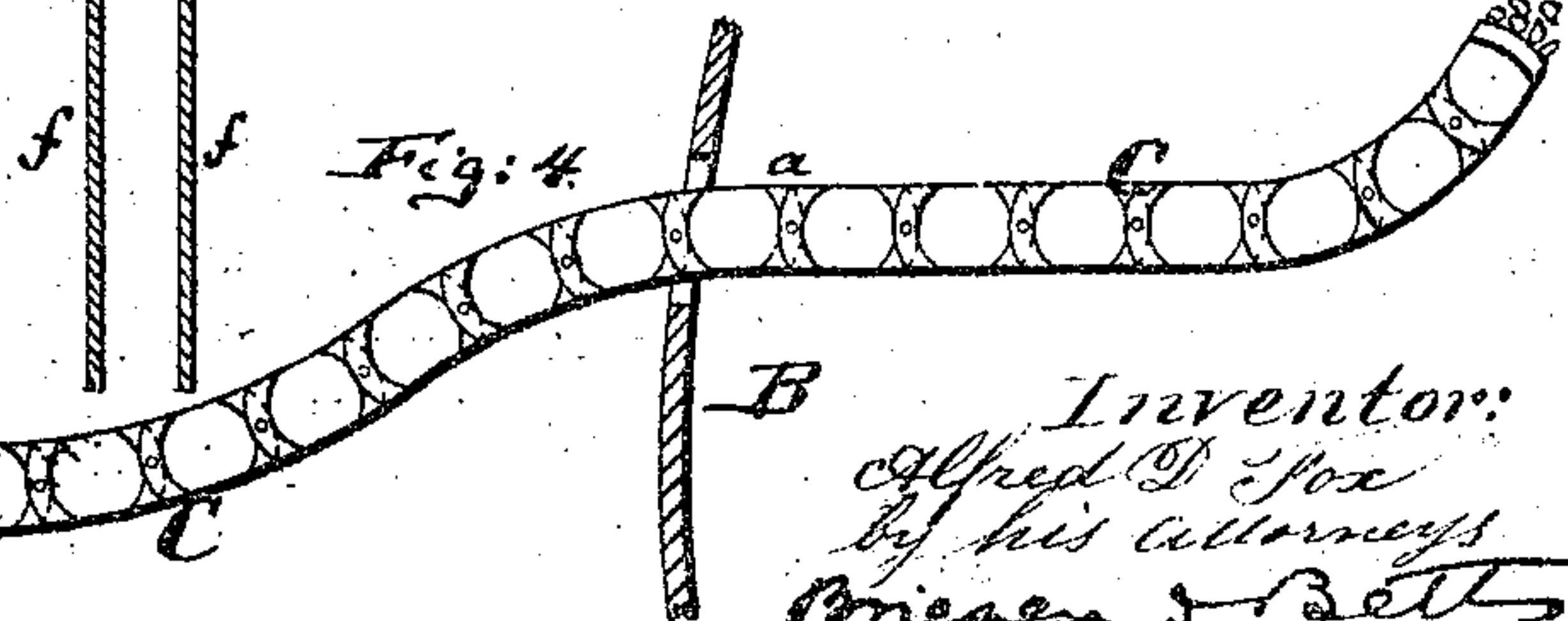
