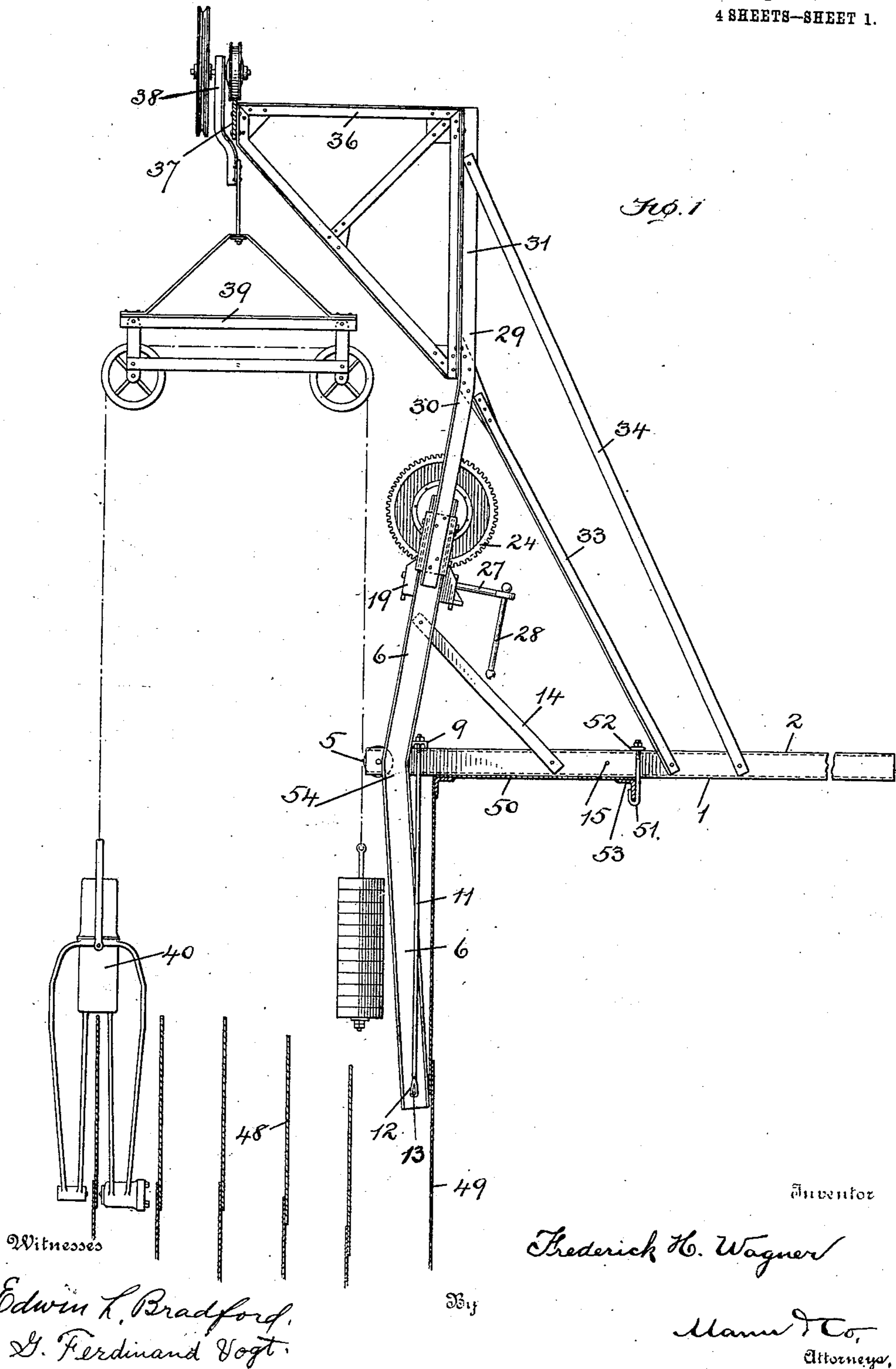


