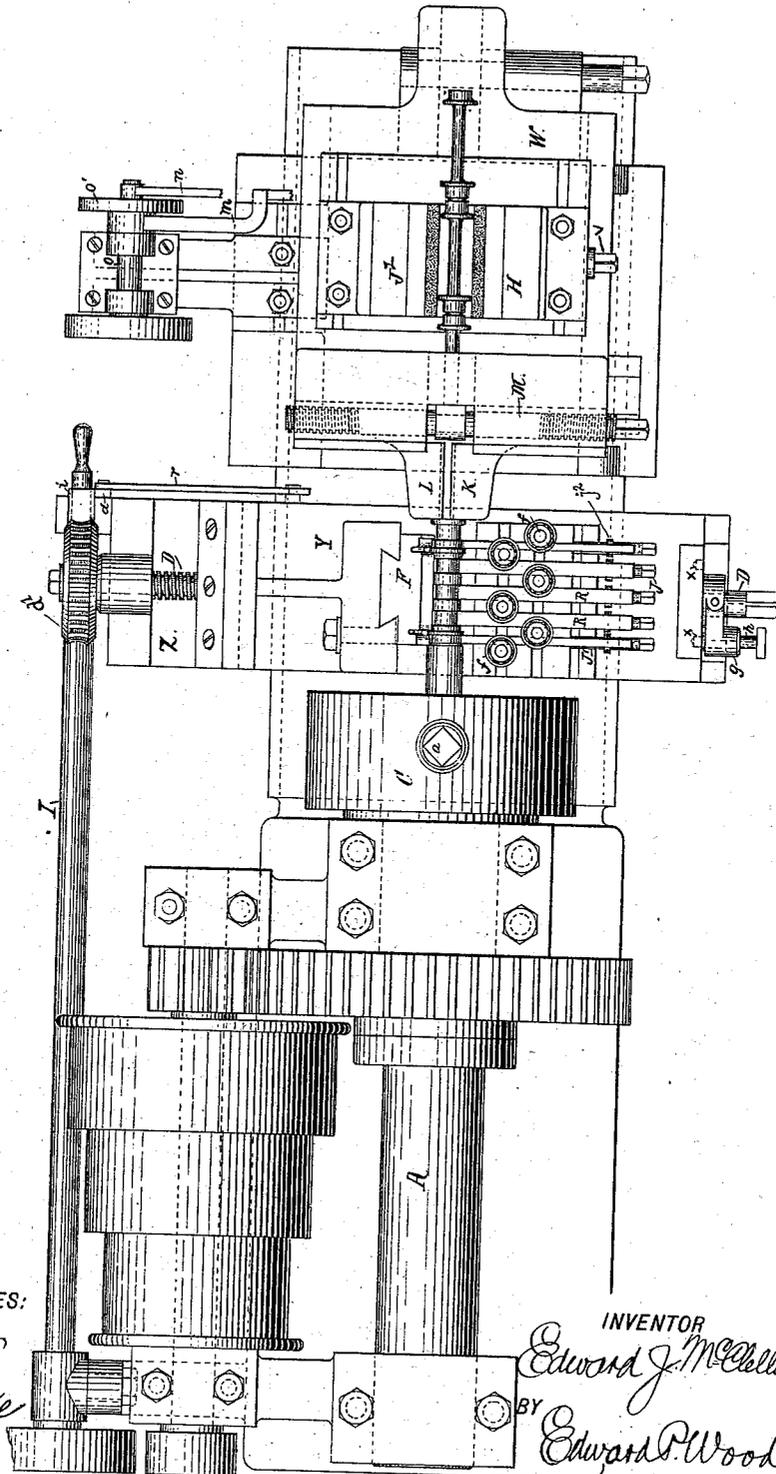
3 Sheets—Sheet 2.

E. J. McCLELLAN.  
FORM TURNING MACHINE.

No. 552,717.

Patented Jan. 7, 1896.

Fig. II



WITNESSES:

*John F. Pries*  
*Elijah Lee Burke*

INVENTOR

*Edward J. McClellan*

BY *Edward Wood*  
ATTORNEY.

E. J. McCLELLAN.  
FORM TURNING MACHINE.

No. 552,717.

Patented Jan. 7, 1896.

