

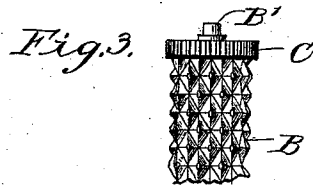
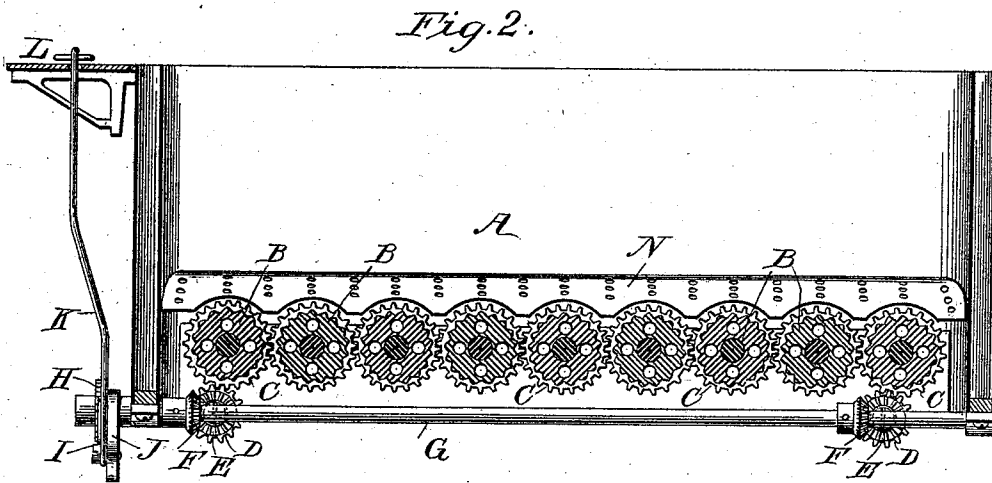
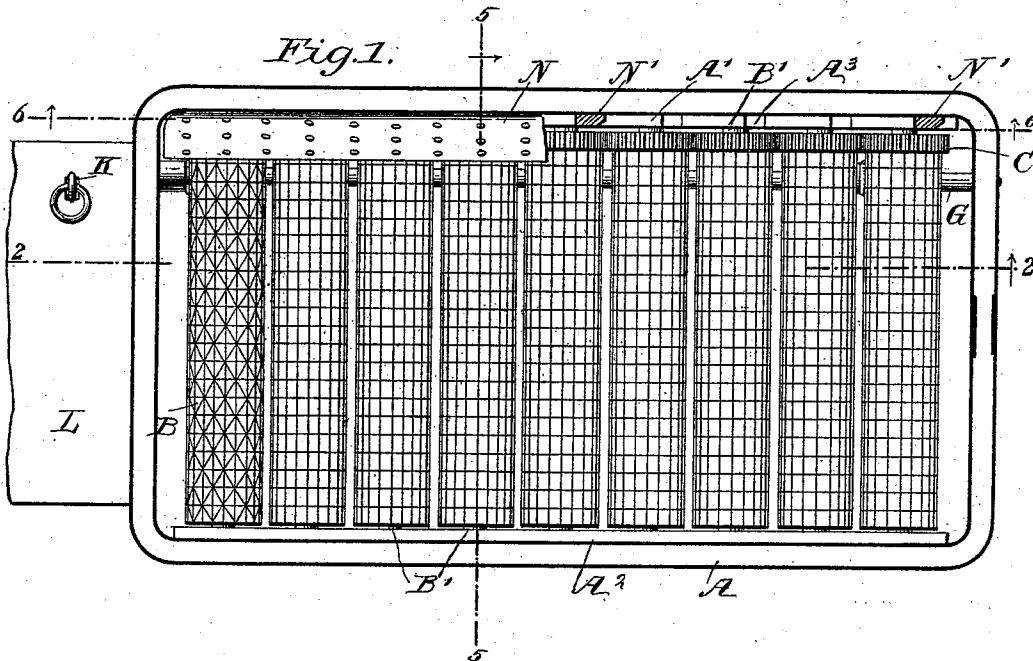
(No Model.)

L. R. ANDREWS.
GRATE.

3 Sheets—Sheet 1.

No. 526,957.

Patented Oct. 2, 1894.



WITNESSES.
John A. Rennie
C. Sedgwick

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ATTORNEYS.

