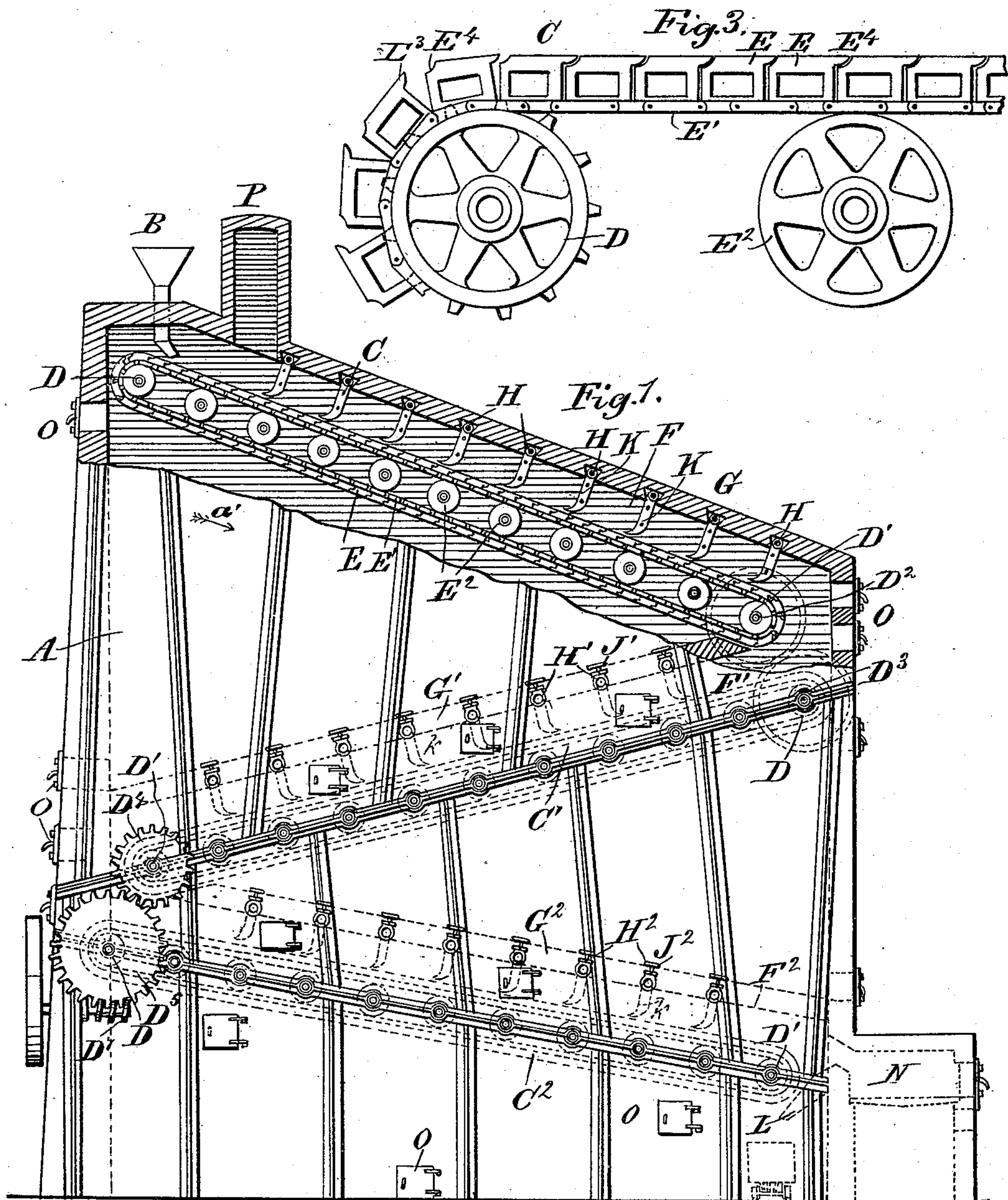


2 Sheets—Sheet 1.

No. 472,848.

Patented Apr. 12, 1892.



