

(No Model.)

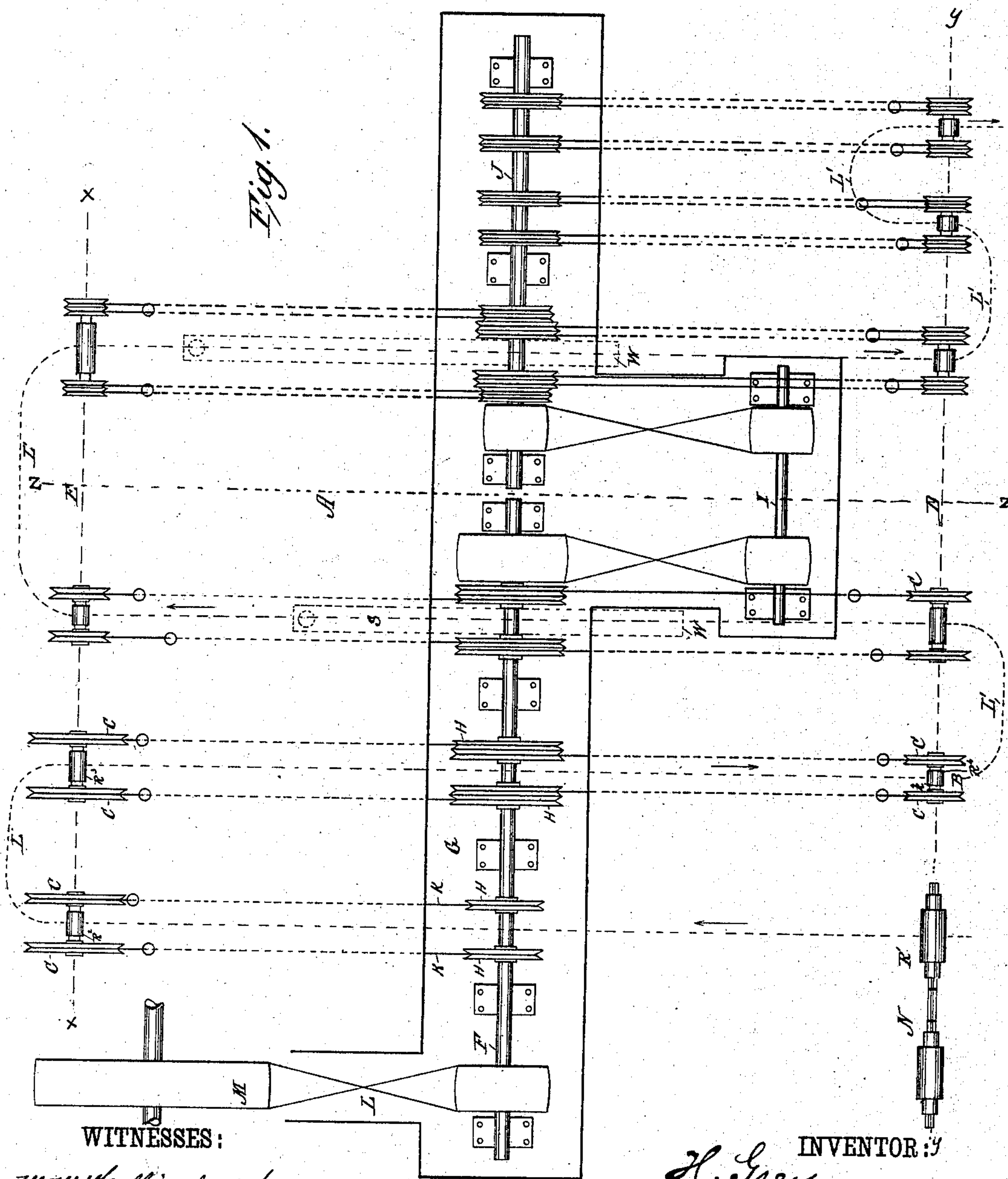
3 Sheets—Sheet 1.

H. GREY & R. BOWATER.

WIRE ROD ROLLING MILL.

No. 322,281.

Patented July 14, 1885.



WITNESSES:

W. W. Hollingsworth
W. F. Stevens

INVENTOR: *H. Grey*

R. Bowater
BY *Munn & Co.*
ATTORNEYS.

(No Model.)