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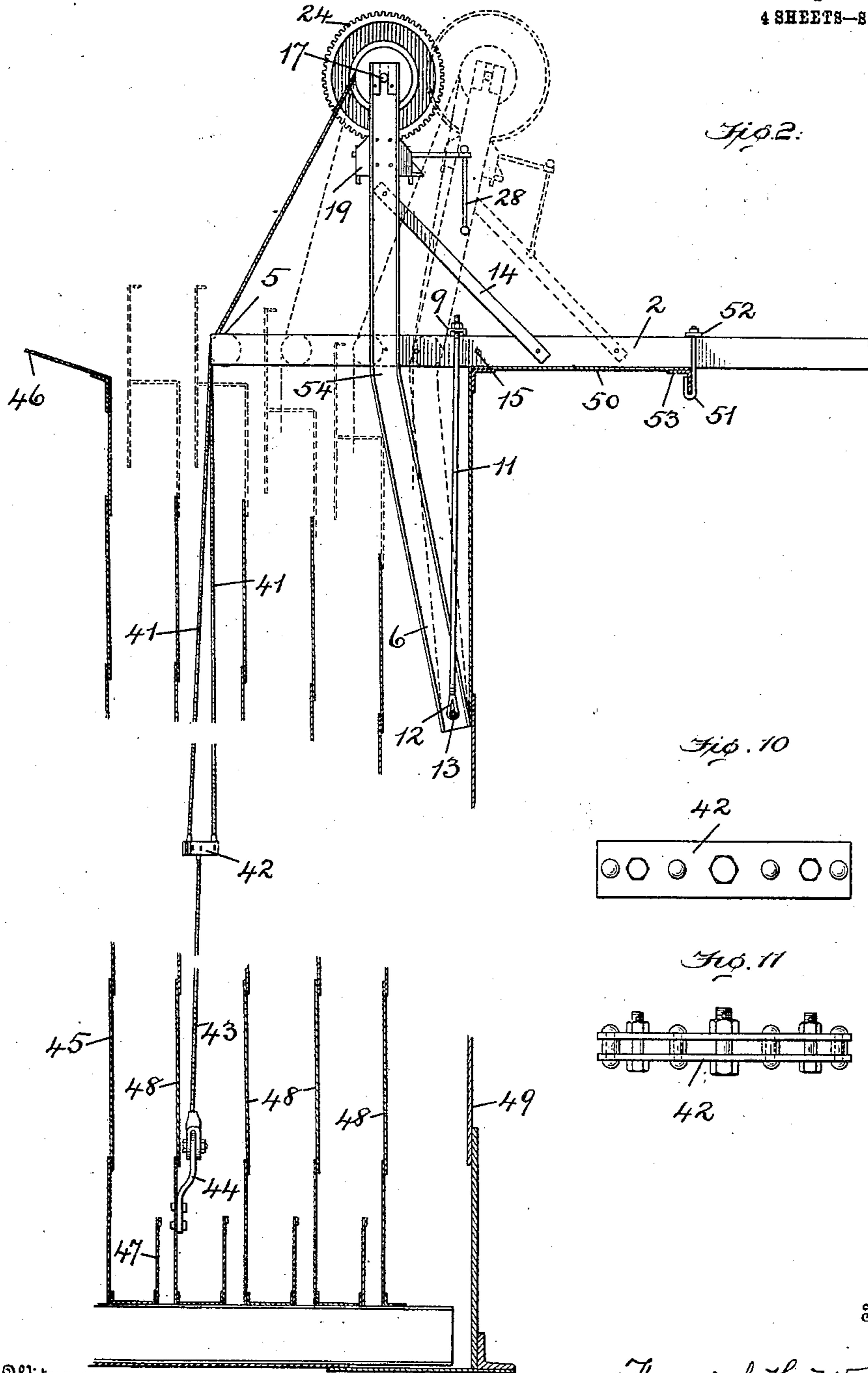
