

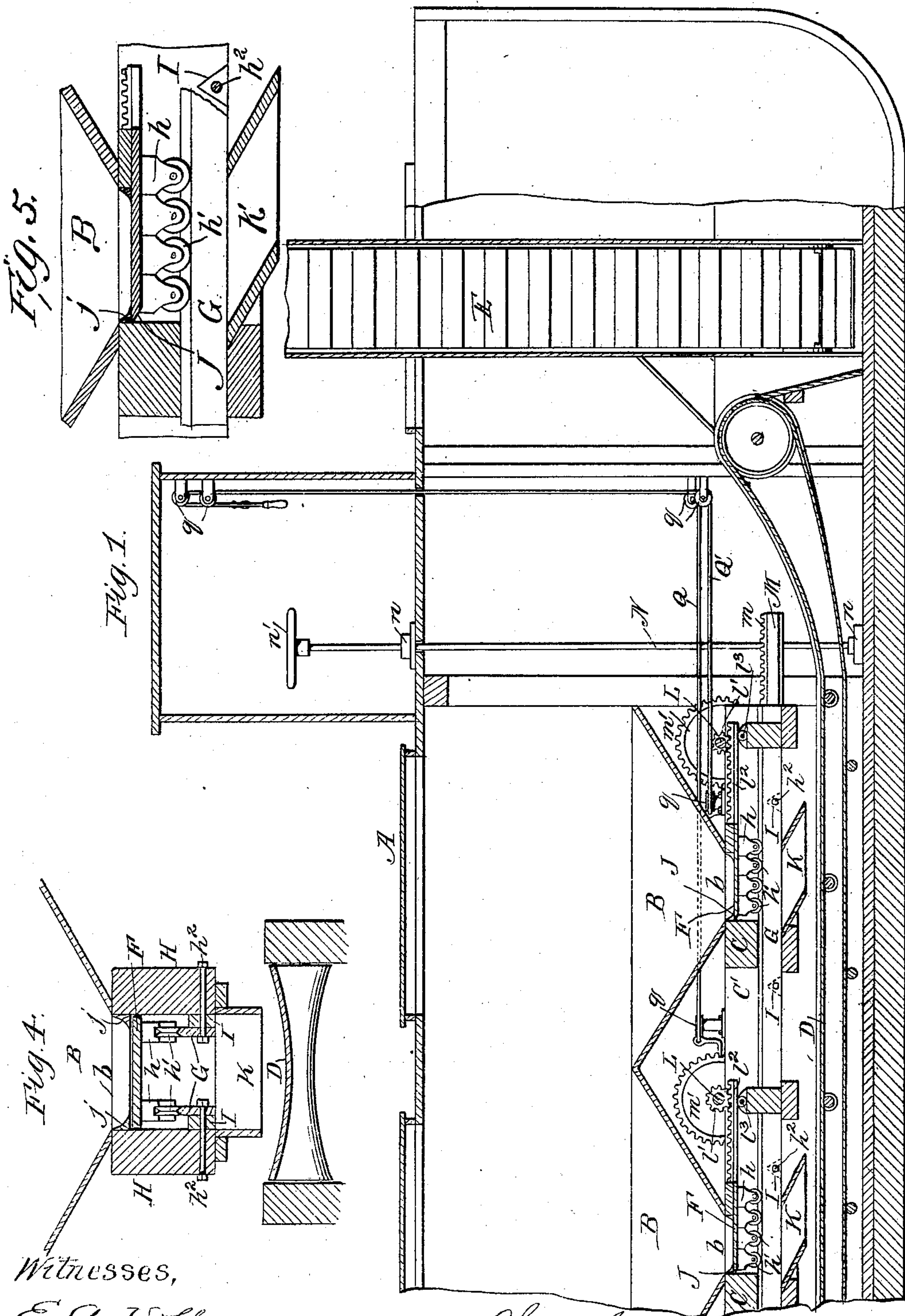
C. O. JOHNSON.

HOPPER GATE AND OPERATING MECHANISM THEREFOR.

(Application filed Mar. 19, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses,

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Chas. O. Johnson Inventor,
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No. 711,632.

Patented Oct. 21, 1902.