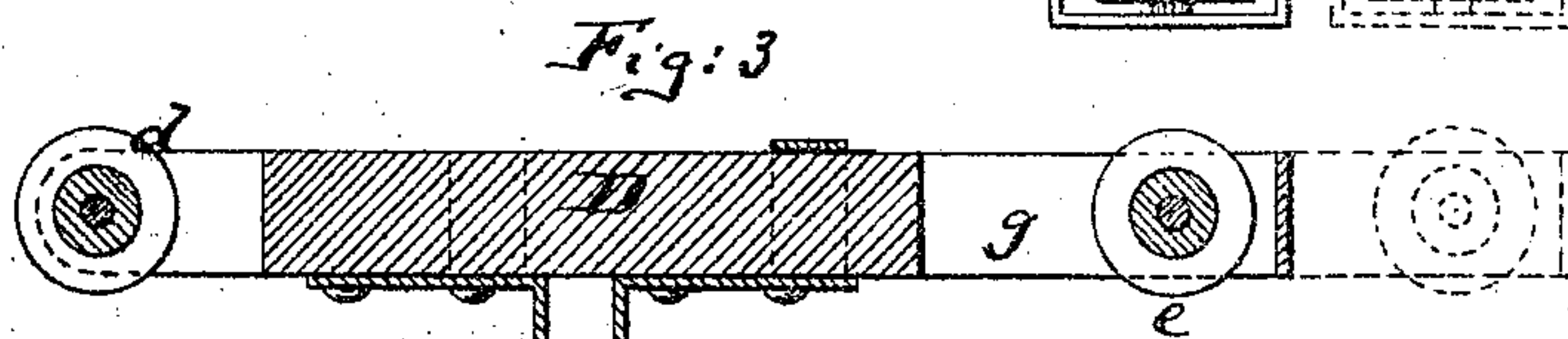
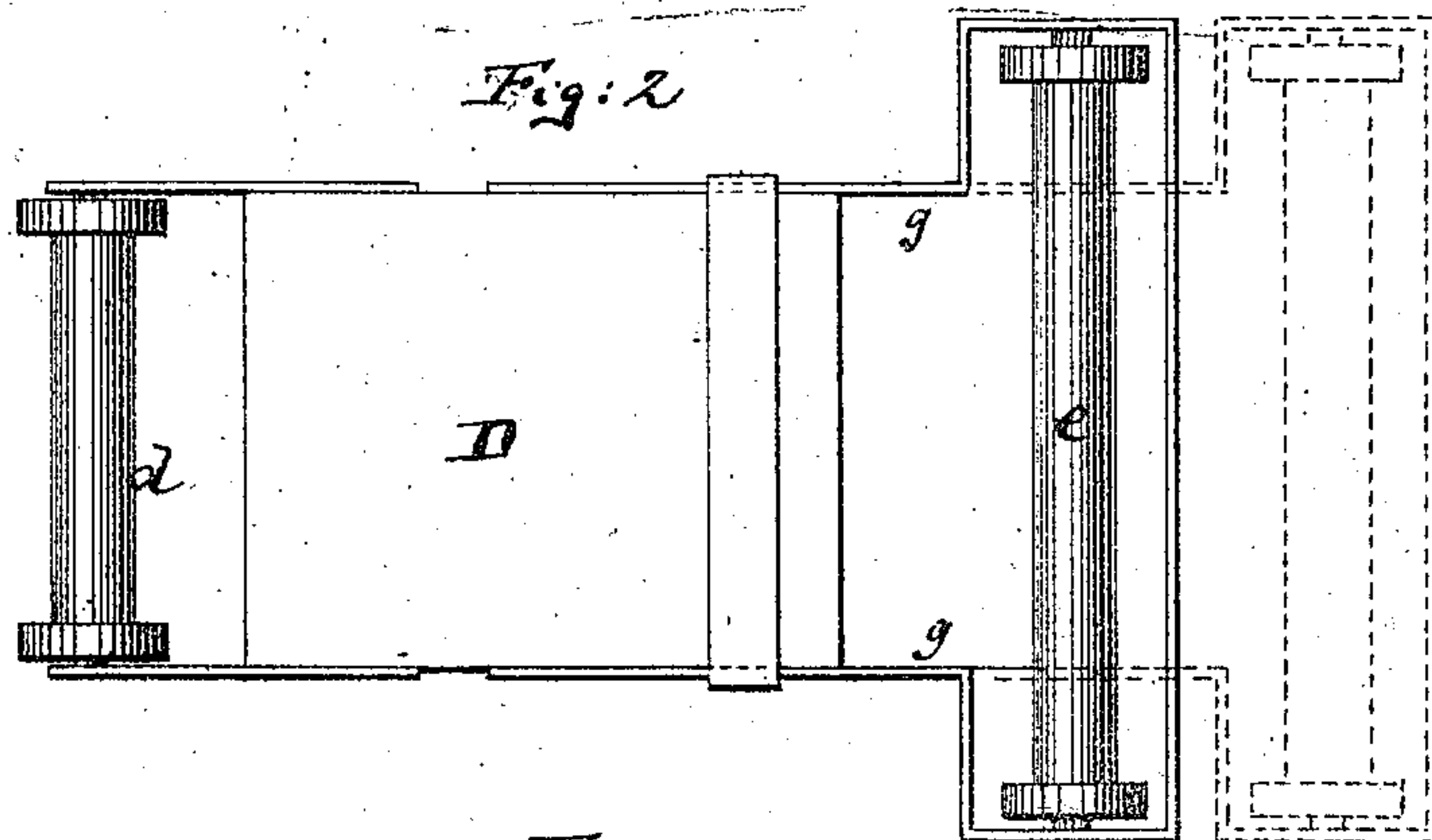