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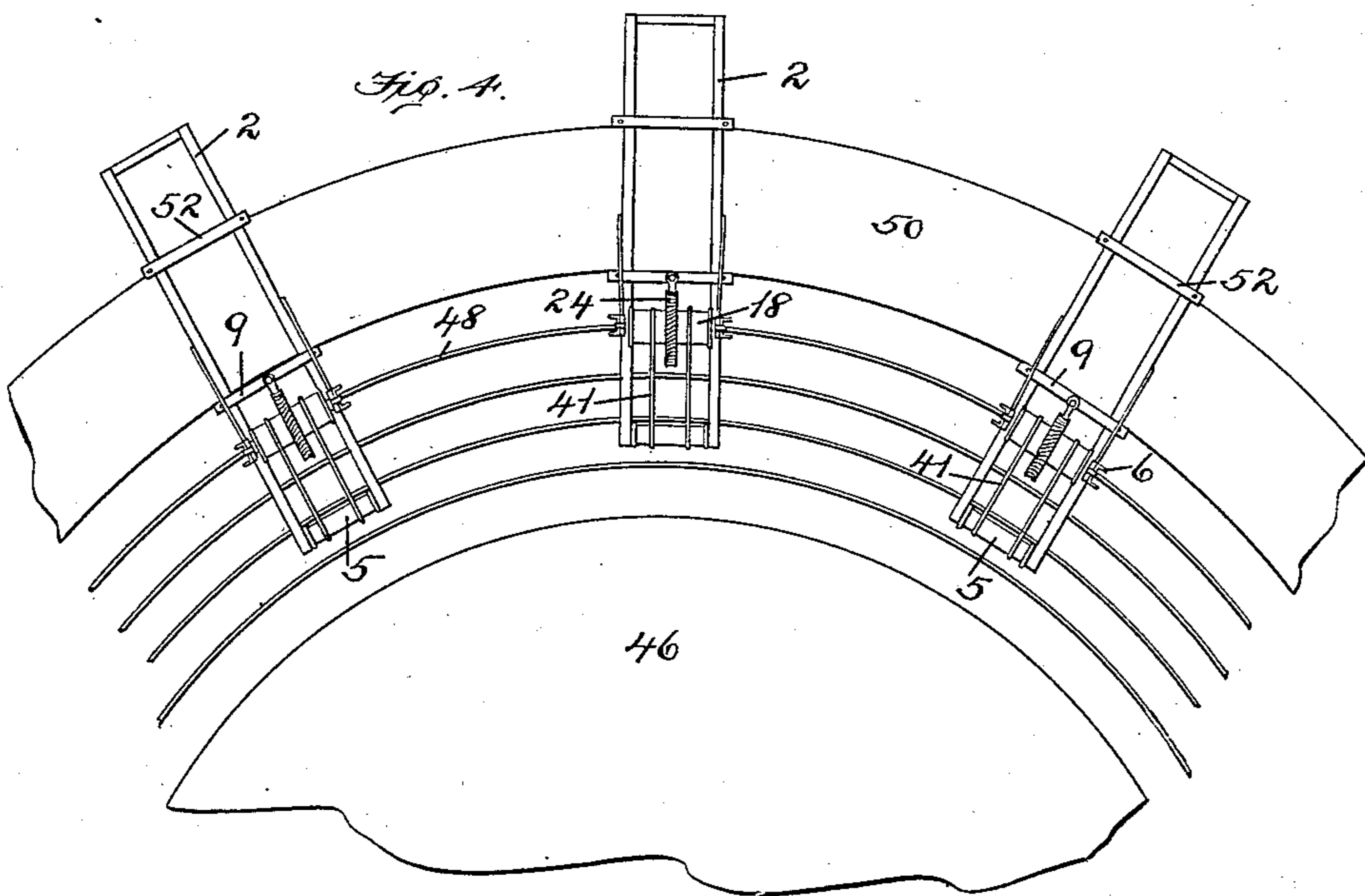
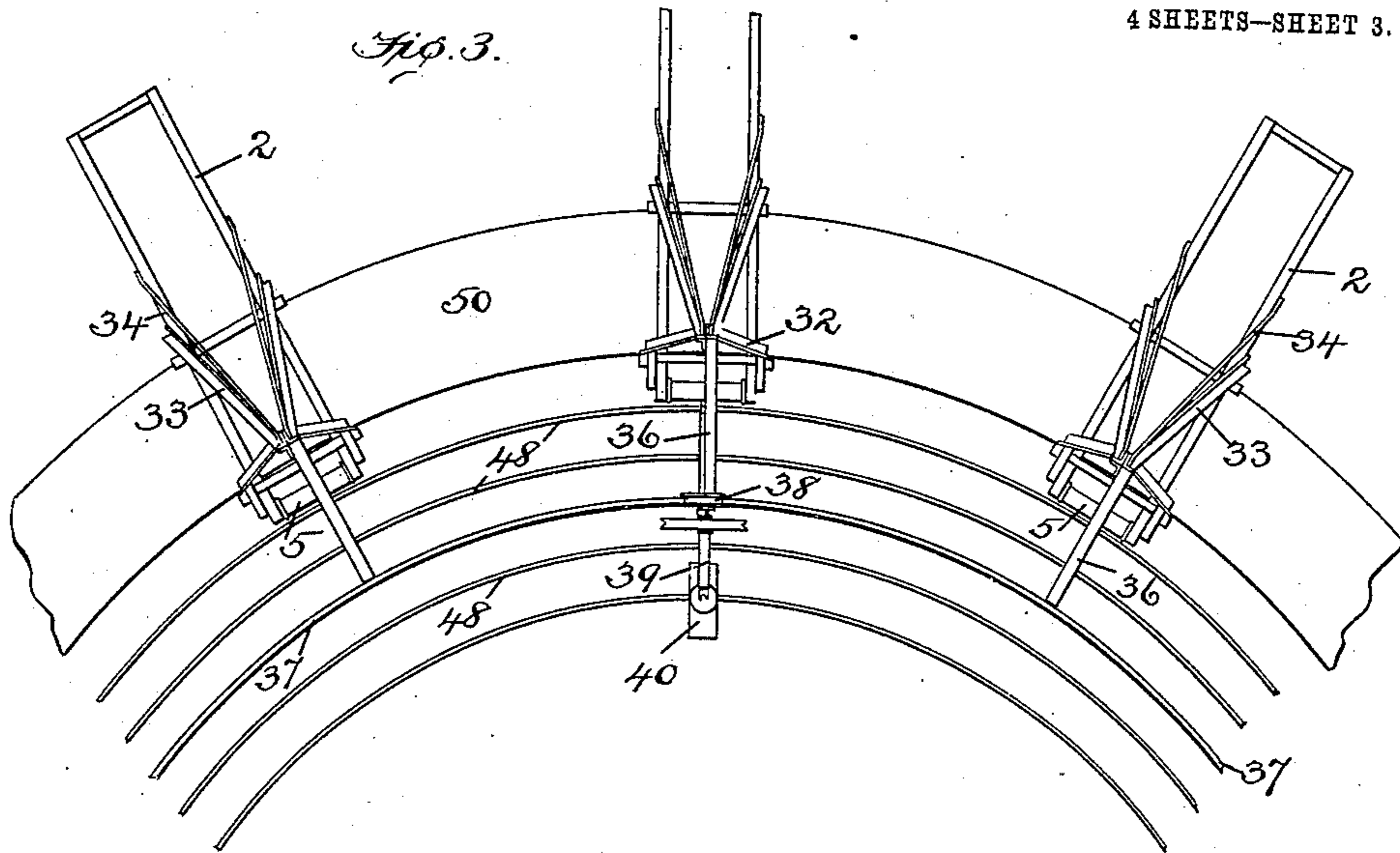
By