WITNESSES:

W. M. Andle.
C. Sedgwick

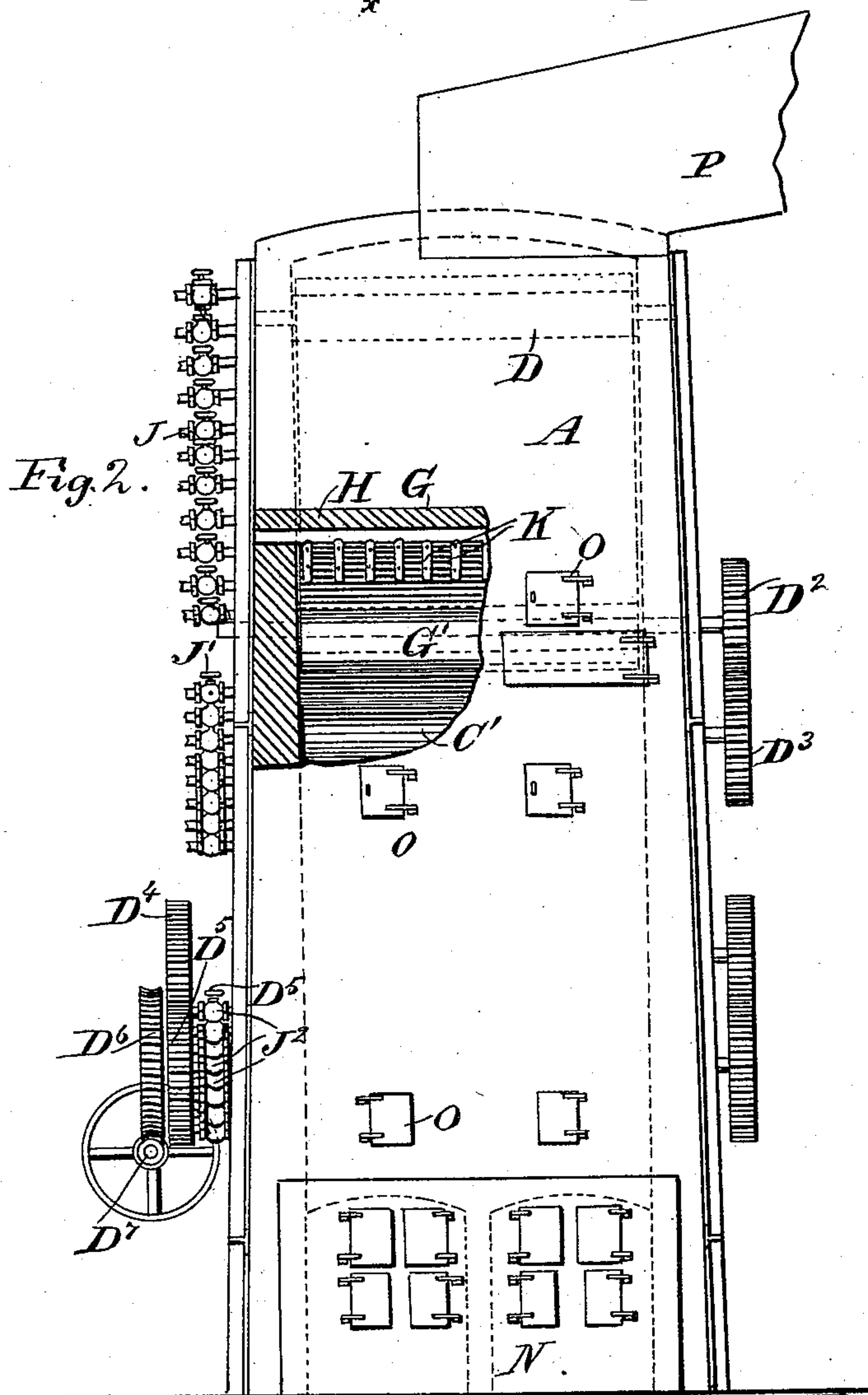
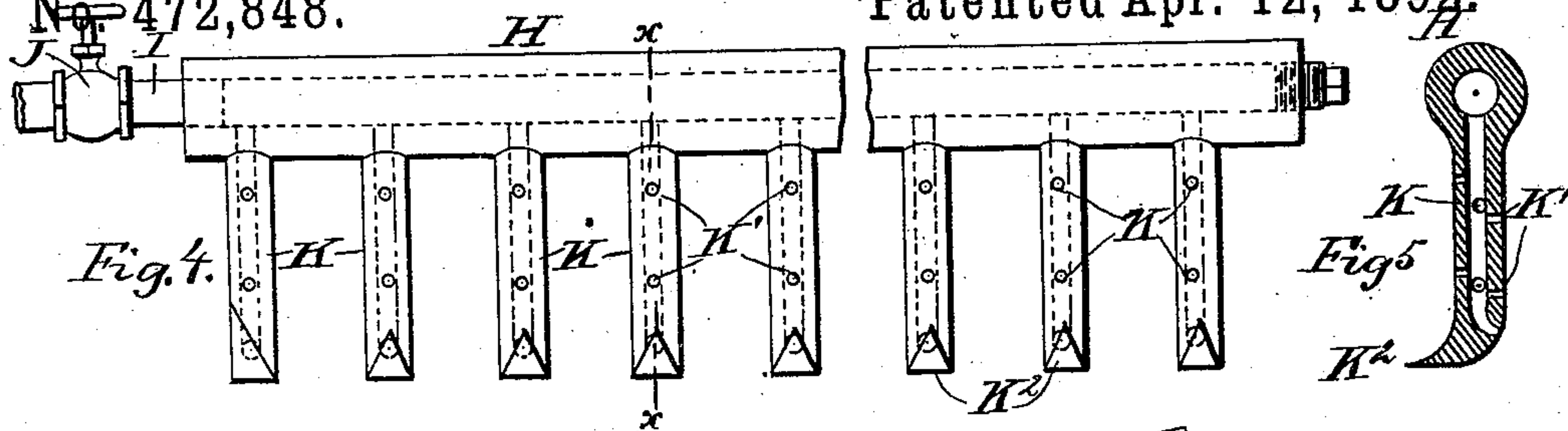
INVENTORS:

INVENTORS
G. F. Bartlett
BY A. J. O'Neill
ATTORNEYS

2 Sheets—Sheet 2.

ORE ROASTING FURNACE.

Patented Apr. 12, 1892.



WITNESSES:

F. M. Arble,
C. Sedgwick

INVENTORS:

E. F. Bartlett
BY J. O'Neill
ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE F. BARTLETT AND AUGUSTUS J. O'NEILL, OF BUTTE CITY,
MONTANA.

ORE-ROASTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 472,848, dated April 12, 1892.

Application filed April 8, 1891. Serial No. 388,109. (No model.)

To all whom it may concern:

Be it known that we, GEORGE F. BARTLETT and AUGUSTUS J. O'NEILL, of Butte City, in the county of Silver Bow and State of Montana, have invented a new and Improved Ore-Roasting Furnace, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved ore-roasting furnace which is simple and durable in construction, self-actuating, and arranged to permit of conveniently regulating the draft to insure complete combustion.

The invention consists of certain parts and details and combinations of the same, as will be described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement with parts in section. Fig. 2 is an end elevation of the same with parts broken out. Fig. 3 is an enlarged side elevation of part of the carrier-belt. Fig. 4 is an enlarged elevation of one of the blast-pipes, and Fig. 5 is a cross-section of the same on the line xx of Fig. 4.

The improved ore-roasting furnace is provided with suitably-constructed brick-work A, forming the casing for the furnace and provided on its top with a funnel B, into which the ore to be roasted is to be placed. The inner end of the funnel B discharges upon the upper end of an endless carrier-belt C, set at an angle within the casing and mounted to travel over the wheels D and D', held on hollow shafts B', mounted to turn in suitable bearings in the side walls of the casing A. The endless carrier-belt C is formed of a series of transversely-extending hollow bars E, (see detail, Fig. 3,) each secured at its ends on the links of the endless chains E', passing over sprocket-teeth formed on the wheels D and D'. To sustain the weight of the carrier-belts and the ore supported thereon, idlers E² are provided, which are also secured on hollow shafts mounted to turn in suitable bearings held on the outside of the casing A.