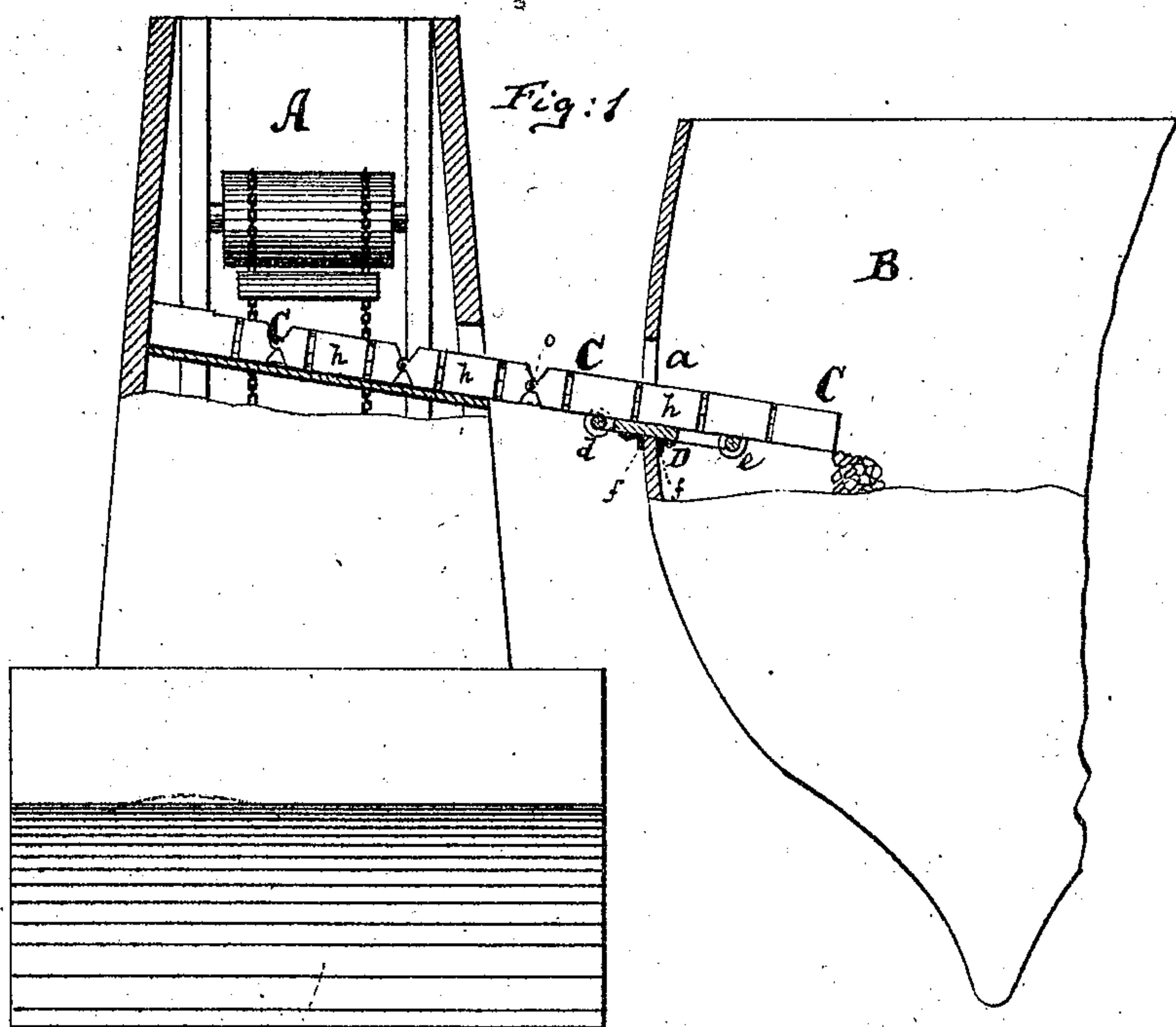