Fig. III.

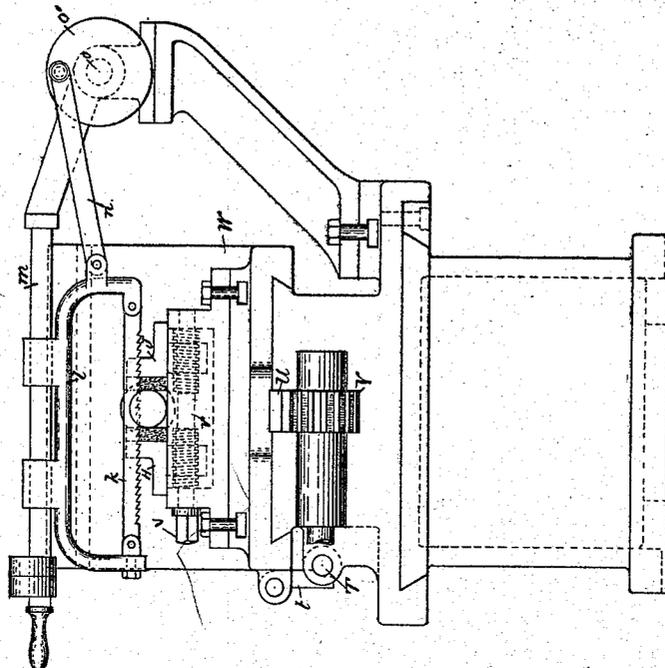
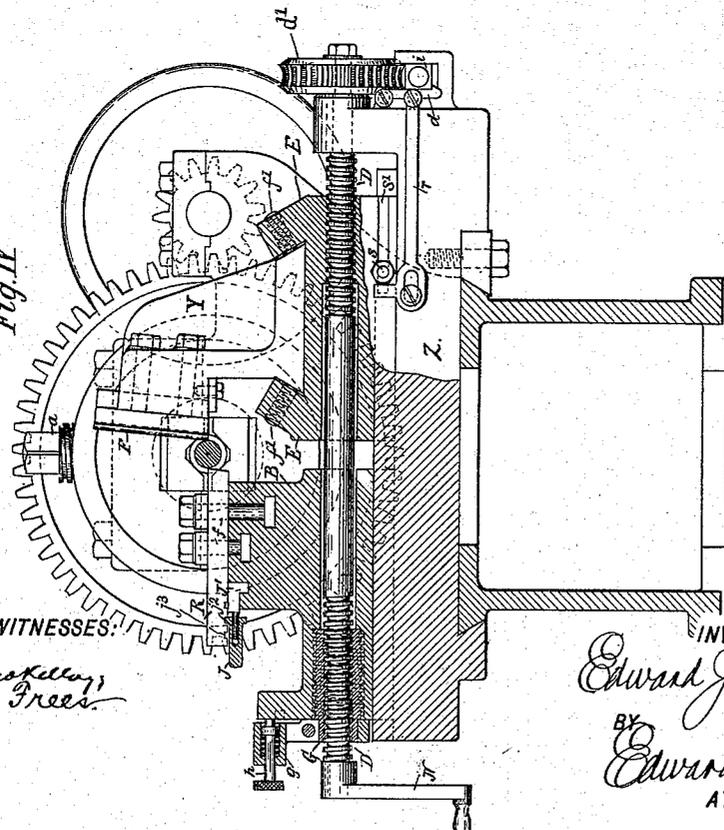


Fig. IV.



WITNESSES:  
*Charles S. Kelley,*  
*John F. Free.*

INVENTOR  
*Edward J. McClellan,*  
BY  
*Edward P. Wood*  
ATTORNEY.

# UNITED STATES PATENT OFFICE.

EDWARD J. McCLELLAN, OF NEW YORK, N. Y., ASSIGNOR TO THE GARVIN MACHINE COMPANY, OF NEW YORK.

## FORM-TURNING MACHINE.

SPECIFICATION forming part of Letters Patent No. 552,717, dated January 7, 1896.

Application filed December 14, 1894. Serial No. 531,807. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD J. McCLELLAN, a citizen of the United States of America, and a resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Form-Turning Machines, of which the following is a specification.