The upper part of the carrier-belt C is in line with the inclined top G of the casing A, a suitable space F being left between the upper part of the carrier-belt and the top G for the introduction of fixed agitators arranged to agitate the ore on the belt, and also serving to introduce the necessary amount of air for combustion of the sulphur contained in the ore. For this purpose on the under side of the top G are arranged transversely-extending blast-pipes H, placed suitable distances apart, as is plainly shown in Fig. 1, each being closed at one end and the other end being connected with an inlet-pipe I, connected with a suitable source of air-supply and provided with a valve J for regulating the amount of blast passing through the pipe H. (See detail, Fig. 4.)

From each of the pipes H extend downward the branch or agitating pipes K, having openings K' on all sides to permit the air to escape into the space F to insure complete combustion of the burning gases. The lower end of each branch or agitating pipe K is formed with a point K², extending upward, as is plainly illustrated in Fig. 1. Each point K² extends to within a short distance of the top surface of the carrier-belt C, so that the ore supported thereon comes in contact with the point, and is thereby agitated at the time the belt C travels downward in the direction of the arrow a' .

It is understood that the inclination of the carrier-belt C is such that the ore discharged thereon at the upper end of the belt imparts, by its own weight, a traveling motion to the said belt, or at least assists in furnishing power. The lower end of the belt C discharges the ore on top of a second belt C', similar in construction and arrangement to the belt C, and inclined, but in an opposite direction. The ore passing upon this belt imparts motion to the same, so that the ore is finally discharged at the lower end of the belt C' upon a third belt C², similar to the belts C and C'. The lower end of the last belt C² discharges into a fixed chute or incline L, adapted to discharge into a wagon or other receptacle for carrying off the roasted ore. At the lower end of this third belt C² is also arranged a furnace N of any

approved construction, so as to charge the combustion-chambers of the furnace with heat in case it is necessary—that is, in case the ores do not contain sufficient sulphur to carry on the roasting successfully.

Above the belt C' is a space F', covered by a top G', arranged transversely and secured at its ends to the sides of the casing A. A similar space F² and top G² are arranged above the belt C², each of the said tops G' and G² containing sets of blast-pipes H' and H², respectively, similar in construction to the blast-pipe H, and also provided with branch or agitating pipes K.

In order to obtain a uniform motion of the belts C, C', and C², the rollers D' and D of the belts C and C' are geared with each other by gear-wheels D² and D³, respectively, as is plainly illustrated in Fig. 2. In a similar manner the rollers D' and D of the belts C' and C² are connected with each other by gear-wheels D⁴ and D⁵, of which the latter carries, in addition, a worm-wheel D⁶, engaged by a worm D⁷ for regulating the speed of the several belts.

In the sides and ends of the casing A are arranged at convenient places doors O, which permit the operator to inspect at any time the workings of the furnace. In order to prevent the ore from passing between the bars E of the carrier-belts, the said bars are provided at one side with a lip E³, fitting into the corresponding recess E⁴ on the adjacent side of the next following link, as is plainly illustrated in Fig. 3. The gases, smoke, &c., arising in the furnace are carried off from the upper end of the space F through the chimney P or may be taken out at the upper end of each belt.

The operation is as follows: The ore is discharged into the hopper B and passes from the latter upon the upper end of the first carrier-belt C, so that the latter travels in the direction of the arrow a', thus carrying the ore downward. The ore in its downward movement is agitated by the agitating or branch pipes K, so that the ore is completely turned over during its downward movement on the belt C. The ore is discharged at the lower end of the belt C upon the upper end of the belt C', on which the ore travels downward through the space F' to be agitated by the agitating-pipes of the blast-pipes H' and to be finally discharged upon the upper end of the third belt C², which carries the ore downward again and finally discharges the same over the chute L into the wagon or other suitable receptacle located below the chute. If the ore contains sufficient sulphur and like burning substances, then the furnace N is not used, as the said sulphur, when burning at the time that the ore travels over the several belts, furnishes sufficient heat to completely roast the ores. If, however, the ores do not contain sufficient sulphur, a fire is started in the furnace N, which leads into the lower end of the space F², so that the heat and gases

discharged from the furnace N circulate through the spaces F², F', and F to heat the ore traveling downward on the belts C, C', and C².

