No. 867,249. PATENTED OCT. 1, 1907.

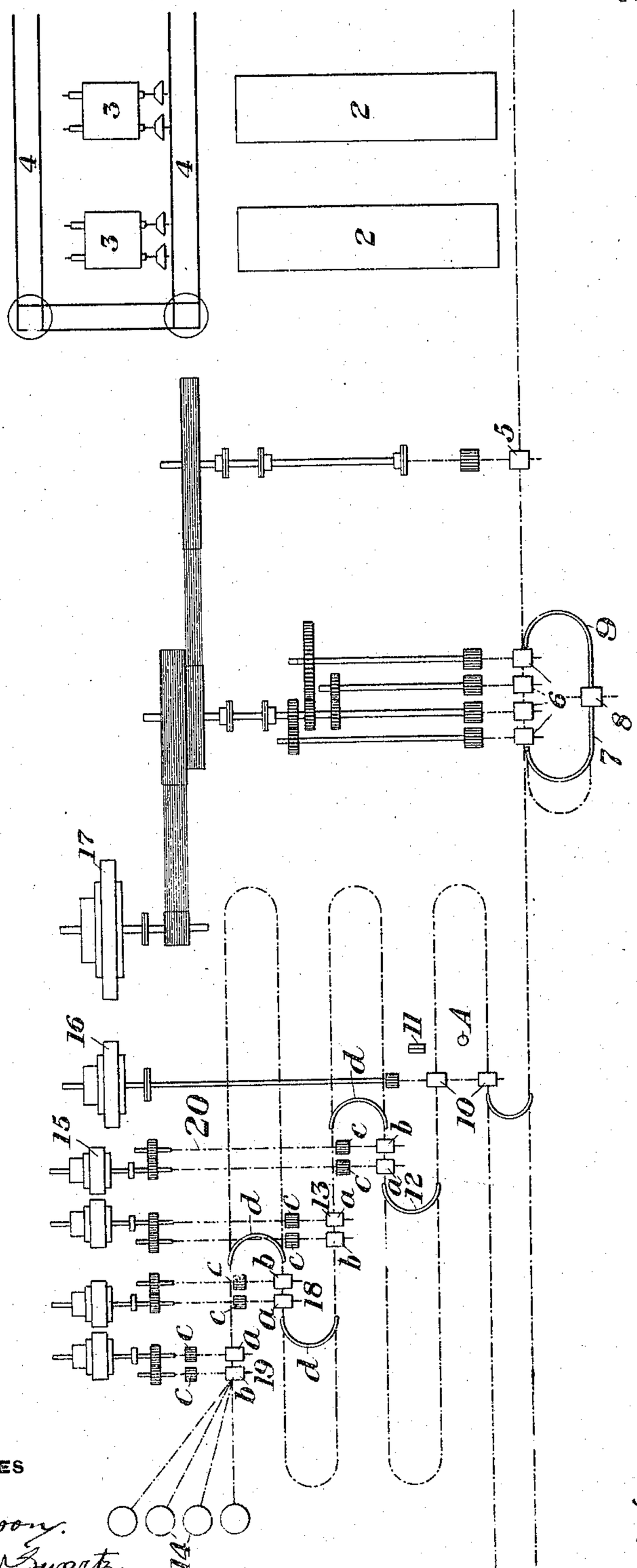
F. H. DANIELS.

ROD OR HOOP MILL.

APPLICATION FILED APR. 4, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

R. A. Balderson.

Warren W. Swartz

INVENTOR

F. H. Daniels

by Baldwin & Hynes

his attys

No. 867,249. PATENTED OCT. 1, 1907.