3 Sheets—Sheet 2.

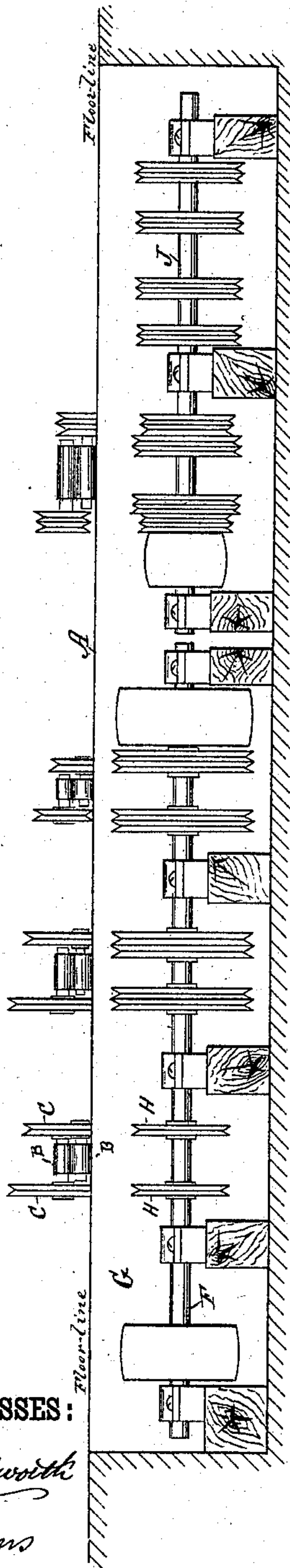
H. GREY & R. BOWATER.

WIRE ROD ROLLING MILL.

No. 322,281.

Patented July 14, 1885.

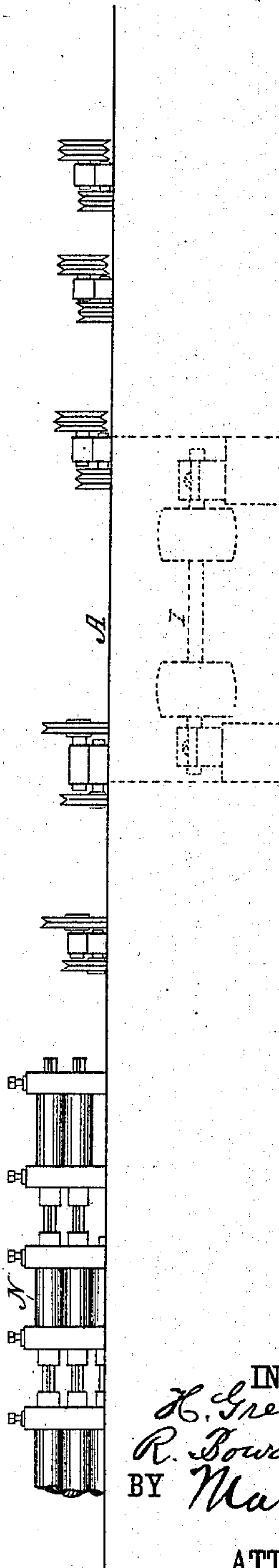
Fig. 2.



WITNESSES:

W. W. Hollingsworth
W. K. Stevens

Fig. 3.



INVENTOR:

H. Grey
R. Bowater
BY Mann
ATTORNEYS.

(No Model.)