A. D. FOX.

FLEXIBLE CHUTE USED IN LOADING AND UNLOADING APPARATUS.

No. 286,193.

Patented Oct. 9, 1883.



Witnesses:
John C. Thimbridge
John M. Spear

Inventor:
Alfred D. Fox
By his Attorneys
Pierce & Bell

(No Model.)

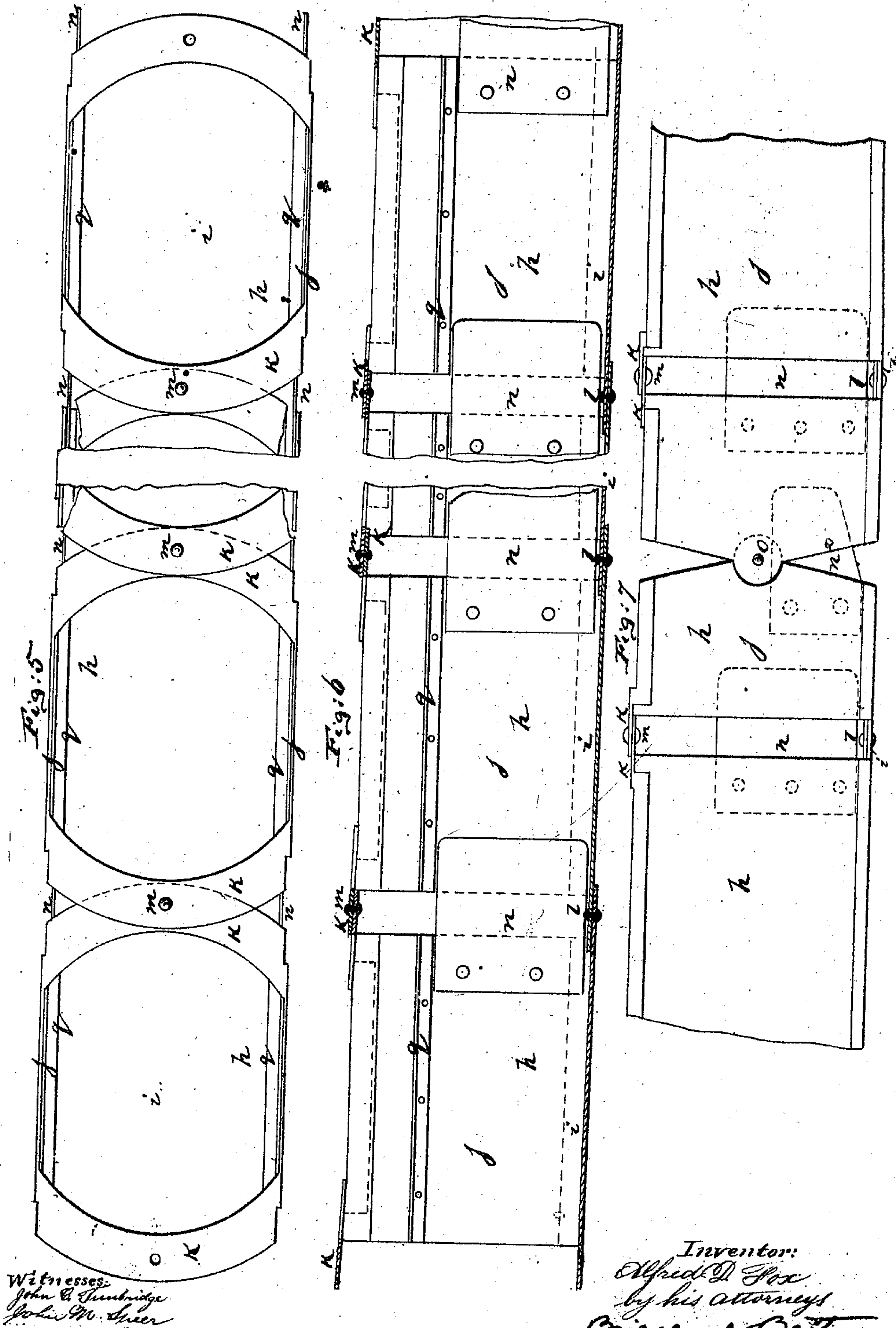
3 Sheets—Sheet 2.

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(No Model.)