This invention relates to machines for turning forms of desired outline from a continuous bar of stock, and especially that class of such machines in which are incorporated two sets of cutting-tools to act on the stock from opposite sides of the axis thereof, which is the plane of movement of the stock; and it consists of certain novel features of construction for producing various advantageous results, as hereinafter fully set forth, and enumerated in the claims.

In the accompanying drawings the machine is illustrated as follows:

Figure 1 is a side elevation, partly in vertical central section through the spindle and chuck, showing the stock in position to be operated upon, and the articles which have been reduced therefrom. Means for cutting off these pieces of finished work are not fully shown in this figure. Fig. 2 is a plan view of the portions of the machine shown in Fig. 1, and showing also a piece of work in the process of reduction to the desired form. Fig. 3 is a view of the right-hand end of the machine as shown in Figs. 1 and 2, showing the cut-off mechanism and other details. Fig. 4 is an end view, partly in vertical section, through the center of the tool-operating screw, showing the roughing and finishing tools, and the means of their adjustment relative to the stock to be operated upon, and other details.

The reference-marks indicating the several parts correspond in all the views.

The kind of work which this machine is particularly intended to do is that in which a large portion of the stock is turned off to produce forms which are in size within the limit of the original diameter of the stock used.

The stock S is passed through the hollow mandrel A, which is revoluble in suitable bearings and held by the chuck C, as best shown

in Fig. 1. The chuck C is provided with a differential screw consisting of an external and an internal thread on and in the plug *a*, these threads being of different pitch and having corresponding threads in the body of the chuck C, and on the plug *b* that bears on the jaw *c*, said plug *b* being kept from revolving with the plug *a* by the screw *b'*, which enters a groove in the side of the said plug *b*. The set-screws *c*<sup>2</sup> bear through the opposite side of the chuck-head upon the opposite jaw of the chuck, being thus adapted to thrust same forward or, by their withdrawal, to allow it to be drawn out to increase the capacity of the chuck. The plug *b* bears on the jaw *c* at a point centrally between the respective bearing-points on the jaw *c* of the set-screws *c*<sup>2</sup>, so as to allow the jaw *c* to adjust itself to the stock.

The tool-blocks B and E are cross-slides and are gibbed to the slide-block Z, and are operated in adjusting and feeding the tools by a right-and-left screw D. This screw has a direct connection with, and bearing in, the cross-slide E, but with the slide B its connection is by means of the externally-threaded nut G, which is screwed into the slide B, the external thread of the said nut being the reverse of the internal, by reason of which turning the nut G will operate the slide B independently of the opposite slide E, for the reason and purpose which will be hereinafter stated.

The roughing-tool consists of a number of cutters R, the cutting-edges of which may be of any desired form, but which are preferably, when allowable, square. As to the form of the cutting-edges of the roughing-tool, however, they should approximately conform to the shape of the work to be turned, in order that they shall reduce the stock so that a comparatively small cut of the finishing or forming tool on the part reduced by the roughing-tool will form and finish the work after the roughing-tool shall cease to cut. It is preferable that, as shown in Fig. 2, the roughing-tool shall take off sections of the stock, turning grooves into the bar, and leaving flanges between, which annular flanges are turned off by the finishing-tool, by reason of

which construction the shavings of both tools are "broken up" or removed in narrow sections.

The finishing-tool F is of the exact form that will shape the stock into the desired finished form, thus completing the work. During the process of the reduction of the stock this finishing-tool will operate on the surplus metal in form of annular flanges left between the grooves made by the roughing-tool until the roughing-tool shall have finished its part of the work, when the roughing-tool will be withdrawn by turning the externally-threaded nut G and thus withdrawing the slide B. This nut G, for the purpose of its operation, has attached thereto a handle *g*, which is limited in its movement and held firmly in its set positions by the piston *h*, which is adapted to engage with holes *x* in the face of the cross-slide B. These parts just described are shown in Figs. 1, 2, and 4.