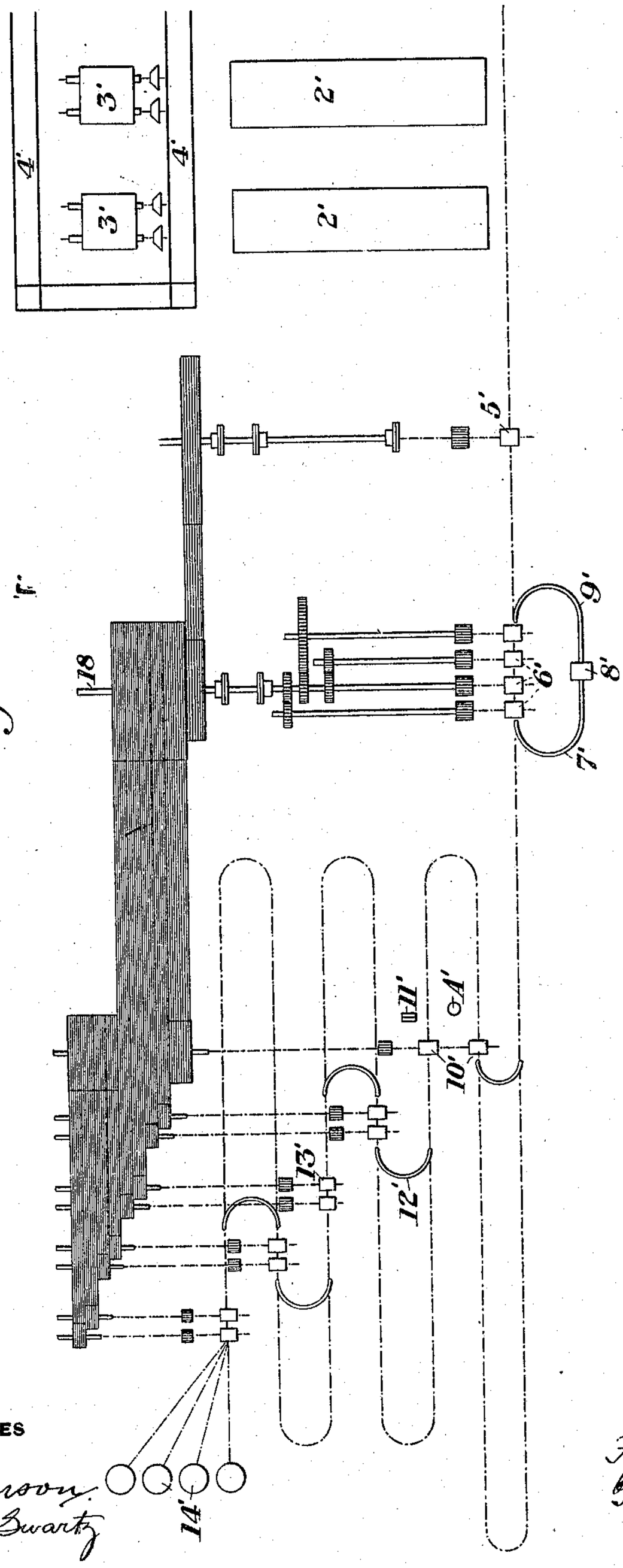
F. H. DANIELS.

ROD OR HOOP MILL.

APPLICATION FILED APR. 4, 1906.

2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

R. A. Balderson

Warren W. Swartz

INVENTOR

F. H. Daniels

by Dallett & Symes

his attys

UNITED STATES PATENT OFFICE.

FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

ROD OR HOOP MILL.

No. 867,242. Specification of Letters Patent. Patented Oct. 1, 1907.

Application filed April 4, 1906. Serial No. 309,825.

To all whom it may concern:

Be it known that I, FRED H. DANIELS, of Worcester, Worcester county, Massachusetts, have invented a new and useful Rod or Hoop Mill, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which,—

Figure 1 is a plan view of a rod mill system constructed in accordance with my invention; Fig. 2 is a similar view showing modified driving mechanism.

The object of my invention is to provide a simple and efficient rod mill which, though especially adapted for one rod, may roll a number of rods at the same time.

The rolling as conducted in my improved mill is continuous and largely automatic, dispensing with excessive hand labor of the Belgian mill or looping system, and at the same time, removing the objectionable pull in the present type of continuous mills, which takes place between the continuous rolls and stretches the product during the rolling operation, forming large ends or fins which must be cut off and wasted. By my invention the product moves through the various rolls of the mill automatically with the minimum labor cost, and is conducted by guides or repeaters so arranged as to form slack at suitable intervals in the form of loops, thus obviating the pull on the product during the rolling operation, in this way insuring a uniform quality of product at a minimum cost. In this way I also diminish the high finishing speed necessary in continuous mills; moreover, the loops cool the rod and make a better finish.