3 Sheets—Sheet 3.

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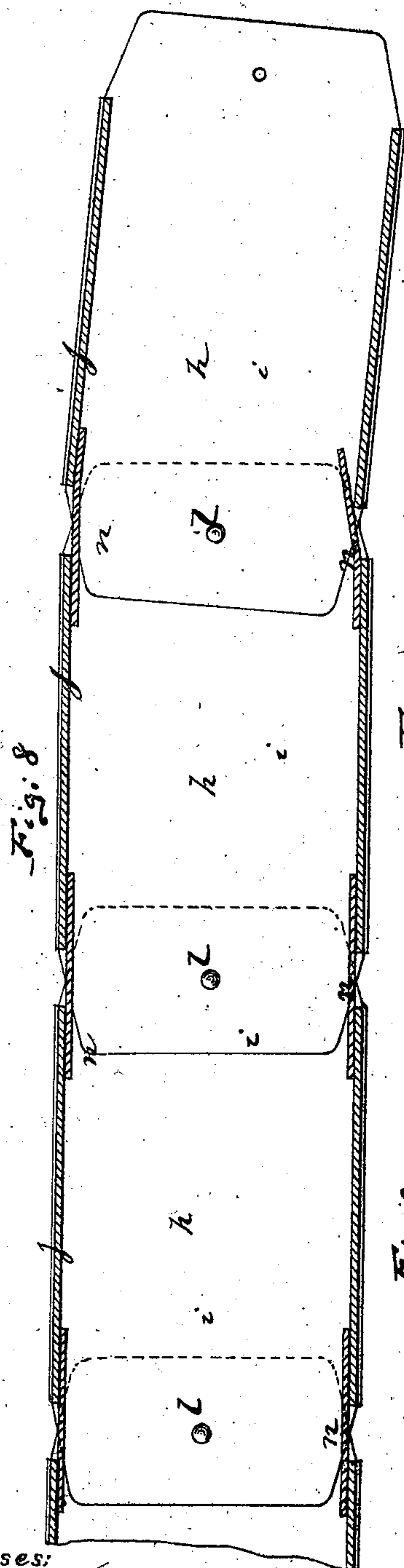