Inventor
Frederick H. Wagner
Mann & Co.,
Attorneys.

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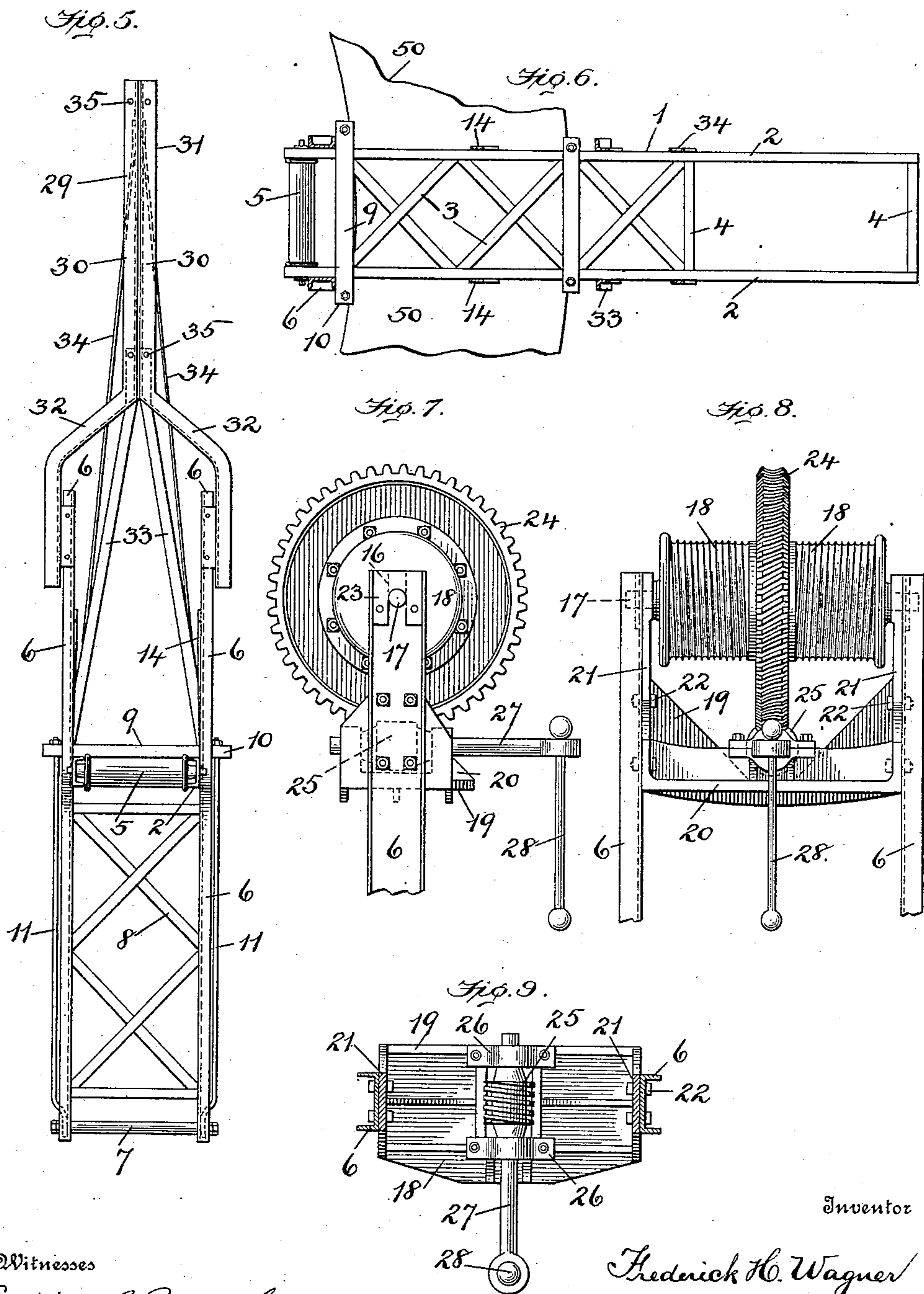
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4 SHEETS—SHEET 4.



Witnesses
Edwin L. Bradford
J. Ferdinand Vogt.

Inventor
Frederick H. Wagner
Mann & Co.,
Attorneys,

UNITED STATES PATENT OFFICE.

FREDERICK H. WAGNER, OF BALTIMORE, MARYLAND, ASSIGNOR TO THOMAS J. HAYWARD,
TRADING AS BARTLETT, HAYWARD & CO., OF BALTIMORE, MARYLAND.

HOISTING AND SUSPENSION APPARATUS.

No. 917,686.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed December 21, 1907. Serial No. 407,557.

