

(No Model.)

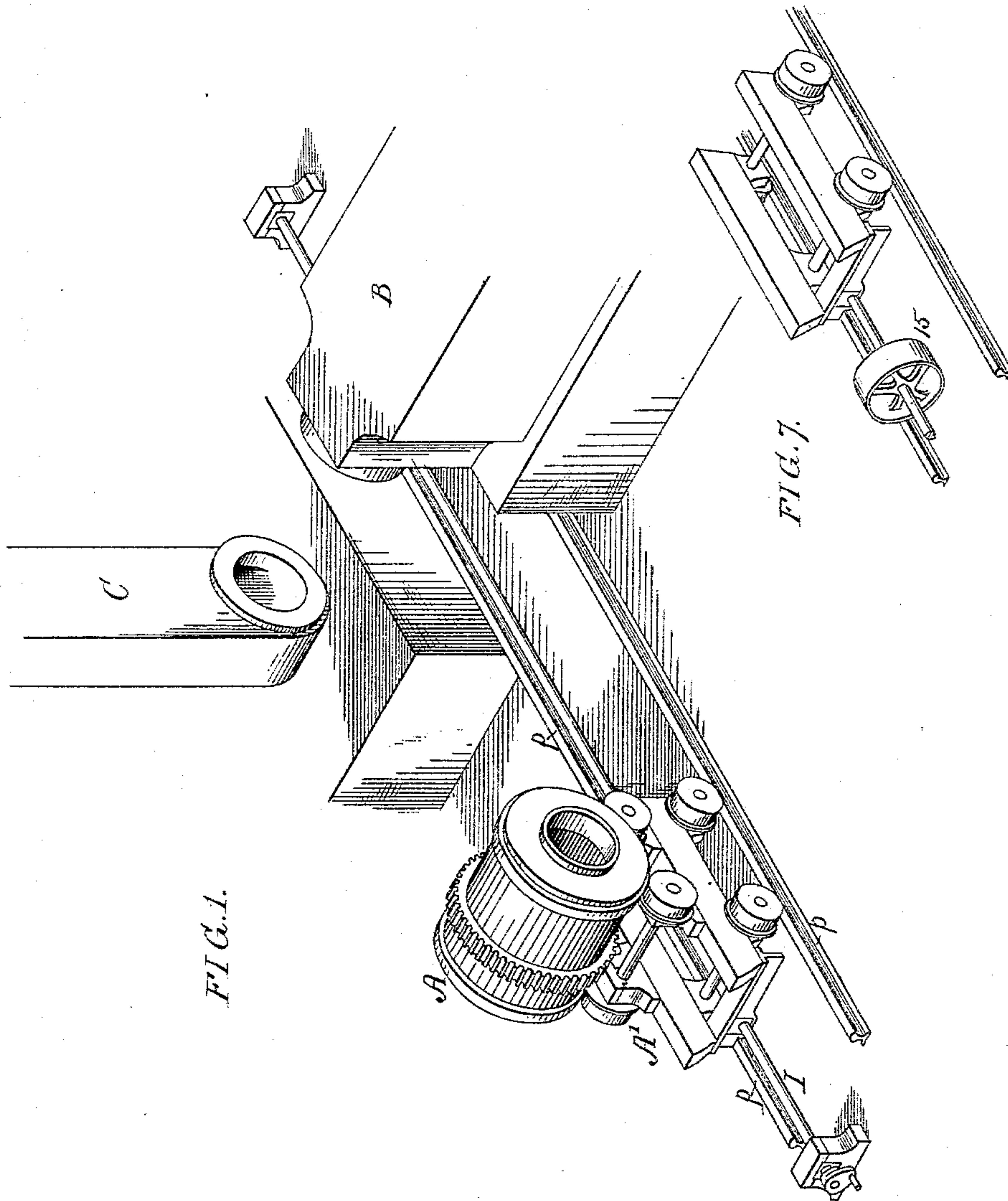
6 Sheets—Sheet 1.

J. GRIFFEN & J. HALL, Jr.

ROTARY PUDDLING FURNACE.

No. 300,250.

Patented June 10, 1884.



WITNESSES:

David Williams
Hamilton D. Turner

INVENTOR:

John Griffen
and
Jesse Hall Jr
by their attys
Howen & Sons

(No Model.)