The roughing-tool is shown in Figs. 1, 2, and 4, and, as therein shown, the cutters are shown to be clamped onto the tool-holder and cross-slide B by means of T-bolts *f* and adjustable to and from its work by means of the nuts J on the ends of the hook-bolts J', set into the tool-holder and movable laterally with the cutters. The annular flanges *j*<sup>2</sup> on the said nuts engage with the cutters forming the compound roughing-tool by entering grooves *j*<sup>3</sup> formed in the under edges of said cutters, thus forcing same forward or back upon the revolution of said nuts on said hook-bolts. It is believed, however, that the roughing-tool, as well as the finishing-tool, might be made in the ordinary form of circular tools without altogether departing from the spirit of this invention, so long as the roughing-tool removes a portion of the stock and the finishing-tool finishes the entire form of the work after the roughing-tool shall have been withdrawn, as described. It is not essential, however, if the character of the work permits, that the finishing-tool finish the entire surface, as the tool R may be made to finish the part on which it operates, leaving only the remaining part for the finishing-tool to finish.

The radial adjustment of the finishing-tool F, as well as its attachment and lateral adjustment on the tool-holder, is effected by the set-screws *f*', several in number, bearing on the beveled edges of the bracket Y, by which the finishing-tool is carried, the looseness of the bracket in the tool-holder being sufficient to permit any required adjustment by the set-screws. The finishing-tool is sharpened, when dulled by use, by grinding on its end, and for that reason is of the uniform shape required, being corrugated on its side for its whole length, so that the shape of the cutting-edge will not be altered by shortening it in sharpening.

The right-and-left cross-feed screw D is driven by worm-gearing, which is itself preferably driven from the machine. The journal-

box *i* of the worm-shaft I, having vertical movement in its housing, is shown in Fig. 4. The worm is held in mesh with its gear *d*' by means of the swinging hook *d*, that hooks onto the journal-box *i*. Connected with the hook *d* is the rod *r*, having an upwardly-projecting arm with which the adjustable stop *s* contacts, and by its forward movement releases the box *i* and allows the worm to drop out of engagement. This stop preferably consists of a bolt in a T-slot *s*', and should be adjusted to cause the worm to drop out of engagement at the time the roughing-tool shall have performed its part of the work of reducing the stock, thus causing the tools to stop cutting when the roughing-tool should be withdrawn to a safe distance by means of the externally-threaded nut G, as above described. The finishing-tool will then be operated by means of the crank N or by a pilot-wheel on the screw D until it shall have turned off the annular flanges left by the roughing-tool, and, if necessary, until the finishing-tool shall have taken a light finishing cut over the entire surface of the piece. Of course on starting a new cut the roughing-tool will be readjusted by means of the nut G to its original position.

While the operation of turning a piece of work is going on, the piece last formed runs in the jaws K and L, which act as a steady-head for that purpose. This steady-rest, in which the stock runs, is made necessary in this machine by reason of the fact that when one of the tools bearing on opposite sides of the stock is withdrawn the pressure of the other tool still bearing on its side of the work would obviously, without a steady-rest to prevent such result, throw the work out of its true position and cause inaccuracies in shaping it. At the same time a saw *k*, carried in a frame *l* that slides on the bar *m* and is driven by the pitman *n*, actuated by the crank-wheel *o*' on the shaft *o*, is cutting off the piece of finished work from the bar of stock. As the process of the formation of a new piece is going on at the same time that a piece already formed is being cut off, the jaws H and J<sup>2</sup> are so adjusted as to form a steady-head to steady the work under the saw, as shown in Fig. 3, being operated in adjusting by the right-and-left screw *v*. In practice the operation of the reciprocating saw just described is found to be satisfactory; but it is believed that a circular saw operated preferably from the machine by suitable mechanism to perform the same function might be substituted in its stead without in any material measure departing from the spirit of this invention.

After the finishing of each piece and the cutting off of one, as described, the machine is stopped, and the jaws K and L are tightened on the place at which they have acted as a steady-rest. The jaws of the chuck C are then opened and the bar of stock is pulled out to the required distance to bring into po-

sition before the tools sufficient stock from which to form another piece. The chuck is then tightened on the stock, and the jaws K and L are opened and carried forward and closed on the piece just formed for the purpose of acting as a steady-head. The mechanism governing the distance that the stop will be pulled out will be hereinafter described.

To prevent any accidental slipping of the stock that would impair the accuracy of its position on each presentation of a new portion to be operated upon, it will be observed that either the jaws of the chuck or the jaws K and L are always tightened on the bar of stock or on the work attached thereto, and that the tightening or loosening of either is always done on one or the other of the extremities of the movement that will now be described, the jaws K and L being opened and closed by the right-and-left screw M.