To all whom it may concern:

Be it known that I, FREDERICK H. WAGNER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have
5 invented certain new and useful Improvements in Hoisting and Suspension Apparatus, of which the following is a specification.

This invention relates to an improved
10 hoisting and suspension apparatus especially designed for use in building or repairing the circular walls of gas holder sections—although the device may be readily used for other purposes.

15 It is a well-known fact that the various sections of gas holders, even those of comparatively small capacity, are cumbersome and exceedingly difficult to handle, and in building the various concentric sections and placing
20 them with respect to each other, a very heavy expense is incurred in special riggings to enable the various parts to be handled and a large number of men must be employed to carry out the work. This is all
25 dead expense and results in a considerable outlay of money to make even slight repairs such as painting the walls of the holder.

The present invention has therefore been
30 designed to enable these gas holders sections to be readily handled with a small number of men and thus at a minimum cost, the saving in time and labor often exceeding the profits heretofore made on such work.

35 With these and other objects in view the invention is illustrated in the accompanying drawings in which,—

Figure 1, shows a sectional elevation through a series of concentric gas-holder sections with my improved hoisting and suspension device sustained by the outermost
40 section. Fig. 2, illustrates a similar view of the gas-holder sections and shows the device as when used for hoisting. Figs. 3 and 4 show plan views of the gas-holder sections and the device illustrated in Figs. 1
45 and 2 to make it clear that in operation, a plurality of the improved hoisting and suspension devices are employed. Fig. 5, illus-

trates a front elevation of one of the frames for carrying the hoisting devices the upper
50 track-supporting brackets however, being omitted. Fig. 6, shows a plan view of the outer gas-holder section and the horizontal platform frame that sustains the hoisting and suspension device. Fig. 7 illustrates an
55 end elevation of the hoisting drum and devices for revolving the same. Fig. 8 shows a side view of the same. Fig. 9 illustrates a plan view of the devices for rotating the drum, and Figs. 10 and 11 show a side and
60 plan view respectively of the equalizing bar that is carried by the hoisting cables.

Referring to the several views of the drawings by numerals, 1, designates a horizontal frame or support which in the present in-
65 stance comprises parallel side rails, 2, and a plurality of struts or diagonal brace-bars, 3, which connect the side rails. Cross-bars, 4, may also be provided to aid in securing the rails of the frame or support together so
70 that it may be strong and rigid. At the inner end, the support or the side rails thereof, carry a roller or idler, 5, which is mounted so as to turn freely in a horizontal
75 plane.

Channel bars, 6, have position at opposite
sides of the horizontal frame and said bars extend substantially vertically in a plane
just behind the pivot points of the horizontal roller or idler, 5. These channel bars
80 extend both above and below the horizontal frame and their lower pendent ends are rigidly connected by a cross-bar, 7. Suitable brace rods, 8, also connect the channel bars, 6, and serve to hold said bars rigid with
85 respect to each other and thus form a vertical frame or support extending substantially at right angles with respect to and across the inner end of the horizontal frame or support.
90

A horizontal channel bar, 9, rests upon and extends crosswise of the horizontal frame or support adjacent its inner end and the ends, 10, of this channel bar project
95 slightly beyond the side rails, 2, of said horizontal frame, as clearly shown in Figs.

5 and 6. Rods, 11, hang pendently from the outer projecting ends, 10, of the horizontal channel bar and said rods have positions at the sides of the vertical channel bars, 6, as shown in Figs. 1 and 5. The lower ends of these pendent rods, in the present instance, are provided with eyes, 12, see Figs. 1 and 2, and these eyes are engaged or receive horizontally-projecting bolts or pins, 13, that are carried at the lower pendent ends of the channel bars, 6, and thus the vertical frame or support is sustained by the rods, 11, from the channel bar, 9, on the horizontal frame or support. Suitable inclined stay bars, 14, connect the bars, 6, and 2, of the horizontal and vertical frames and these bars are so attached by bolts which pass through suitable perforations or holes, 15, in the horizontal frame as to permit of their detachment for a purpose presently to be described.