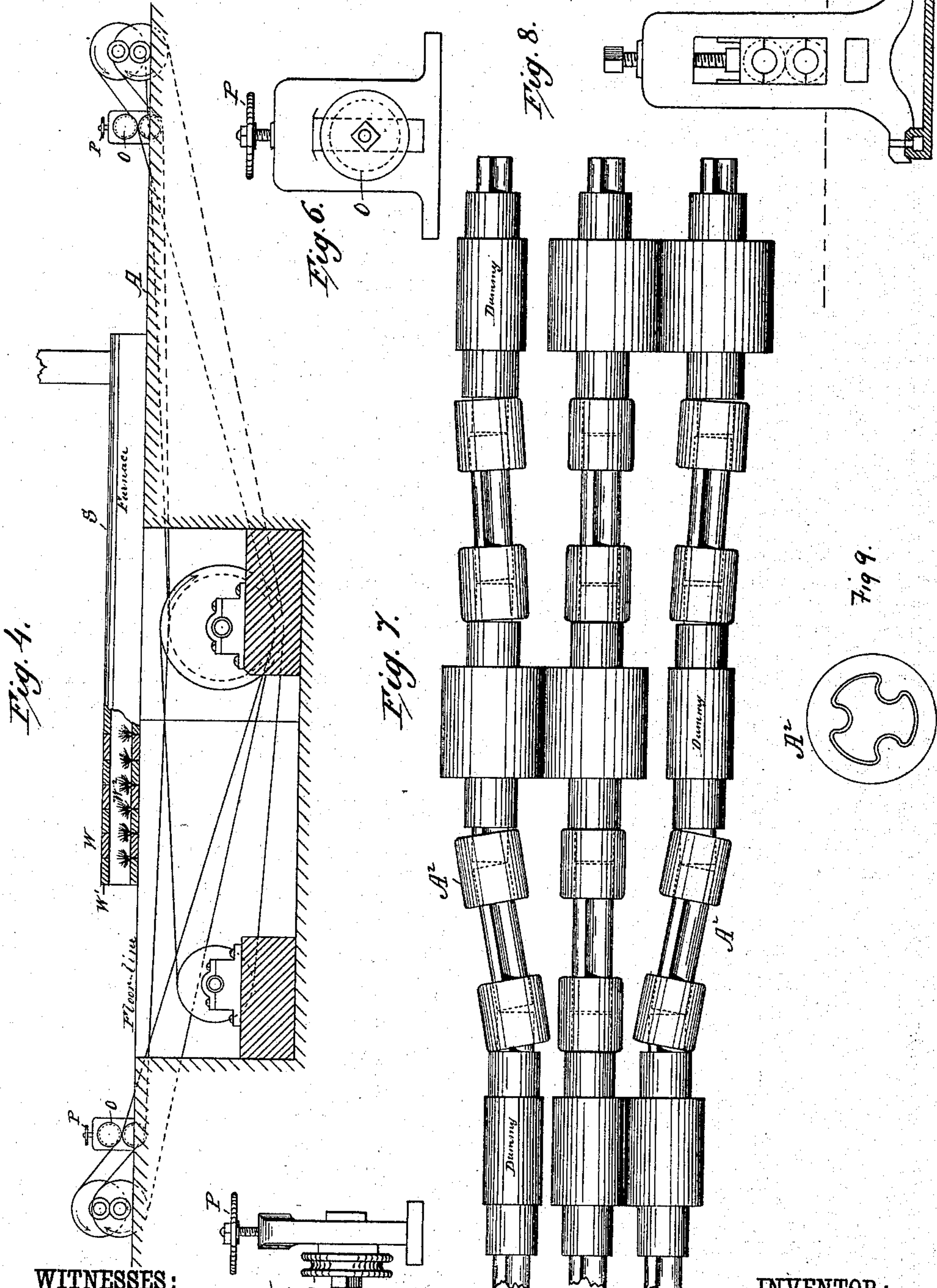
3 Sheets—Sheet 3.

H. GREY & R. BOWATER.

WIRE ROD ROLLING MILL.

No. 322,281.

Patented July 14, 1885.



WITNESSES:

W. W. Hollingsworth
H. X. Stevens

INVENTOR:

H. Grey
R. Bowater
BY Munn & Co.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

HENRY GREY AND RICHARD BOWATER, OF BEAVER FALLS, PENNSYLVANIA.

WIRE-ROD-ROLLING MILL.

SPECIFICATION forming part of Letters Patent No. 322,281, dated July 14, 1885.

Application filed February 6, 1885. (No model.)

To all whom it may concern:

Be it known that we, HENRY GREY and RICHARD BOWATER, citizens of Great Britain, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Wire-Rod-Rolling Mills, of which the following is a description.

This invention relates to that class of devices which are used for reducing heated rods to prepare them to be drawn into wire. It is usual to conduct this operation by means of a series of rollers arranged to act upon the wire, one pair after another. In passing between each pair of rollers the rod is reduced in size and proportionately lengthened. It is a matter of great economy to have the rod kept continually traveling through the mill after it is once started, that it may not have time to cool, and in order that it may be as much extended as possible at a single passage through the mill. For this purpose it has been common to arrange different pairs of rollers in a wire rolling with their shafts in line, and to pass the heated wire rod from the first pair of rollers to the second by turning the rod back in a loop as soon as possible after it issues from the first pair. This makes it necessary that each succeeding pair of rollers shall revolve in the opposite direction to the previous pair. At the same time it is necessary for the convenience of the operatives that the working-rollers should be as nearly as possible at one common level or height above the floor. To thus reverse the direction of succeeding pairs of rollers, it has been common to mount the rollers in triplets, the central line of rollers being level, while the upper and lower lines are out of level in some places. Succeeding triplets are connected along the line by means of loose spindles and wabblers. These spindles and wabblers are consequently out of level, so that their weight bears heavily on the box or bearing of the lower roller, thus rapidly wearing away the lower box, and allowing the rollers to gradually spread open at that end, thus requiring continual watching by an experienced machinist and frequent stoppages for repairs to keep the mill in order. It is also found difficult to keep the wire hot enough to produce light thin grades of wire.

The object of this invention is to avoid the use of wabblers-connections and of gearing between the rollers, and to provide means for supplemental heating of the wire rod during the process of rolling.