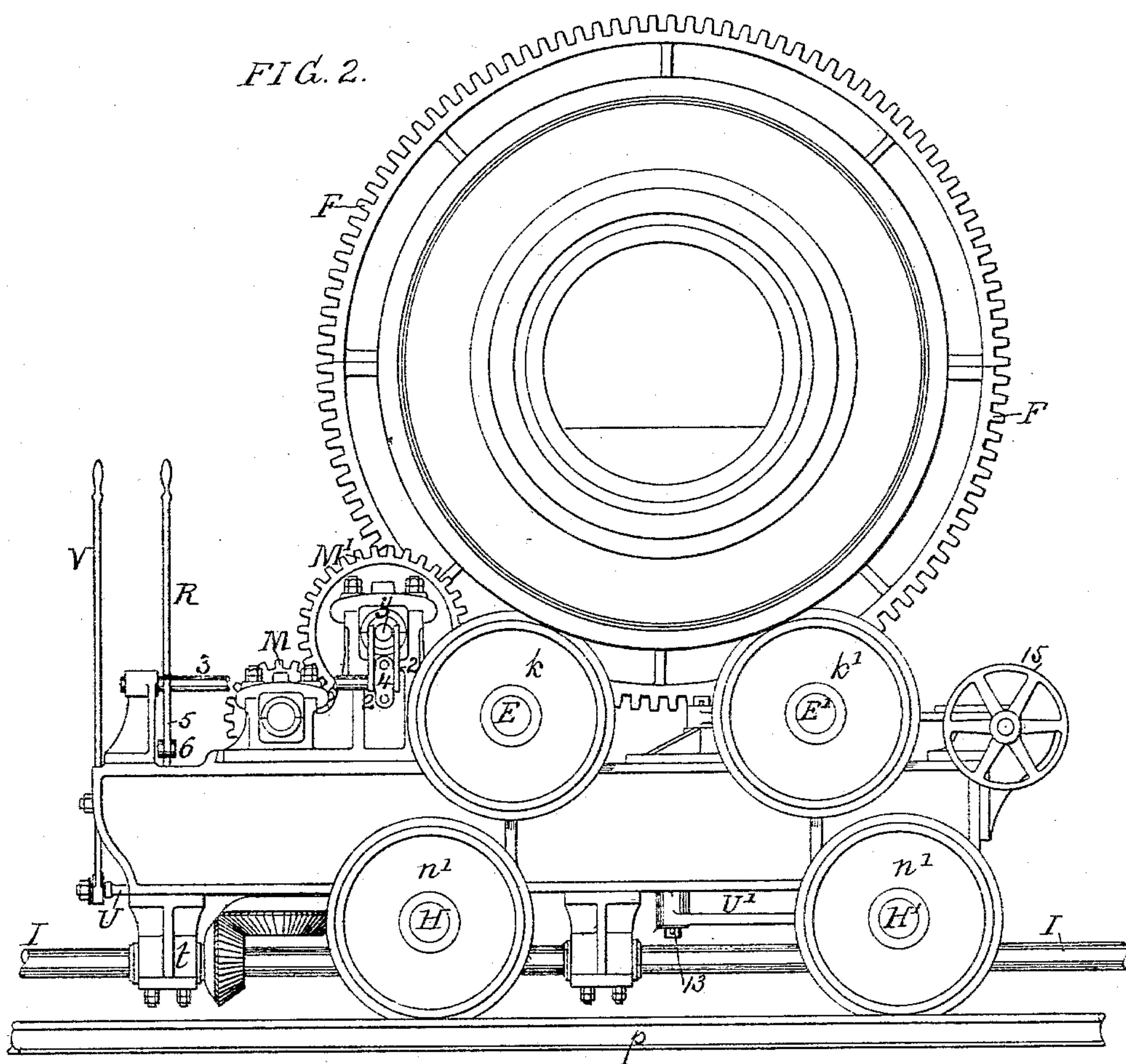
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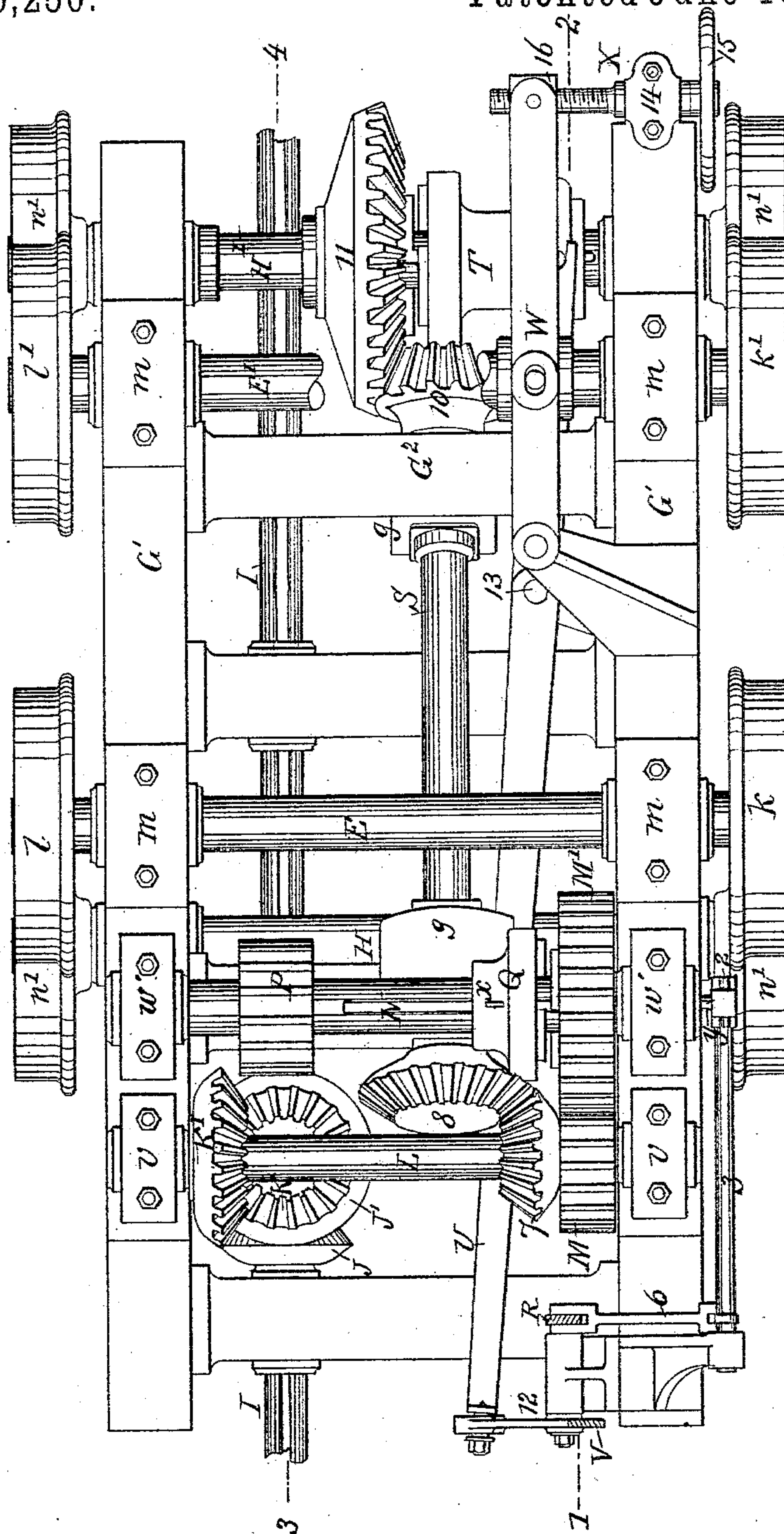
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FIG. 3.