The upper ends of the vertical channel bars, 6, are provided with vertical slots, 16, see broken lines in Fig. 7 through which a horizontal drum shaft, 17, on which a drum, 18, is mounted projects. A bracket frame, 19, having a horizontal base, 20, and vertical sides, 21, fits snugly between the upper ends of the vertical channel bars, 6, and is rigidly secured thereto by means of bolts, 22, as shown in Figs. 7 and 8. The drum-shaft, 17, and drum, 18, are sustained at the upper ends of the vertical sides of the bracket frame while slotted plates, 23, are fitted over the projecting ends of the shaft, 17, and are secured to the upper ends of the channel bars, 6, so as to hold the drum-shaft in place.

The drum, 18, may be either a single continuous drum or it may comprise two drum surfaces as shown, and the mechanism for imparting a rotary motion to the drum may vary but in the present instance a worm wheel, 24, is mounted rigidly with respect to the drum and drum shaft so as to turn in a vertical plane while a worm, 25, is mounted in suitable bearings, 26, on the horizontal base, 20, of the bracket frame. In the present instance the outer end of the worm shaft, 27, is provided with a head through which an operating rod, 28, freely passes and by means of this rod the shaft and worm may be revolved.

The upper ends of the channel bars, 6, sustain a yoke frame, 29, which is formed in the present instance by two angle-iron bars, 30, the upper ends, 31, of which are rigidly secured together, while their lower ends, 32, diverge and extend laterally and then downwardly so as to straddle the upper ends of the channel bars, 6. This yoke frame is preferably detachably connected to the channel bars, 6, so that the same may be readily disconnected from the vertical

frame or support, of which the channel bars form a part, either for transportation or other purposes. Suitable brace rods, 33, and, 34, serve to maintain the rigidity of the yoke frame by connecting the latter with the side rails, 2, of the horizontal frame, as clearly seen in Fig. 1.

The upper end of the yoke frame is provided with perforations or bolt holes, 35, and a triangular-shaped bracket, 36, is secured to the upper end of said yoke frame by bolts or other fastening devices which enter the holes, 35.

When building or repairing gas-holder sections a plurality of devices such as heretofore described are employed, the number varying according to the size of the gas-holder and in order to operate expeditiously it is desirable that an overhead trackway or rail, 37, be provided on which a suitable traveling carriage, 38, may travel so as to sustain heavy operating tools. By reference therefore, to Fig. 1 it will be seen that the overhead trackway or rail, 37, is sustained by the triangular bracket, 36, while the tool-sustaining carriage, 38, is mounted so as to travel thereon. In the present instance a suitable tool-sustaining device, 39, is suspended from the carriage, 38, and a tool, 40, hangs pendently from said tool-sustaining device.

In Fig. 2, the horizontal and vertical frames, and the hoisting drum devices are shown,—the upper yoke frame, bracket and trackway devices however being removed. In this figure the two flexible cables or ropes, 41, from the drums are shown connected to an equalizing bar, 42, while a single cable or rope, 43, extends from said bar and is provided at its lower end with a suitable coupling device, 44, that may be engaged with the gas-holder sections to lift the latter. It is deemed desirable at this point to merely mention the fact that the various gas-holder sections are usually provided with a plurality of man-holes and that in placing the various sections in position the man-holes aline so that the coupling devices, 44, may be readily attached or detached by reaching through the man-holes.

The operation of the device will now be described reference being made particularly to Figs. 1 and 2. The gas holder is of the usual construction and comprises the innermost section, 45, which has a crown or dome, 46, and is also provided with a U-shaped hook flange, 47, at its lower end for purposes obvious to those skilled in the art. The surrounding sections, 48, may vary in number, but in the present instance four of such sections are shown. The outermost section, 49, is provided with a flat circular platform, 50, at its upper end and this section and its platform are built first in the construction

of a gas-holder. The platform, 50, is then utilized for sustaining the improved apparatus,—the horizontal frame or supports, 1, resting on said platform at intervals around the gas holder sections and being held thereon by means of a clamp hook, 51, which passes through a cross bar, 52, on top of the horizontal frame and has its hook end engaged with an angle plate, 53, at the outer edge of said platform. This manner of securing the horizontal frame or support on the platform, 50, enables or permits a ready horizontal adjustment of said support with respect to said platform to project the inner operating end of said support over the various gas-holder sections as the work progresses.