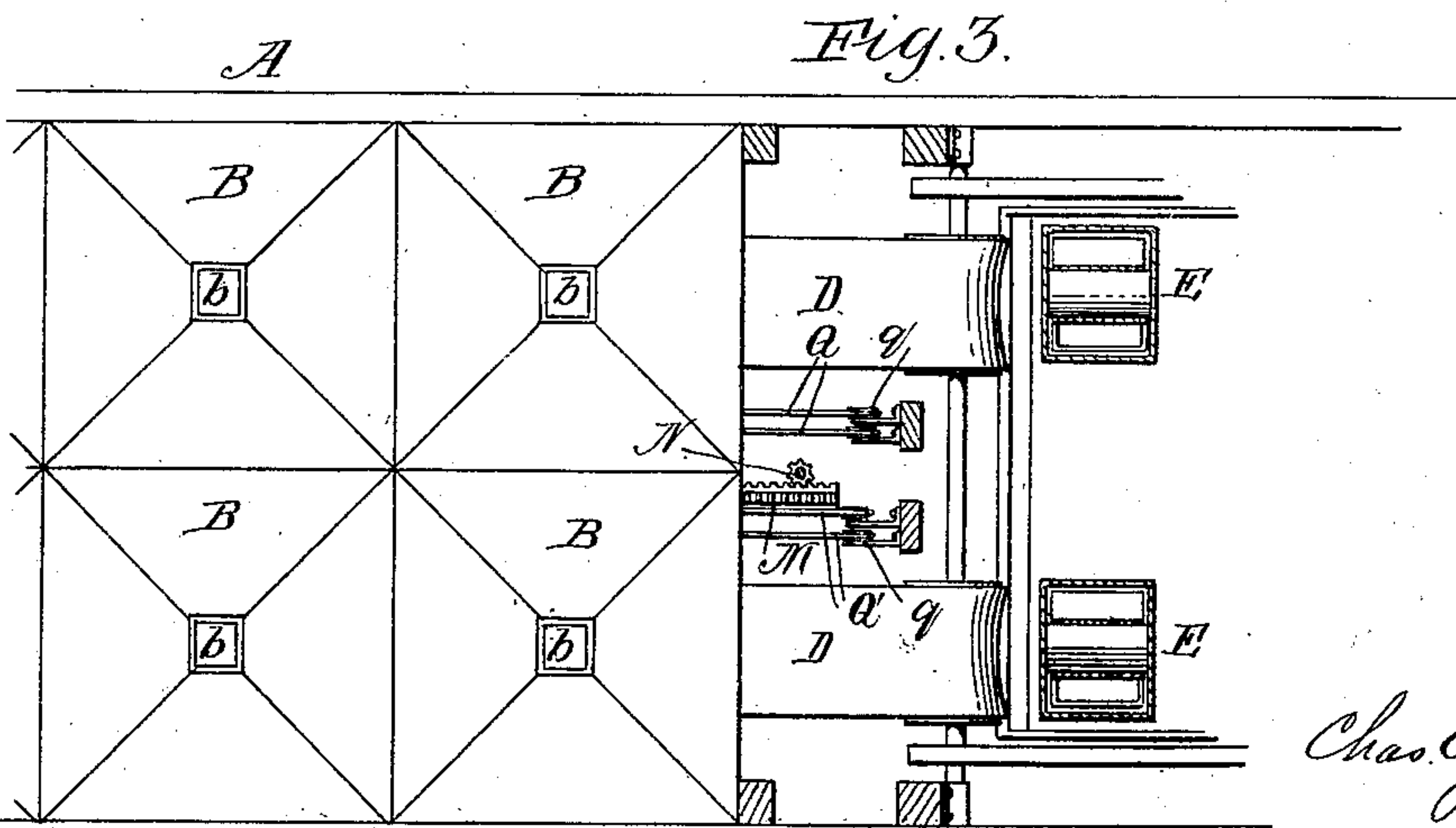
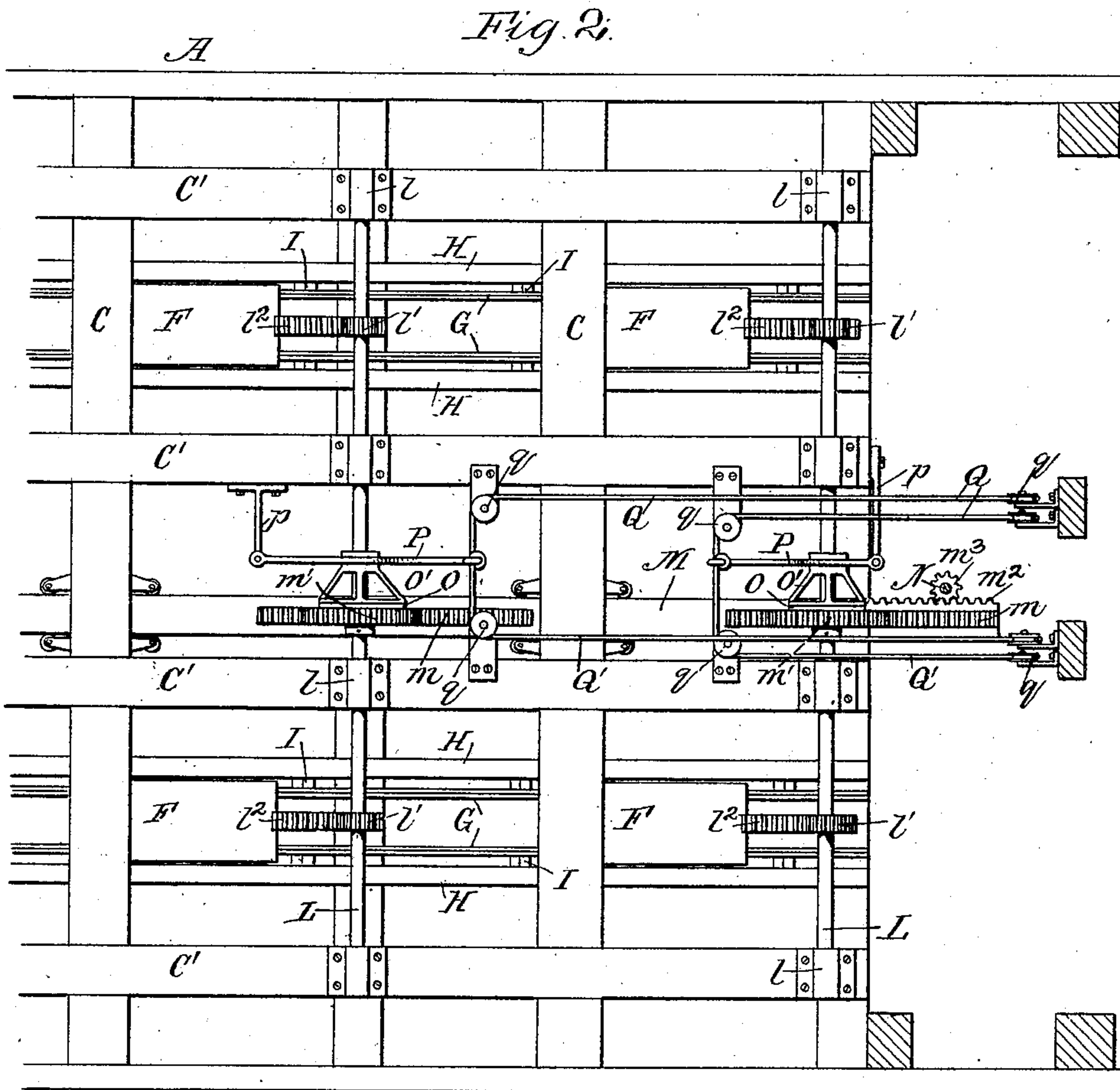
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(Application filed Mar. 19, 1902.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