Fig. 8

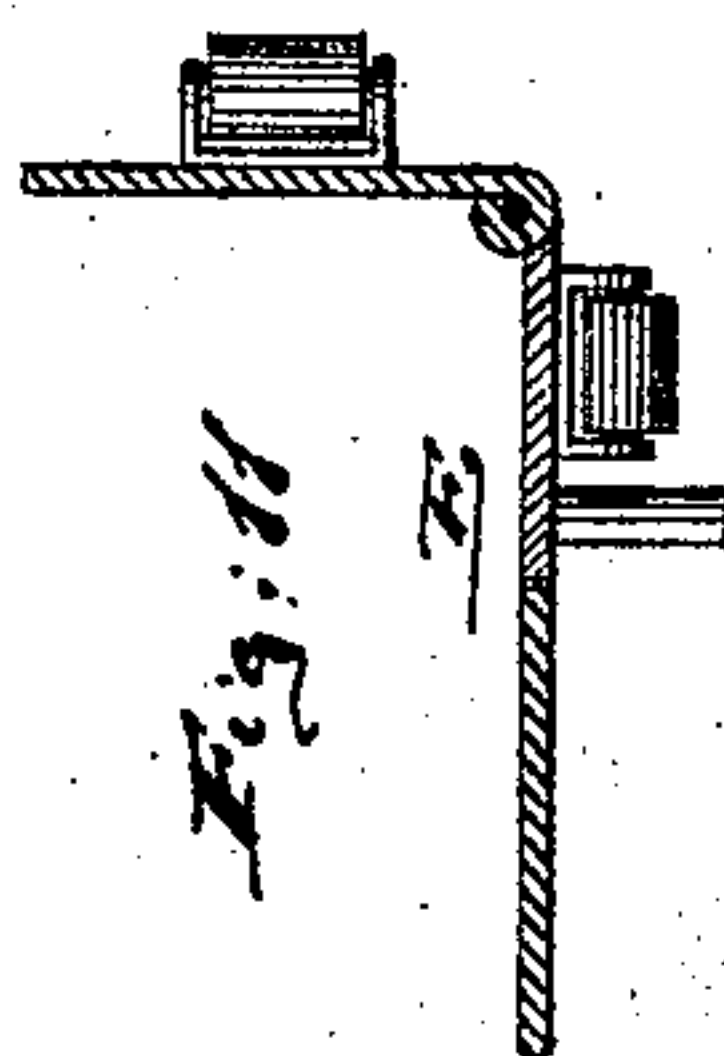


Fig. 11

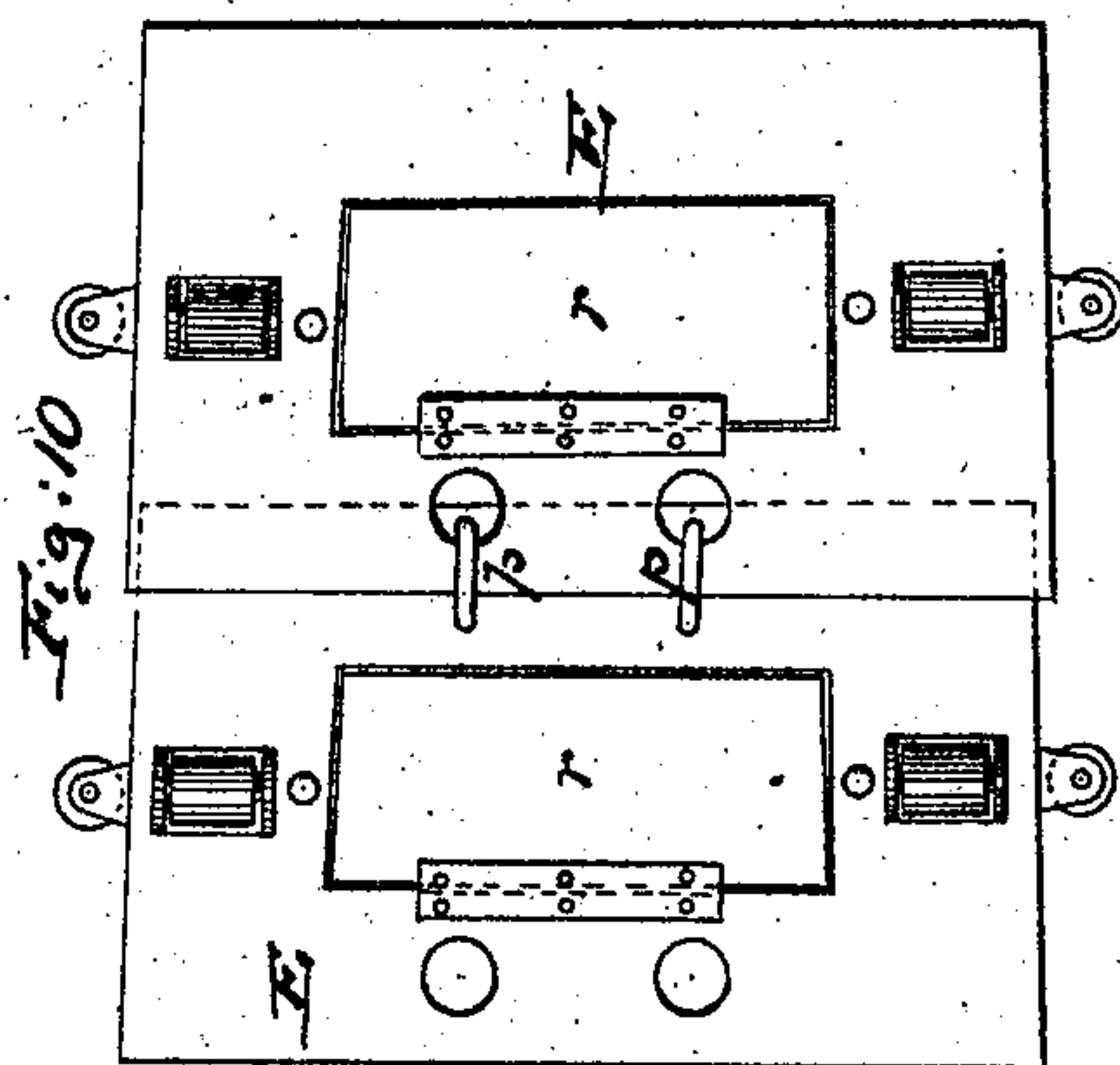


Fig. 10

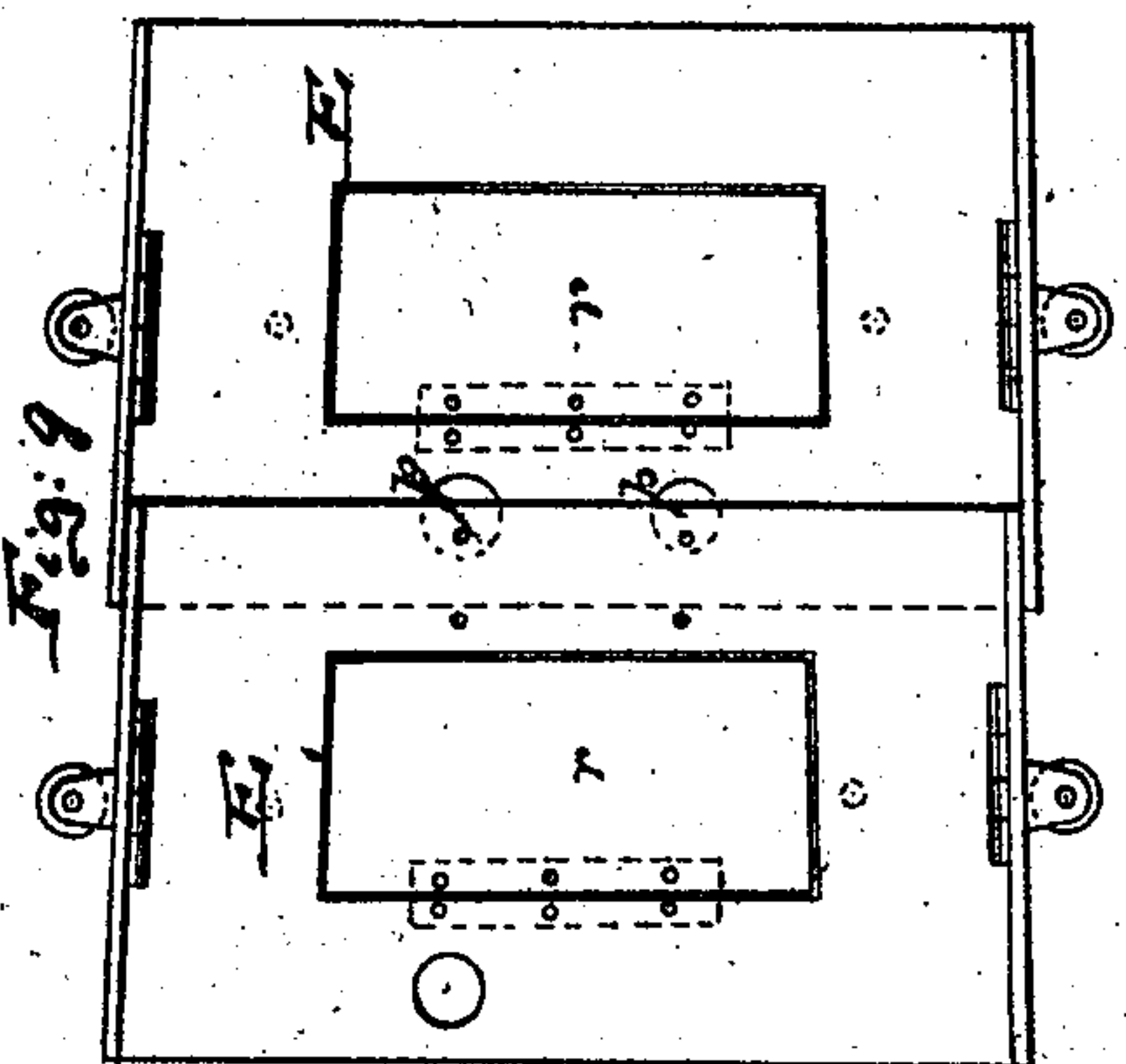


Fig. 9

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UNITED STATES PATENT OFFICE.

ALFRED D. FOX, OF NEW YORK, N. Y.

FLEXIBLE CHUTE USED IN LOADING AND UNLOADING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 286,193, dated October 9, 1883.

Application filed November 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALFRED D. FOX, of New York, in the county and State of New York, have invented an Improved Flexible Chute Used in Loading and Unloading Apparatus, of which the following is a specification.

Figure 1 is a sectional elevation of a loading apparatus using my improved chute. Fig. 2 is a top view, on an enlarged scale, of the rest for the chute. Fig. 3 is a longitudinal vertical section of said rest. Fig. 4 is a plan or top view of the flexible chute. Fig. 5 is a top view, on an enlarged scale, of the flexible chute; Fig. 6, a vertical longitudinal section of the same; Fig. 7, a side view of a modification thereof; Fig. 8, a horizontal section of the same. Fig. 9 is a top view of a pair of links for an endless chain that may be employed in said chute. Fig. 10 is a top view of said links, and Fig. 11 a cross-section through one end of one of said links.

The object of this invention is to produce a flexible chute that may be advantageously employed in loading and unloading vessels, and that will be flexible not only in a vertical direction, but also in a horizontal direction, or in either of these directions alone, as occasion may require. For loading and unloading vessels whose displacement will be varied according as their load increases or decreases, it is desirable to have a chute flexible in a vertical direction, so as to adapt itself to such variation. The horizontally-flexible chute is of advantage for the purpose of enabling a vessel to be reached even when its port-hole cannot be brought exactly in line with the opening in the structure from which the chute is to lead into the vessel, and to distribute the load to any desired part of the vessel. Thus in Fig. 4 is shown a diagram representing at A a plan of the elevator, and at B a plan of the vessel. The vessel, it may be assumed, cannot be moved farther than is represented to bring its port-hole *a* opposite the elevator A, and the flexible chute C will nevertheless permit connection to be made between the elevator and the vessel, so as to allow the latter to be loaded.