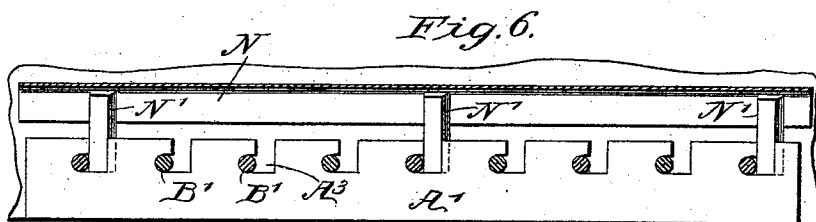
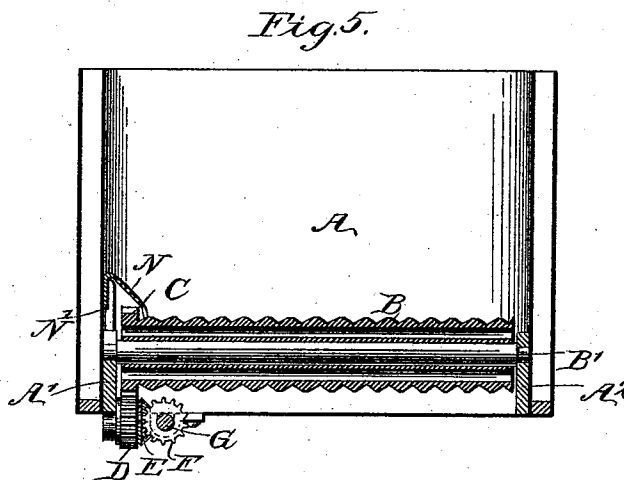
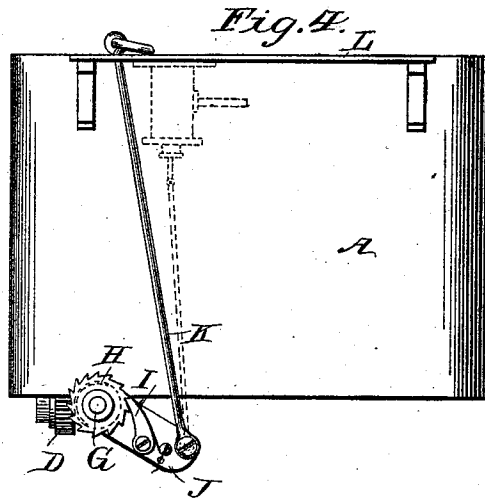
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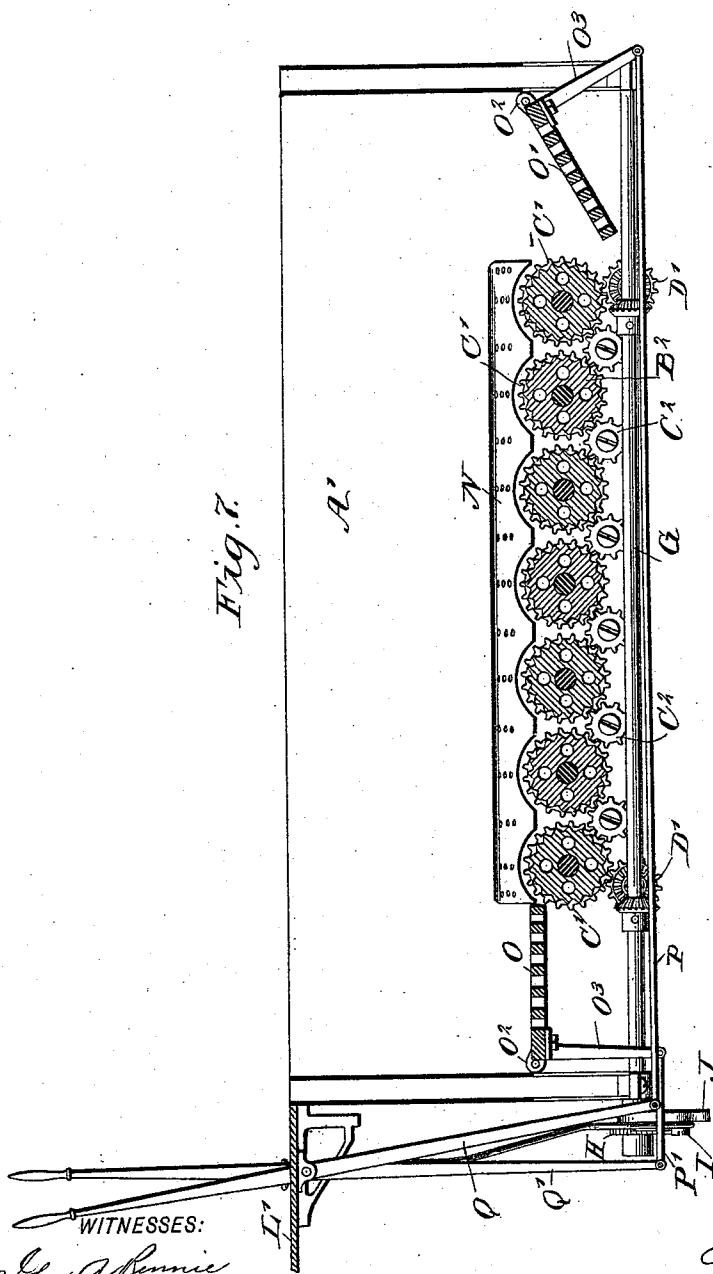
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3 Sheets—Sheet 3.