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a blast-pipe and stirrer consisting in the pipe K, having a series of lateral apertures K' and having its lower end curved or projected forwardly and forming the integral stirring-point K², substantially as set forth.

2. The combination, with the roasting-chamber and ore-carrier extending longitudinally through said chamber, of the blast-pipe crossing the same and provided with a series of depending apertured branches projecting at their lower ends adjacent to the upper surface of the carrier to stir the ore thereon, substantially as set forth.

3. An ore-roaster consisting in the furnace proper, inclined endless carriers, one above the other within the furnace and geared together, a funnel discharging upon the upper end of the upper carrier to impart motion thereto, blast-pipes crossing the spaces above the carriers and provided with depending apertured branches having stirring-points at their lower ends projecting toward the upper ends of the carriers, and a worm geared to a shaft of the lower carrier and operated thereby to regulate the speed of the carriers, substantially as set forth.

4. In an ore-roasting furnace, the combination, with a casing, of an endless carrier-belt set at an angle in the said casing to receive a traveling motion from the ore discharged thereon, and blast-pipes having branch or agitating pipes extending close to the upper part of the said traveling belt, the said branch pipes being provided with openings for the discharge of air, substantially as shown and described.

5. In an ore-roasting furnace, the combination, with a casing, of a series of endless carrier-belts arranged one above the other in the said casing and set at angles, the lower end of one belt discharging upon the upper end of the next following belts, tops or partition-walls arranged in the upper part of the casing above said endless carrier-belts, so as to form a space for the latter, and blast-pipes held in the said tops or partition-walls, each blast-pipe being provided with perforated branch or agitating pipes extending through the said space close to the upper surfaces of the carrier-belts, substantially as shown and described.

6. In an ore-roasting furnace, the combination, with a casing, of a series of endless carrier-belts arranged one above the other in the said casing and set at angles, the lower end of one belt discharging upon the upper end of the next following belts, tops or partition-walls arranged in the upper part of the cas-

ing above said endless carrier-belts, so as to form a space for the latter, blast-pipes held in the said tops or partition-walls, each blast-pipe being provided with perforated branch or agitating pipes extending through the said space close to the upper surface of the carrier-belts, and points formed on the lower ends of the said perforated agitating-pipes, substantially as shown and described.

10 7. In an ore-roasting furnace, the combination, with a casing, of a series of endless carrier-belts arranged one above the other in the said casing and set at angles, the lower end of one belt discharging upon the upper end of
15 the next following belts, tops or partition-walls arranged in the upper part of the casing above said endless carrier-belts, so as to form a space for the latter, blast-pipes held in the said tops or partition-walls, each blast-
20 pipe being provided with perforated branch or agitating pipes extending through the said space close to the upper surfaces of the carrier-belts, and a chute arranged at the lower

end of the lowermost carrier-belt, substantially as shown and described. 25

8. In an ore-roasting furnace, the combination, with a casing, of a series of endless carrier-belts arranged in the said casing and set at angles, the lower end of one belt discharging upon the upper end of the next following
30 belts, tops or partition-walls arranged in the upper part of the casing above said endless carrier-belts, so as to form a space for the latter, blast-pipes held in the said tops or partition-walls, each blast-pipe being provided
35 with perforated branch or agitating pipes extending through the said space close to the upper surface of the carrier-belts, and a furnace connected with the lower end of the lowermost carrier-belt, substantially as shown
40 and described.

GEORGE F. BARTLETT.
AUGUSTUS J. O'NEILL.

Witnesses:

JOHN A. CANNON,
AUGUSTIN ROCHE.