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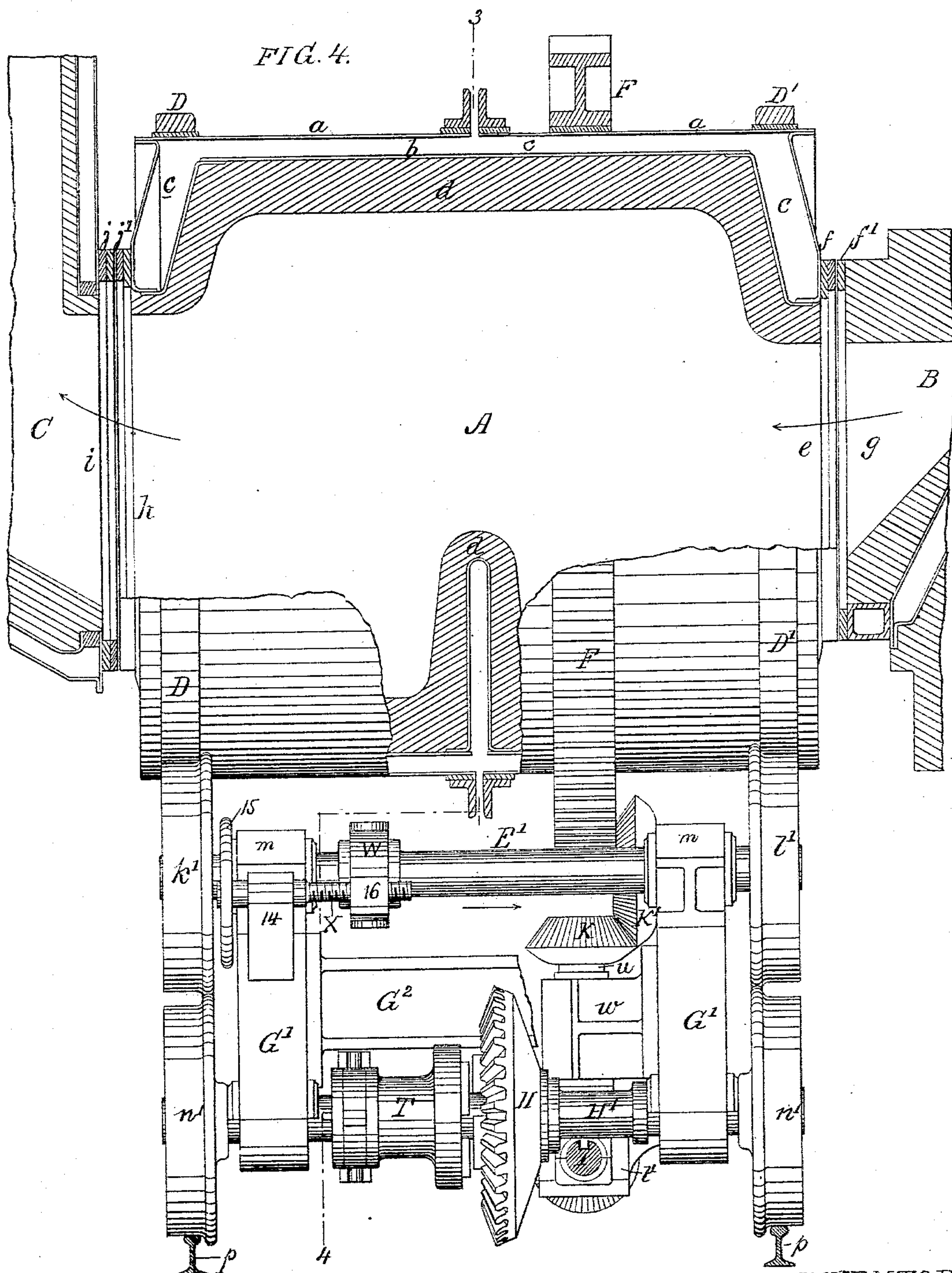
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