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HOPPER-GATE AND OPERATING MECHANISM THEREFOR.

SPECIFICATION forming part of Letters Patent No. 711,632, dated October 21, 1902.

Application filed March 19, 1902. Serial No. 98,944. (No model.)

To all whom it may concern:

Be it known that I, CHARLES O. JOHNSON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Hopper-Gates and Operating Mechanism Therefor, of which the following is a specification.

This invention relates to hopper-gates and operating mechanism therefor. It is particularly applicable to gates employed for closing the bottom discharge-openings of hopper-bottom grain and coal barges and the like wherein the bottom is divided or formed into a number of hoppers which are provided with discharge-openings arranged in rows or series over conveyers onto which the material is discharged through openings and by which it is conveyed to a suitable point of transference from the barge or the like to an elevator, other vessel, or any desired place. The invention, however, is useful generally where sliding gates are employed for closing the discharge-openings of hoppers or receptacles for granular or divided material.

The primary object of the invention is to provide a hopper or the like with an easily-operated tight gate which requires but little energy or power to operate the same and which is so constructed that the material cannot clog or choke the discharge-opening or ways for the gate and, further, to provide a gate-operating mechanism whereby certain desired gates or all of a series of gates can be readily and easily operated from a distant point.

In the accompanying drawings, consisting of two sheets, Figure 1 is a fragmentary vertical sectional elevation of a barge or the like, showing gates and operating mechanism embodying the invention. Fig. 2 is a fragmentary plan view, partly in section, showing the gate-operating mechanism, the hoppers being removed. Fig. 3 is a plan view, partly in section, on a reduced scale, showing the hoppers. Fig. 4 is a section on an enlarged scale through the lower portion of one of the hoppers and gate therefor. Fig. 5 is an enlarged sectional elevation showing one of the gates

and a portion of the hopper and the supporting-track for the gate.

Like letters of reference refer to like parts in the several figures.

A represents a grain or coal barge, other vessel, or apparatus provided with a hold or compartment for grain or other divided material, the bottom of said compartment being divided into a plurality of hoppers B, each of which is provided with converging inclined walls which lead to a central discharge-opening *b*. The relative arrangement and number of the hoppers may be such as to suit various conditions or necessities. In the drawings the hoppers are arranged in rows, so that the discharge-openings of the hoppers of each row are in line. The hoppers are supported by any suitable framework. In the construction shown the supporting-frame is composed of transverse timbers C and longitudinal timbers C', which are suitably connected to each other and to the frame of the barge or vessel.

D represents conveyers which extend longitudinally one beneath each row of discharge-openings and are adapted to receive the material passing through the openings and convey the same to the upright endless bucket conveyers E or other means adapted to remove the material from the barge. The construction and arrangement of the conveyers and operating mechanism therefor forms no part of the present invention and is not further described herein.

F represents the gates, of which one is provided for the opening *b* of each hopper. The gates are similar, and each one is mounted to slide horizontally beneath the discharge-opening to open and close the latter. Each gate moves on longitudinal horizontal supporting tracks or ways G, and to reduce friction and enable the easy operation of the gate it is provided with roller-carriages *h*, having rollers *h'* journaled therein which roll on the tracks G. In gates of this character it is found difficult in practice to prevent the granular or divided material from lodging on or in the ways or tracks for the gate and clogging the same, so as to prevent the proper

operation of the gates or render their operation very difficult. In the present invention this objection is overcome by spacing the tracks G from the supporting timbers or parts and beveling, inclining, or convexing the upper or top faces of the tracks, so that the material cannot lodge thereon, but can fall freely from each track on both sides thereof. The top faces of the tracks shown are V-shaped, and the rollers of the gate-carriages are provided with correspondingly-shaped peripheral grooves. As shown, the tracks are secured to longitudinal supporting rails or timbers H parallel therewith by suitable means—such, for instance, as bolts h^2 —and they are held spaced from the supporting-timbers by spacing-blocks I. The spacing-blocks also have inclined top faces, being preferably V-shaped in cross-section. The easy operation of the gate is further insured by beveling or reducing the front edge of the gate, as shown at J, and providing the discharge-opening with a surrounding metal facing-strip j , which is also provided with a thin or sharp inner edge. The upper face of the facing-strip is preferably inclined and concaved. The beveled or sharpened edges of the gate and facing-strip enables the gate to wedge between the particles of material or to sever the same in closing. The dished or concaved upper face of the facing-strip of the discharge-opening tends to throw the discharging material toward the center of the opening and over the tracks for the gate. K represents the usual inclined chutes arranged one beneath each discharge-opening for directing the discharging material properly onto the conveyers.

The gate-operating mechanism shown in the drawings is constructed and arranged as follows:

L represents horizontal transverse shafts which are journaled in suitable bearings on the longitudinal supporting-timbers for the hoppers and one arranged in the space beneath and between two transverse rows of hoppers. Each shaft is provided with a gear-pinion l' for each gate, and each pinion meshes with a toothed rack l^2 , carried by the gate. The rack is supported at its outer end and held in proper mesh with its operating-pinion by a roller or the like l^3 , supported in a bracket beneath the rack-bar. (See Fig. 1.) When the shafts L are rotated, the gear-pinions move the racks and the gates are opened or closed, according to the direction of rotation of the shafts.