In the drawings, referring to Fig. 1, 2, 2 are reheating furnaces through which billets may be fed by the usual pusher devices 3, 3, 4, 4 being the billet car tracks. From the opposite end of the furnaces 2 the billets are discharged upon a conveyer which automatically and without hand labor feeds them forward into a pair of rolls 5, from which they pass automatically to the multiple sets of rolls 6 which in this particular case are four in number. The billet preferably leaves the rolls 5 before it enters the first set of rolls 6, in which it receives four reductions and from which it passes through repeater 7 into feed rolls 8, from which it passes back through repeater 9 into the same set of rolls to receive four more reductions therein. This double reduction will ordinarily take place before another billet is fed forward from the rolls 5 into the four sets of rolls 6, but for large tonnages there is no reason why the second billet cannot follow shortly after, provided a sufficient interval of space is allowed for the first billet to keep in advance of the second. After the second set of four reductions, the rod is conducted and delivered to a single pair of Belgian mill rolls 10, a catcher being located between these single rolls at the point marked A for cropping the first end in the shears 11. The rod is now passed through a repeater 12 into the finishing mill 13, which in this particular case is made up of eight pairs of rolls but can be of any number desired. As the product issues from the last or finishing pair of rolls in this mill, it is conducted through suitable conveying pipes to automatic reels 14 where the product is coiled. If the product is desired to be in straight lengths, it is run out on to a suitable floor without coiling.

In the form shown in Fig. 1, every alternate spindle in the finishing mill 13 is driven by an electric motor 15, the power being transmitted from one spindle to its mate by a chain or spur gearing. The single rolls 10 are also driven by a motor 16 and the billet mill rolls 5 and 6 may be driven by electric motors, rope drives or spur gearing. In Fig. 1 the rolls 6 are driven by spur gearing from one of their spindles, which is rope-driven from motor 17, while rolls 5 are rope-driven from the same spindle. It is not imperative, however, to drive the rolls in the particular way above described, for although the arrangement shown herein is desirable and convenient, other arrangements may be employed. Thus, in the arrangement shown in Fig. 2, in which similar parts are marked with similar numerals with the prime mark applied, all of the spindles are rope-driven, the main shaft 18 being driven from an engine or suitable source of power.

An important feature of my invention consists in the arrangement of the rolls. As shown in Fig. 1 of the drawings, the rolls 12, 13, 18 and 19 are arranged in the manner of double Belgian mills, that is to say, each set comprises a pair of rolls arranged in tandem, the rod being changed successively by the rolls of each pair to oval shape and square or round shape in cross-section. My invention, so far as it relates to the construction of these rolls, consists in arranging the double Belgian sets so that their ends are exposed and free to access, the sets of rolls being arranged in staggered relation instead of being set in line with each other. Each of the main shafts 20 of the rolls, therefore, as shown in Fig. 1, is accessible for transmitting power either by ropes, belts, or motors, and the operator in charge of the mill can get access to each pair of the Belgian rolls without walking between the other rolls. Thus, referring to Fig. 1, *a*, *b* are the rolls of each set and *c*, *c* are the pinions which transmit power from the shaft of the lower to the shaft of the upper roll, or vice versa. *d*, *d* are the repeaters which transfer the rod from the rolls *b* to the succeeding rolls *a* of the next Belgian set, the rod being formed into oval shape by the rolls *a* and covered into square or round shape in cross-section by the rolls *b*. The advantage of the arrangement of these rolls which I have explained above, is that the operator can work with entire freedom at the outer ends of the rolls and between the rolls. This is of importance, because there are guides between the rolls that must frequently be changed and adjusted, and the staggered arrangement

which I have shown leaves the ends of the rolls free for such adjustment and for inspection and repair. This is accomplished without complicating the arrangement of the mill or entailing any disadvantages.

The advantages of my invention will be obvious to those skilled in the art. The system is simple, economical and gives a large output for the cost of installation. While especially adapted for one rod it may be employed to roll a number of rods at the same time.

Variations may be made in the form and arrangement of the mills, the conveyers, &c., without departing from my invention.

I claim:—

1. In a rod or hoop mill system, a mill having a series of sets of rolls in tandem, and a repeater arranged to repeat the billet back through said series of sets of rolls; substantially as described.

2. In a rod or hoop mill system, sets of double rolls each comprising a pair of rolls arranged in tandem, said sets being staggered or out of line with one another; substantially as described.

In testimony whereof, I have hereunto set my hand.

FRED H. DANIELS.

Witnesses:
WM. A. BACON,
H. M. LATHAM.