L. R. ANDREWS.
GRATE.

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UNITED STATES PATENT OFFICE.

LEE R. ANDREWS, OF BATH BEACH, NEW YORK.

GRATE.

SPECIFICATION forming part of Letters Patent No. 526,957, dated October 2, 1894.

Application filed October 18, 1893. Serial No. 488,446. (No model.)

To all whom it may concern:

Be it known that I, LEE ROBERTS ANDREWS, of Bath Beach, in the county of Kings and State of New York, have invented a new and Improved Grate, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved grate which is simple and durable in construction, very effective in operation, more especially designed for use in locomotive and other boilers, furnaces, &c., and arranged to give the operator complete control of the burning fuel and to permit of conveniently raking it and removing clinkers.

The invention consists of certain parts and details, and combinations of the same, as will be hereinafter described 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 plan view of the improvement with parts in section, and arranged in a locomotive fire-box. Fig. 2 is a sectional side elevation of the same on the line 2—2 of Fig. 1. Fig. 3 is a detail plan view of part of one of the cylindrical grate bars. Fig. 4 is an end elevation of the improvement. Fig. 5 is a transverse section of the same on the line 5—5 of Fig. 1. Fig. 6 is a sectional side elevation of part of the improvement on the line 6—6 of Fig. 1; and Fig. 7 is a sectional side elevation of another form of the improvement.

The improved grate as illustrated in the drawings, is shown as applied to a locomotive fire-box A, and the said grate is composed of a series of transversely-extending cylindrical grate bars B arranged one alongside the other and formed on their peripheral surface with projections arranged in parallel spiral rows with their bases contiguous to each other as plainly indicated in Fig. 3, so as to give a symmetrically roughened surface to each of the grate bars.

As shown in Fig. 2, each of the grate bars is made hollow preferably by being formed with transverse or longitudinal apertures to make the same perfectly light and to permit the circulation of air to keep the grate bars as cool as possible. Each of the cylindrical

grate bars B has its shaft B' journaled in side strips A' and A², secured to the sides of the fire-box A, as plainly illustrated in Figs. 1, 5 and 6. On each of the grate bars B and near one end thereof is secured or formed a gear wheel C, and the several gear wheels are preferably made to mesh with each other, as illustrated in Figs. 1 and 2, but they may be made of smaller size, so as not to be in mesh, as illustrated in Fig. 7. When the several gear wheels are in mesh with each other, then they all rotate together in such a manner that two succeeding ones will rotate in opposite directions.

Now, in order to impart motion to the grate bars, I mesh the gear wheels of the end grate bars B with spur wheels D journaled in suitable bearings attached to the side strip A'. Each spur wheel D is formed at its face with a bevel gear wheel E in mesh with a like gear wheel F secured on a longitudinally-extending shaft G journaled in suitable bearings at the end of the fire-box A. On the rear end of the shaft outside of the fire-box A is secured a ratchet wheel H engaged by a spring pressed pawl I fulcrumed on an arm J mounted to swing loosely on the shaft G and connected with a rod K extending to the deck L of the locomotive so as to be under the control of the operator to permit the latter to impart by the said rod, an up and down swinging motion to the arm J to cause a revolving of the shaft G in one direction by the action of the spring pressed pawl I on the ratchet wheel H. The intermittent motion thus given to the shaft G is transmitted by the bevel gear wheels F to the bevel gear wheels E so that the spur wheels D are rotated and the motion of the latter is transmitted to the gear wheel C of the end cylindrical grate bars B, whereby all the grate bars are rotated in unison, as above described.