To this end our invention consists in the construction and combination of parts forming a rolling-mill hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a plan of a portion of a rolling-mill according to our invention. Fig. 2 is a longitudinal section at $x x$, part in elevation. Fig. 3 is a longitudinal elevation at $y y$. Fig. 4 is a transverse vertical section at $z z$. Fig. 5 is a detail in side elevation of a belt guide and tightener. Fig. 6 is an end elevation of the subject of Fig. 5, and Fig. 7 is a longitudinal elevation of a portion of an old style of mill. Fig. 8 is an end elevation of a roller-housing. Fig. 9 shows a detail of Fig. 7.

A represents the ground or floor of the mill.

B B represent a pair of our rollers, each provided with an independent driving-pulley, C. The pulley of the upper roller is at one end of the pair of rollers, and the pulley of the lower roller is at the other end of the pair. By this construction the pulleys may each pass the center of the other, and consequently be as large as may be required to drive the mill either by wire rope or other belting. It is common to use gear-wheels (see Fig. 7) in order to drive these rollers with sufficient force and speed to do the work; but gearing is very noisy and dangerous, and therefore objectionable. We use a series of these pairs of rollers, consisting of any required number, and we place them in two lines, D E, opposite to each other, so that the wire rod may start in at a pair of rollers, R^1 , in the first line, then pass to a pair, R^2 , in the opposite line, then in a loop, L^1 , back to rollers R^3 , and thence be returned to a pair, R^4 , in the first line, and so on until it is reduced to the required size. In order to accomplish this successfully, each succeeding pair of rollers must run as much faster than its predecessors as will correspond to the amount which the latter has lengthened the rod in addition to what the present pair will lengthen it. To this end a counter-shaft, F,

is mounted in bearings in a pit, G, below the floor of the mill, and provided with pulleys H, which may increase in size along the shaft, as here shown. These pulleys are placed in pairs, 5 to register with and be connected by belts K with the two pulleys C, the two pulleys of a pair being of the same size in order that the two rolls of a pair may be driven at the same speed. Of course the pulleys on the two rollers of a pair may vary in size, and the corresponding counter-shaft pulleys be proportioned to maintain equal speed of the two rollers of each pair and the required increasing speed from pair to pair. 10

Besides the counter-shaft F there may be other counter-shafts, I, to serve as speeders, taking power from the shaft F and returning it to another similar shaft, J, in line therewith. These counter-shafts, being below the mill-floor, 20 may have pulleys of any desired size on them without interfering with the mill-works. The counter-shaft F may be run by a belt, L, from a pulley, M, on the shaft of an engine or main driver.

N represents a series of rollers called the "roughing-train," whose duty is to reduce the billet, which is well understood in rolling-mills, and on which we make no particular claim. 25

O represents a series of idlers or tightening-pulleys, which direct the driving-belts beneath the floor, and which are mounted as shown in Fig. 5, and provided with hand-screws P, by which they may be strained to tighten the 30 belts, the bearing being fitted to slide in the housing across the line of the shaft and of the belt.

The pulleys here shown on the rollers are sheaves for the purpose of using a wire-rope; 40 but any other style of belt may be substituted. The view in Fig. 8 of one of the housings for a pair of rollers is enlarged to show how the rollers may be mounted.

It is to be understood that any gearing which 45 will accomplish the same purpose as the belts and pulleys described in substantially the same way is considered as an equivalent thereof.

For the purpose of adding heat to the wire rod while it is in progress of being rolled, we have placed the two lines of rollers D and E 50 far enough apart to introduce furnaces S into the path of the wire rod in its crossings between the lines D and E. The furnaces may be constructed to burn gas. In that case each furnace is a mere pipe, W, lined with a refractory substance, W', provided with gas-burners W'', and open at the ends to permit ingress and egress of the wire rod without hinderance; or 55 the furnaces may be suitably constructed to burn coal or other fuel. Any number of these furnaces placed in the path of the wire rod between parallel pairs of rollers may be used in a mill. 60

A², Fig. 7, shows wabblers and spindles used in old-style mills out of level, as described in 65 the early part of this specification.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of two series of independent pairs of rolling-mill rollers journaled 70 in two parallel lines upon a floor, pulleys on the roller-shafts, a counter-shaft journaled beneath the floor between the lines of rollers, pulleys in pairs on the shaft so proportioned as to gradually increase the speed of delivery of 75 each successive pair of rollers, and belts connecting the pairs of pulleys on the shaft with the roller-pulleys in pairs, substantially as shown and described.

2. The combination of a series of rolling-mill 80 rollers and pulleys thereon journaled above the floor, a counter-shaft below the floor, pulleys on the counter-shaft, belts connecting the pulleys above the floor with those below the floor, and a series of binding-pulleys journaled 85 in bearings fitted to slide in their housings, and hand-screws therefor, substantially as shown and described.

HENRY GREY.
RICHARD BOWATER.

Witnesses:

A. D. LONG,
THOMAS BARBER.