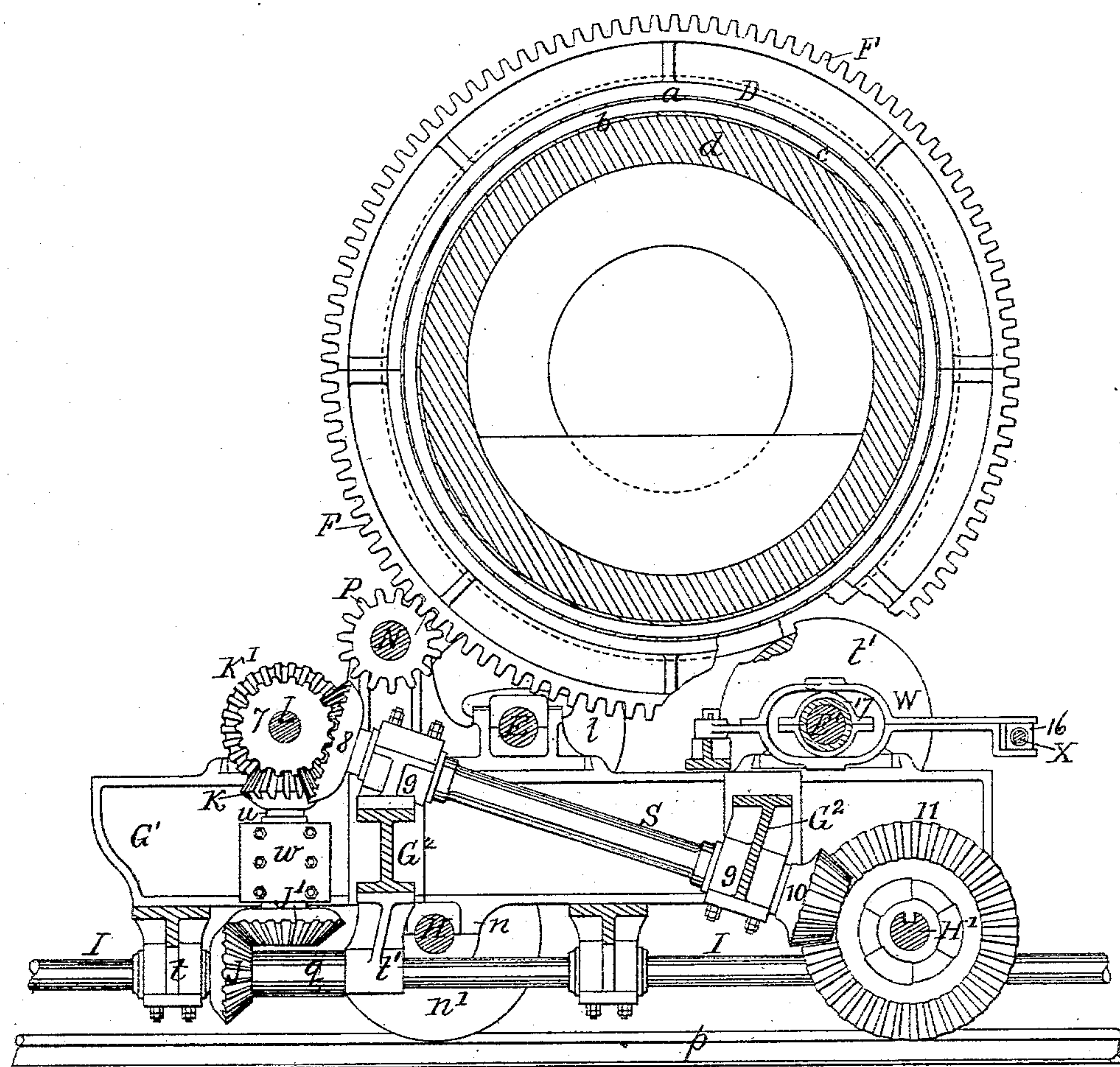
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FIG. 5.