Now, when the fuel is burning on top of the grate bars, and the operator imparts a rotary motion to the same, as above described, then the fuel is disturbed and broken up at the under side by the action of the roughened surfaces of the said grate bars, to cause the ashes to readily pass downward between adjacent grate bars to the ash pan. It will also be seen that should any clinkers lodge between two adjacent grate bars, the rotary mo-

tion of the latter and their roughened surfaces will break up the clinkers so that they finally drop down into the ash pan.

It is understood that the grate bars are sufficiently far apart to permit sufficient admission of air for complete combustion, the air being free to circulate over the recesses formed by the roughened surfaces of the grate bars to be thus distributed under the entire under side of the burning fuel.

In order to protect the several gear wheels C from the heat generated in the fire-box A by the burning fuel on top of the grate bars, I provide a perforated hood N formed with dovetail posts N' adapted to engage the vertical parts of L-shaped notches A³ forming the bearings for that end of the shafts B' located on the strip A'. See Fig. 6. By this arrangement, the hood N is securely held in place on the strip A', and can be removed therefrom by lifting the hood upward, and at the same time the posts N' lock some of the ends of the shafts B' in place to permit their rotation, so as to prevent longitudinal movement thereof. When the hood N is removed, the L-shaped recesses A³ permit of conveniently removing any one of the grate bars B for repairs or for other purposes. In order to do this, the next adjacent grate bar is pushed forward to permit of sliding the shaft B' from the horizontal part of the notch A³ into the vertical part, to permit of lifting this grate bar upward to release the shaft D' from the notch A³, and by pulling it transversely to release the other end of the shaft from its bearing in the strip A².

As illustrated in Fig. 7 the grate bars B² do not extend to the ends of the fire-box A', so as to leave sufficient room for dumping grates O and O', which, when swung downward permit the operator to dump part of the fuel, clinkers, ashes, &c., either at the front or rear end of the fire-box. Each dumping grate O or O' is pivoted at O² to either the strips A', A² or sides of the fire-box, and is provided with a downwardly-extending arm O³ connected by a longitudinally-extending link P or P' with a lever Q or Q' fulcrumed preferably on the deck L' and under the control of the operator, so as to swing the respective dumping grate O or O' from its normal horizontal position into a downward angular position as illustrated at the right in Fig. 7, to dump the fuel at that end of the fire-box. It will also be seen by reference to Fig. 7, that the several gear wheels C' on the grate bars B² are not in mesh with each other but are in mesh with intermediate gear wheels C², so that if one grate bar is rotated, the several

grate bars are rotated simultaneously, and all in the same direction, instead of in opposite directions, as previously described, in reference to the grate bars shown in Fig. 1.

The gear wheels C' at the end grate bars B² mesh in spur wheels D' connected with the shaft G as previously explained, so that an intermittent rotary motion can be given to the gear wheels C' to rotate all the grate bars B² in unison and in one direction, either forward or backward according to the direction in which the shaft G turns. By this arrangement large clinkers which locate between two adjacent grate bars and cannot be crushed, can readily be removed to either the front or rear end of the fire-box onto a corresponding dumping grate, from which the clinkers or other material can then be dumped into the ash pan.

It will be understood that the dumping grates O O' may be employed in connection with the construction represented in Figs. 1 to 6, and if desired, only one dumping grate will be provided.

The grates may be operated by a small cylinder attached to the boiler, using steam or compressed air for power as desired, the piston rod of the said cylinder being connected, in this case, with the rod K as indicated in dotted lines in Fig. 4.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A grate comprising a series of revoluble grate bars and gear wheels connecting the same with each other, strips provided with open slots in which the grate bars are journaled, and a removable hood having posts engaging the said slots of the strips to hold the shafts of the grate bars in place, said hood covering the gear wheels, substantially as described.

2. A grate comprising a series of revoluble cylindrical grate bars, strips forming bearings for the shafts of the said grate bars, gear wheels for connecting the said grate bars with each other, a perforated hood held removably on one of the said strips to cover the said gear wheels, the said hood being provided with dovetail posts engaging correspondingly shaped dovetail grooves in the bearings for the shafts, to lock the latter in place on the corresponding strips, substantially as shown and described.

LEE R. ANDREWS.

Witnesses:

THEO. G. HOSTER,
J. L. MCAULIFF.