By comparison between Figs. 1 and 2 it will be seen that not only may the horizontal frame be adjusted in a horizontal direction with respect to the platform, 50, but the vertical frame or support may also be adjusted with respect to the horizontal frame so that its upper end may be made to assume a vertical or an inclined position as desired. It will also be noted that the central portion, 54, of the vertical support is bowed or has position in a plane slightly beyond a line that would be straight from end to end of the frame so that the lower end of the vertical frame may be maintained against the wall of the section, 49, while its upper end may be vertical or inclined with respect to the horizontal frame. The adjustment of the upper end of the vertical frame is effected by a horizontal movement of the horizontal frame and an adjustment of the lower ends of brace bars, 14, 33, and, 34, along the side rails, 2,—the holes, 15, in said side rails being provided for this adjustment. As the building or repairing of the sections progresses, the adjustment of horizontal and vertical frames is made so as to enable the work to be done rapidly.

While the horizontal and vertical frames are in the present instance formed of structural iron they may readily be constructed in a form that may not accurately be termed a frame and it is to be understood that the word frame as herein used is intended to include any form of horizontal and vertical, or substantially vertical, supports that coact so as to perform the operations herein described, it obviously being my intention to so combine the two supports as to enable their adjustment to meet the requirements as the work of building or repairing the gas-holders progresses.

It is also to be understood that the word vertical as applied to one of the frames or supports is intended to mean an upright frame or support which may have a vertical or an inclined position with respect to said horizontal frame or support.

Having thus described my invention what I claim and desire to secure by Letters Patent is,—

1. The combination with the horizontal frame, of an upright frame projecting above and below the horizontal frame and having spaced-apart upright bars, means hanging pendently from the horizontal frame and connecting the spaced-apart bars of the upright frame and hoisting mechanism sustained between the bars of the upright frame and above the horizontal frame.

2. The combination with the horizontal support, of an upright support projecting above and below the horizontal support; means for sustaining the upright support at a point below the horizontal support, means for adjustably securing the upper end of the support, and a hoisting mechanism.

3. The combination with the horizontal support, of an upright support projecting above and below the horizontal support, rods adjustably sustained from the horizontal support and extending downwardly therefrom and connected with the upright support, and a hoisting mechanism carried by said upright support.

4. The combination with the horizontal support, of an upright support fitting over the end of said horizontal support and projecting above and below the latter, rods having their lower ends connected with the upright support and their upper ends sustained from the horizontal support, and a hoisting device carried by the upright support above the horizontal support.

5. The combination with the horizontal support of a revoluble member sustained adjacent one end of said support, an upright support sustained from the horizontal support,—said supports being adjustable with respect to each other and a hoisting mechanism carried by the upright support above the said revoluble member.

6. The combination with the horizontal support, of an upright support having side bars which project downwardly at the sides of the horizontal support, rods having their upper ends sustained from the horizontal support and their lower ends connected with the side bars of the upright support and a hoisting mechanism carried by the upright support.

7. The combination with the horizontal support, of an upright support having side bars which extend above and below the horizontal support,—said bars being bowed between their ends and a hoisting mechanism carried by said bars.

8. The combination with a horizontal frame formed of side and cross bars, of an upright frame also having side bars which project adjacent to and above and below the side bars of the horizontal frame, a trackway,

and a bracket carried by the upright frame and sustaining the trackway.

9. The combination with a horizontal frame having spaced apart horizontal side
5 bars, of an upright frame also having spaced apart bars which have position adjacent to and project above and below the horizontal bars of the horizontal frame, a yoke frame connected to the upper ends of the bars of

the upright frame, a bracket carried by the 10 yoke frame, and a trackway sustained by said bracket.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK H. WAGNER.

Witnesses:

CHAS. B. MANN,

G. FERDINAND VOGT.