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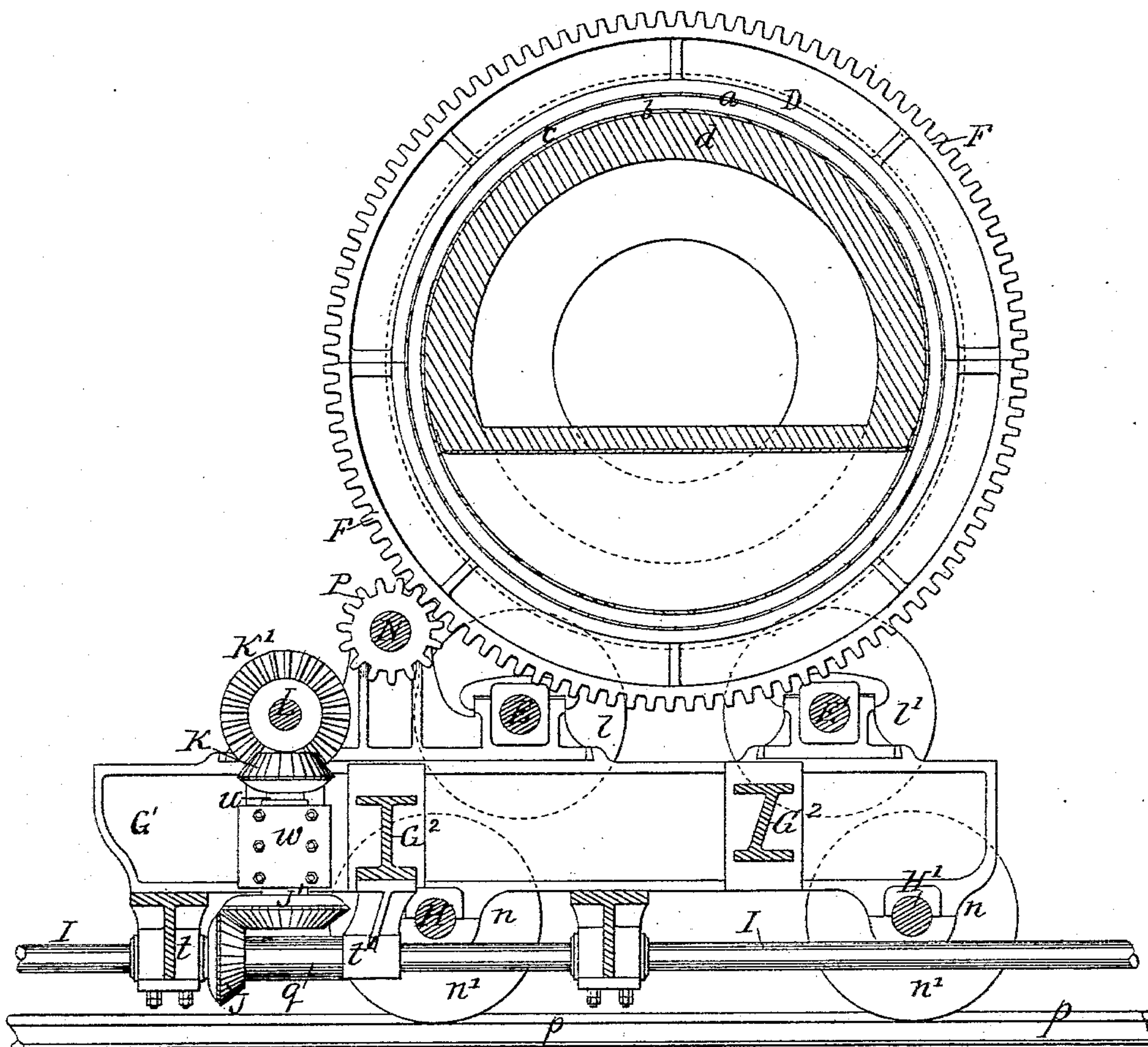
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ROTARY PUDDLING FURNACE.