The length axially of the article turned and to be removed from the stock is determined by the extent of movement of the sliding carriage W, which forms the support for the jaws K L, serving to pull out the bar of stock by means of the sliding carriage, and for the jaws H J<sup>2</sup>, that serve to sustain the work in the operation of the cutting-off device. The sliding carriage W and its attached parts are to be moved back and forth by means of a rack U and pinion V, which is geared with a crank or pilot wheel, the said carriage having an appropriate guide on a bolster Z<sup>7</sup>, which is attached to the bed or frame of the machine.

The sliding carriage W is constructed to engage with the screw-threaded bar T, and the latter has stops *p q*, preferably in the form of nuts, thereon to coact with a lug *t*, which is integral with or attached to the sliding carriage for regulating the adjustment of the carriage.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a form turning machine, the combination of a hollow revoluble mandrel and a chuck thereon adapted to receive a continuous bar of stock, tool blocks with tools adapted to act on the stock from opposite sides of the axis thereof, a screw rod with a right and left hand member respectively engaging one of the tool blocks for its adjustment in relation to the stock, a roughing tool on one member of said tool blocks adapted to groove the stock circumferentially, a finishing tool on the other member of said tool blocks adapted to remove the surplus metal intermediate of said grooves of the stock and a steady-rest adapted to receive and support the stock during the operation of the respective tools, substantially as and for the purpose herein described.

2. In a form turning machine, a chuck composed of the two jaws which are set diametrically opposite to each other in the head

thereof, a differential screw mechanism composed of a hollow plug having an external thread engaging with an internal thread in a chuck head and having an internal thread of different pitch from its external thread, engaging with an external thread on a second plug inside of said hollow plug and bearing on one of said jaws, and a screw set into said chuck head and bearing in a groove cut longitudinally of said interior plug to hold the same from revolving with said hollow plug during its operation, in combination with a means for receiving and advancing a bar of stock through the medium of the chuck and a steady rest adapted to receive and support the stock during the operation of the roughing and shaping tools, said tools being located at a point intermediate of the chuck and steady rest, substantially as and for the purpose herein described.

3. In a form-turning machine, the combination of the hollow revoluble mandrel, the chuck thereon adapted to receive and actuate the bar of stock, the roughing tools and finishing tools adapted to act on the stock from opposite sides thereof, a cutting-off device on the machine frame, adapted to operate simultaneously with the roughing and finishing tools, for separating successively from the stock the finished articles, and a means for adjusting the stock in relation to said tools and cutting-off device, substantially as and for the purpose herein described.

4. In a form-turning machine, the combination of the hollow revoluble mandrel, the chuck thereon adapted to receive and actuate the bar of stock, the roughing tools and finishing tools adapted to act on the stock from opposite sides thereof, the cutting-off device on the machine frame, adapted to operate simultaneously with the roughing and finishing tools, for separating successively from the stock the finished articles, the two sets of jaws for receiving the stock, the sliding carriage supporting said jaws and a means for regulating the extent of movement of said carriage, substantially as and for the purpose herein described.

5. In a form turning machine, a roughing tool and finishing tool mounted on separate slides and operated or fed forward by a right and left screw engaging with the slides, the engagement with one of said slides being through a nut which is also externally threaded and which is screwed into the slide, whereby said nut is adapted to operate said slide independently of the turning of said right-and-left screw, substantially as shown and described.

6. In a form turning machine, having a hollow spindle and a chuck adapted to carry and drive the bar of stock to be operated on, tools for forming the work and jaws operated by a right-and-left hand-screw said jaws and screw being mounted on a slide parallel with the axis of the hollow spindle and chuck,

said slide being actuated by a suitable mechanism and governed in its movements by a lug attached to said slide and by stops attached to the stationary part on which the  
5 slide moves and adapted to contact with said lug, substantially as shown and described.  
In testimony that I claim the foregoing as

my invention I have signed my name, in presence of two witnesses, this 12th day of December, 1894.

EDWARD J. McCLELLAN.

Witnesses:

CHAS. T. LUTHER,  
H. F. FREVERT.