It is desirable to provide a mechanism whereby certain desired gates or all of the gates may be operated from a suitable distant point—for instance, the cabin of the barge-tender. The mechanism shown in the drawings for this purpose is constructed as follows:

M represents a rack-bar which extends longitudinally in the space beneath and between

the adjacent longitudinal rows of hoppers and is supported in suitable roller-bearings to reduce the friction in sliding the rod longitudinally. The rack-bar M is provided adjacent to each of the transverse shafts L with rack-teeth m , which mesh with a gear-wheel m' , loosely mounted on the shaft L. The rack-bar is also provided at one end and preferably on one of its vertical faces with a toothed rack m^2 , with which meshes a pinion m^3 , fixed on a vertical operating-shaft N, which is journaled in suitable bearings n at its upper and lower ends and extends up into the cabin of the tender, being provided at its upper end with an operating wheel or crank n' . By turning the upright shaft N the rack-bar M is moved longitudinally, so as to rotate the gear-wheels m' on the shafts L. The gear-wheels m' are locked to the shafts L, so as to rotate with the same, by clutch devices of any suitable form. Friction-clutch devices are shown, each comprising one member O, secured to the gear-wheel m' , and a member O', which is movable longitudinally on the shaft L and is splined thereto, so as to rotate with the shaft. The movable clutch member is provided with a grooved collar, and an operating-lever P is shown, one end of which is bifurcated, straddles the grooved collar, and is pivoted to a suitable part, such as a bracket p , fixed to the adjacent longitudinal frame-timber. By swinging the lever the movable clutch member can be moved into and out of engagement with its cooperating member. The clutch is preferably of that type in which the movable member is automatically locked or held in contact with the other member until forcibly released. The free end of each lever has connected thereto two operating cords, wires, or the like Q and Q', by pulling the former of which the lever P is moved to throw the movable clutch member out of engagement with its cooperating clutch member and by pulling the other of which the clutch-lever is thrown in the other direction to lock the clutch members together and couple the gear-wheel to the shaft L. The operating-cords are led over suitable pulleys q up into the cabin of the tender, and each is provided with an operating-handle or the like provided with suitable designations to indicate to the operator the clutch device controlled thereby. This mechanism, as will be apparent, enables the operator at will to operate any desired gates or all of the gates, as when the rack-bar M is moved by the operating-shaft N it operates those shafts L which have their gear-wheels m' coupled thereto.

I claim as my invention—

1. The combination with a hopper or the like provided with a discharge-opening, of a sliding gate controlling said discharge-opening, and tracks on which said gate is slidably supported and which have inclined top faces, substantially as set forth.

2. The combination with a hopper or the like provided with a discharge-opening, of a substantially horizontal sliding gate controlling said discharge-opening, and tracks on
5 which said gate is slidably supported arranged beneath said gate and having inclined top faces, substantially as set forth.

3. The combination with a hopper or the like provided with a discharge-opening, of a
10 sliding gate, tracks on which said gate is slidably supported, and which have inclined top faces, supports for said tracks, and devices having inclined upper faces for spacing said
15 tracks from said supports, substantially as set forth.

4. The combination with a hopper or the like provided with a discharge-opening, of a substantially horizontal sliding gate, supporting-tracks beneath said gate provided
20 with inclined upper faces, and supporting-rollers for said gate rolling on said tracks, substantially as set forth.

5. The combination with a hopper or the like provided with a discharge-opening, of a
25 sliding gate, supporting-tracks beneath said gate and provided with inclined upper faces, supports for said tracks, and devices having inclined upper faces for spacing said tracks from said supports, substantially as set forth.

6. The combination with a hopper or the like provided with a discharge-opening having a beveled edge, of a sliding gate having a cooperating beveled edge, substantially as set forth.

7. The combination of a plurality of gates, 35 shafts, connections between each shaft and one of said gates, a loose gear-wheel on each of said shafts, a common means for operating said gear-wheels, and mechanism for coupling either of said gear-wheels to its shaft, 40 substantially as set forth.

8. The combination with a plurality of gates, of shafts, connections between each shaft and one of said gates, a loose gear-wheel on each of said shafts, a movable rack-bar for operating said gear-wheels, a clutch member connected to each of said gear-wheels, and a cooperating clutch member movable with each of
45 said shafts, and means for operating said clutches to couple said gear-wheels to said
50 shafts, substantially as set forth.

Witness my hand this 11th day of March, 1902.

CHARLES O. JOHNSON.

Witnesses:

JNO. J. BONNER,

CLAUDIA M. BENTLEY.