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FIG. 6.



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UNITED STATES PATENT OFFICE.

JOHN GRIFFEN AND JESSE HALL, JR., OF PHOENIXVILLE, PENNSYLVANIA,
ASSIGNORS TO THE PHOENIX IRON COMPANY, OF SAME PLACE.

ROTARY PUDDLING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 300,250, dated June 10, 1884.

Application filed June 22, 1883. (No model.)

To all whom it may concern:

Be it known that we, JOHN GRIFFEN and JESSE HALL, Jr., citizens of the United States, and residents of Phoenixville, Chester county, Pennsylvania, have invented certain Improvements in Rotary Puddling-Furnaces, of which the following is a specification.

Our invention relates to rotary puddlers and to appliances connected therewith, the main object of our invention being to readily introduce the puddler to its working position between the furnace and the chimney structure, and to withdraw it from the said position to one where its openings are exposed for the removal of the puddled iron, and for receiving a new charge, these duties, as well as that of rotating the puddler, being accomplished, through the medium of gearing on a truck which carries the said puddler, by a shaft driven by a fixed motor apart from the truck, all of which, and other features of our invention, are fully described hereinafter.

In the accompanying drawings, Figure 1, Sheet 1, is a perspective diagram showing the main feature of our invention; Fig. 2, Sheet 2, a side view of mechanism for carrying and operating the rotary puddler; Fig. 3, Sheet 3, a plan view of the same; Fig. 4, Sheet 4, an end view showing the puddler partly in section; Fig. 5, Sheet 5, a vertical section on the line 1 2, Fig. 3; Fig. 6, Sheet 6, a section on the line 3 4, Fig. 3; and Fig. 7, Sheet 1, a modification of part of the mechanism relating to the main feature of our invention. Figs. 3 and 4 are drawn to a larger scale than Figs. 2, 5, and 6, as indicated by the scales of feet and inches on the different sheets.

A general preliminary understanding of the main feature of our invention may be best given, in the first instance, in connection with the perspective diagram, Fig. 1, which has been drawn without any regard to detailed construction, gearing and other appliances which are illustrated by other views being omitted. In this diagram, B represents part of the furnace, and C part of a suspended flue structure, through which the products of combustion from the furnace, after passing through the rotary puddler A, are permitted to escape.

This rotary puddler is supported by wheels, the axles of which have bearings on a truck, A', the latter being also provided with flanged wheels adapted to the rails *p* of a track laid between the furnace and flue structure, and extending outward therefrom, as shown.

A grooved shaft, I, which may be the crank-shaft of a steam-engine, and which is adapted to fixed bearings, is arranged between the rails and passes through bearings on the truck, so that when the latter is traversed on the rails it slides on the shaft; or the grooved shaft may move with the truck and slide in the hub of a driving wheel or pulley; but in all cases the shaft must be driven by a fixed motor apart from the truck which carries the puddler. The truck can be wheeled to such a position that the rotary puddler can take its place between the furnace and flue, or can be moved away from the furnace when the openings in the opposite ends of the puddler are exposed for the removal of the puddled iron, and for receiving a new charge, preparatory to the restoration of the puddler to its working position.

Through the medium of gearing and other appliances carried by the truck, and described hereinafter, the puddler can either be traversed to and fro on the truck by the shaft I, or can be rotated when it is in its working position.