In Fig. 1 is shown the connection between the elevator A and vessel B in vertical section, the chute C being flexible vertically, so as not

to be strained when the vessel sinks and the elevator rises as the load is being transferred from the latter to the former.

The invention consists in combining the jointed sections of the chute with joint-closing springs, all as hereinafter more fully described.

It also consists in providing a rest for such a chute, and in other details, that will be hereinafter more clearly pointed out.

The chute C rests on a pair of rollers, *d e*, that are hung in a platform, D, which is fastened to the side of the ship, as indicated in Fig. 1. This platform, with its rollers *d e*, is more clearly shown in Figs. 2 and 3. It is provided with downwardly-projecting lugs *f f*, that are adapted to embrace the side of the vessel and straddle the same for the purpose of holding the platform D in place. The chute, whose upper end is fixed in the elevator A, rests on the rollers *d e*, or on the flanges thereof, and enters the vessel through the opening *a*. The distance between the rollers *d e* may be varied, as indicated by dotted lines in Figs. 2 and 3, by hanging the roller *e* in a sliding framing, *g*, that can be adjusted along the flank D, to regulate such distance. The inner end of the chute C, which enters the vessel B, can be operated by the attendant, so as to deposit the load at any suitable part of the vessel—that is to say, instead of depositing the load of coal or of grain at one particular place, and then requiring additional men to shovel it from that place to other places, the end of the chute itself can be moved, so as to bring the load into any desired part of the vessel. Thus a great deal of labor will be saved. The chute itself is composed of series of links or sections *h h*. Each of these sections is composed of a bottom plate, *i*, of two side plates, *j j*, and of a top plate or bracing, *k*. The bottom plate, *i*, of one link or section laps over that of the adjoining one, and is joined thereto by a pivotal pin, *l*, in line with which is another pivotal pin, *m*, that joins the overlapping top plates, *k k*, of the two sections. Thus the sections can be vibrated in a horizontal plane on the vertical pins *l* and *m*. The sides *j j* do not usually abut, but are at some distance apart, as indicated in Fig. 5, and the space between them is closed by spring-plates *n n*, each spring-plate being secured to the side of one section

and made to bear against the side of the adjoining section without being fastened to the latter. The chute can be bent on its pivots *l m* without at any time permitting the matter that passes through it to escape through the side openings between the sides *j j*. When vertical adjustment or flexibility is desired, the sides of a section, *h*, are divided, as shown, at the middle section in Fig. 7, and rejoined by horizontal pins *o*, triangular pieces being cut out of the sides so united directly above and below the pins *o*. At such a joint for allowing a vertical play a spring, *n²*, is also employed, as indicated in Fig. 7. Thus the chute can be bent vertically on the pivots *o* and horizontally on the pivots *l m*.

The chute may be employed as a plain chute, allowing the matter to pass from the elevator to the ship, or vice versa, without any belt or carrying device being added thereto; but, if desired, an endless belt or chain may be hung in the chute to convey the matter from one end thereof to the other. Such an endless chain would have to be composed of links *E* *E*, (see Figs. 9, 10, and 11,) that are connected together by rings *p*, and that rest on rails *q*. Fig. 6, which are secured on the inner faces of the sides *j* of the chute. Friction-rollers may be hung in the links of the chain to facilitate their freedom of motion, and said links may

be made with vertical cheek-pieces at the sides, to prevent what they carry from flowing over their edges upon the rails *q*. Trap-doors *r* may be hung in the links *E*, to allow the matter carried by the endless chain to be discharged at any part of the transit along the chute; but nothing herein contained is intended to claim the said endless chain or any part thereof.

I claim—

1. The combination of the chute-link *h* with vertical pivots *l m* at one end and with horizontal pivots *o o* at the other end, for connection with adjoining chute-links, substantially as herein shown and described.

2. The jointed chute-links *h h*, combined with spring-plates *n n*, that close the gaps or spaces between them, substantially as specified.

3. The combination of the flexible chute with the supporting-platform *D*, having rollers *d e*, substantially as specified.

4. The flexible chute, composed of jointed chute-links *h h*, and combined with the rails *q*, that are secured on the inner sides of these links, substantially as herein shown and described.

ALFRED D. FOX.

Witnesses:

WILLY G. E. SCHULTZ,
JAMES TURK.