The rotary puddler A does not differ materially, as regards general construction, from ordinary rotary puddlers. There is the outer casing, *a*, the inner shell, *b*, the water-space *c* between the two, and the refractory lining *d*, as best observed in Fig. 4. On one end of the puddler is a ring, *f*, surrounding the inlet-opening *e*, and adapted to fit against a ring, *f'*, surrounding the outlet-opening *g* at the rear end of the furnace B, a portion only of which is shown in the said figure.

C is the above-mentioned flue structure for carrying off the products of combustion from the puddler, the inlet-opening *i* of this structure being surrounded by a ring, *j*, adapted to fit against a ring, *j'*, surrounding the opening *h* at the outlet end of the puddler. As the flue structure C, a portion only of which is

shown in Fig. 4, forms the subject of a separate application for a patent, it will suffice to remark here that it is suspended and combined with mechanism by which it can be moved to a limited extent from or to the end of the puddler.

The appliances by which water under pressure is introduced into the water-space of the puddler as the latter is rotated also form the subject of a separate application for a patent, and are therefore not shown in the drawings.

Two flanged rings, D and D', are secured to the outer casing, *a*, of the puddler—one near each end of the same—one ring bearing on two flanged wheels, *k* and *k'*, and the other on two flanged wheels, *l* and *l'*, all of these wheels being shown in Fig. 3. The wheels *k* and *l* are secured to the shaft E, and the wheels *k'* and *l'* to a shaft, E', these shafts being adapted to bearings *m* on the frame of the truck. A toothed rim, F, is also secured to the outer casing of the puddler.

The truck A' is composed mainly of opposite side frames, G' G', and suitable transverse braces, G², and has on the top the bearings *m* for the above-mentioned shafts E E', to which are secured the above-mentioned flanged wheels for supporting the puddler, and on the under side of the frame are bearings *n*, as shown in Fig. 6, for the two axles H H', each of which has two flanged wheels, *n'* *n'*, adapted to rails *p* of the track before alluded to.

A bevel-pinion, J, and its long hub *q* are adapted to the driving-shaft I, and confined longitudinally between the bearings *t* *t'* on the truck, as shown in Fig. 5, the pinion and hub having a key or feather adapted to the longitudinal groove in the said shaft. The bevel-pinion J gears into a bevel-wheel, J', on a vertical shaft, *u*, having its bearing *w* on the carriage, and having at its upper end a bevel-pinion, K, gearing into a bevel-wheel, K', on the horizontal shaft L, which is adapted to bearings *v* *v* on the top of the truck, as shown in Fig. 3. A pinion, M, on this shaft L gears into a cog-wheel, M', which is loose on a shaft, N, the latter having its bearings *w'* on the top of the truck, and a pinion, P, on this shaft is adapted to gear into the teeth of the rim F on the puddler A.

A clutch, Q, is arranged to slide on, but must turn with, the shaft N, and has projections adapted to like projections on the cog-wheel M'. Different appliances for throwing this clutch in and out of gear with the said wheel will readily suggest themselves to an expert mechanic; but we prefer the mechanism which is shown in the drawings, and which we will now briefly describe.

A key, *x*, Fig. 3, is driven through the hub of the clutch and passes through a slot in the shaft, the slot being of sufficient length to permit the desired limited sliding movement of the clutch on the shaft. The key also passes through a rod, *y*, adapted to slide in a central orifice in the shaft, this rod being attached to

arms 2 (shown in Figs. 2 and 3) on a shaft, 3, adapted to bearings 4, and an arm, 5, on the shaft being connected by a link, 6, to the operating-lever R, which is pivoted to the frame of the truck. By operating this lever the clutch Q can be moved into gear with the wheel M' when the puddler has to be rotated, or can be thrown out of gear when a cessation of the movement of the puddler is required.

A bevel-pinion, 7, on the shaft L gears into a bevel-wheel, 8, on the diagonal shaft S, which has its bearings 9 9 on the transverse braces G² of the truck, and to this shaft, at the lower end of the same, is a bevel-pinion, 10, gearing into a bevel-wheel, 11, on the axle H', a clutch, T, arranged to slide on but to rotate with the axle, having projections adapted to like projections on the face of the bevel-wheel 11. This clutch may be controlled by the operating-lever V, through the medium of different devices, this lever being pivoted to the truck or to any attachment thereto near the operating-lever R, for the convenience of the attendant who has to manipulate both levers. The lower arm of the lever V is connected by a link, 12, to an arm, U, (Figs. 2 and 3,) which is secured to a vertical shaft, 13, having its bearings on attachments to the truck, and which carries an arm, U', connected to a two-part collar adapted to a groove in the clutch T. It will be seen that by operating the lever V the clutch T can be thrown into gear with the bevel-wheel H, when the truck and the puddler have to be traversed on the truck, or can be thrown out of gear when the carriage has to be stationary.

The stationary engine which drives the shaft I should be provided with reversing mechanism; or the shaft I may be combined with any ordinary reversing devices.

When the truck has to carry the puddler away from the furnace, and as the puddler is being moved to its working position, the rings *f* of the puddler should be free from frictional contact with the rings *f'* of the furnace; but when the furnace is in its working position the ring of the puddler should be as close to that of the furnace as possible without creating too much friction to prevent the free rotation of the puddler. To effect this purpose a lever, W, Figs. 2 and 4, is pivoted at one end to a bracket on the truck, and is controlled at the opposite end by a screw-shaft, X, having its bearing 14 on the truck, and provided with a hand-wheel, 15, the threaded portion of the shaft passing through a nut, 16, swiveled to the outer end of the said lever, which is connected to a collar, 17, on the shaft E', the latter carrying the flanged wheels *k'* and *l'*, for supporting one end of the puddler.

Referring to Fig. 4, it will be observed that when the shaft E', which can slide in its bearings, is moved by the mechanism last described in the direction of the arrow, the flanged wheel *l'* on the shaft, bearing against the flange of the ring D' of the puddler, must

push the latter in the same direction, and the ring *f* of the puddler will consequently be brought into the desired proximity to the ring *f'* of the furnace.

5 Devices other than those described for imparting an endwise motion to one of the shafts *E* or *E'* will readily suggest themselves to expert mechanics. Devices may be used for moving both of these shafts endwise in their bearings; but this is not necessary, for on
10 moving the shaft *E'* and its wheels in the direction of the arrow, the puddler being thereby carried in the same direction, the other shaft, which can also slide in its bearings, will
15 follow the puddler.

When it is necessary to wheel the puddler away from the furnace, the shaft *E'* should be moved in a direction contrary to that pointed out by the arrow, Fig. 4, so that the ring *f* of
20 the puddler will be free from contact with the ring *f'* of the furnace.

It is not essential that the truck should slide on the grooved shaft *I*, for, as remarked at the outset, the latter may move with the
25 truck and pass through and slide in the hub of a driven wheel or pulley—the wheel 15, for instance, as shown in Fig. 7, Sheet 1—a key in the hub of the said wheel being adapted to the groove in the shaft; but it is essential in all cases that the motor from which the
30 shaft *I* is driven should be fixed and apart from the truck. The gearing through the medium of which the shaft *I* is caused to traverse the truck and rotate the puddler
35 may admit of different modifications, as will be readily understood by those familiar with mechanism of this class; hence we do not desire to restrict ourselves to the special gearing shown.

40 We claim as our invention—

1. The combination of a furnace and chimney structure, a track between the two, and a truck adapted to carry a rotary puddler, with a grooved shaft, *I*, driven by a fixed motor apart from the truck, and with mechanism

through the medium of which the said shaft is caused to traverse the truck, all substantially as set forth.

2. The combination of a furnace and chimney structure, a track between the two, a truck
50 having wheels adapted to the rails of the track, and wheels for supporting a rotary puddler, with a grooved shaft, *I*, deriving its motion from a fixed motor, and with mechanism whereby the said shaft is caused to rotate the supporting-wheels of the puddler, substantially
55 as specified.

3. The combination of the truck, its shafts *E* *E'*, having wheels, and the rotary puddler supported by the said wheels, with mechanism for imparting an endwise motion to one of the shafts, substantially as described.

4. The combination of the shaft *I*, the shaft *L* on the truck, wheels whereby the two shafts are geared together, the axle *H'*, a wheel, 11,
65 on the shaft, gearing whereby the shaft *L* is caused to drive the said wheel 11, and clutching mechanism whereby the latter wheel may be thrown in or out of gear with its shaft, all substantially as set forth.

5. The combination of the grooved shaft *I*, the truck, the puddler *A*, supported by wheels on the truck, and having a toothed rim, *F*, the shaft *N*, having its bearings on the truck, and carrying a pinion, *P*, having teeth adapted to those of the rim, a cog-wheel, *M'*, on the shaft *N*, gearing by which the said wheel is driven from the shaft *I*, and clutching mechanism by which the said wheel *M'* may be thrown in and out of gear with its shaft, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN GRIFFEN.
JESSE HALL, JR.

Witnesses:

THOS. SHAFFER,
D. W. BROWER.