(No Model.) 2 Sheets—Sheet 1.

# A. F. KNORP.

## HYDRAULIC ELEVATOR.

No. 302,003. Patented July 15, 1884.

FIG. 1.

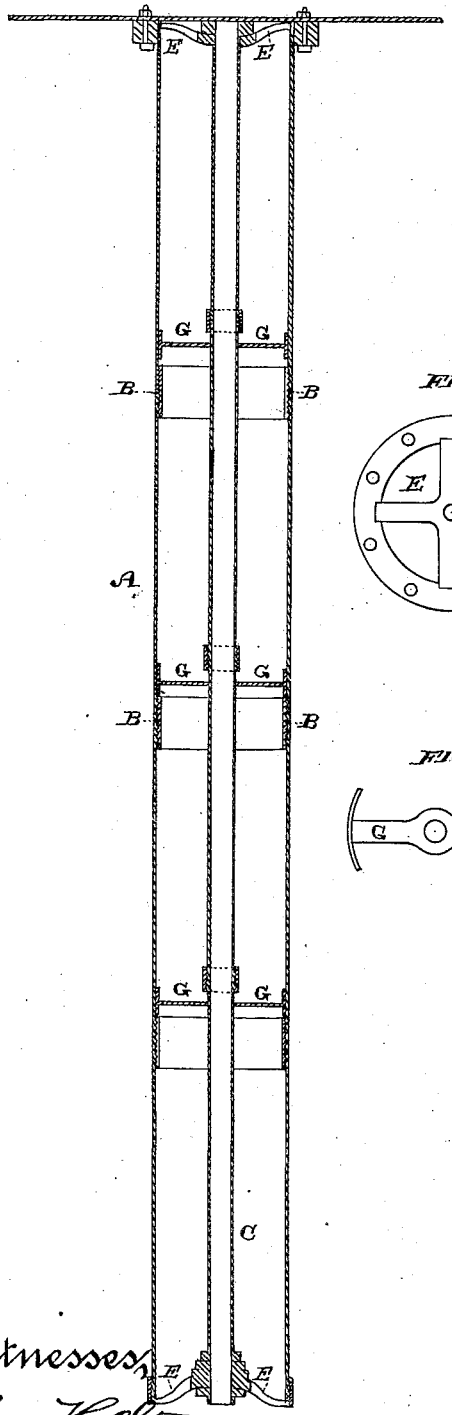



FIG. 2.

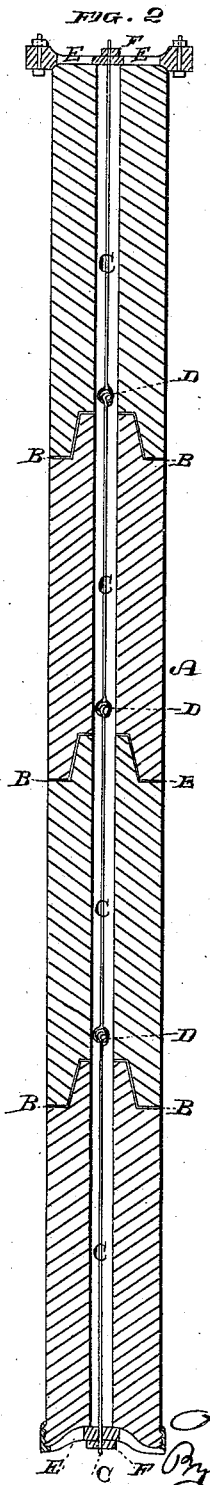



FIG. 3.

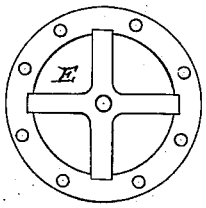



FIG. 4.

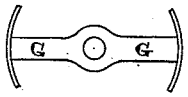
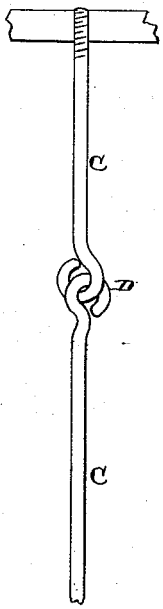



FIG. 5.

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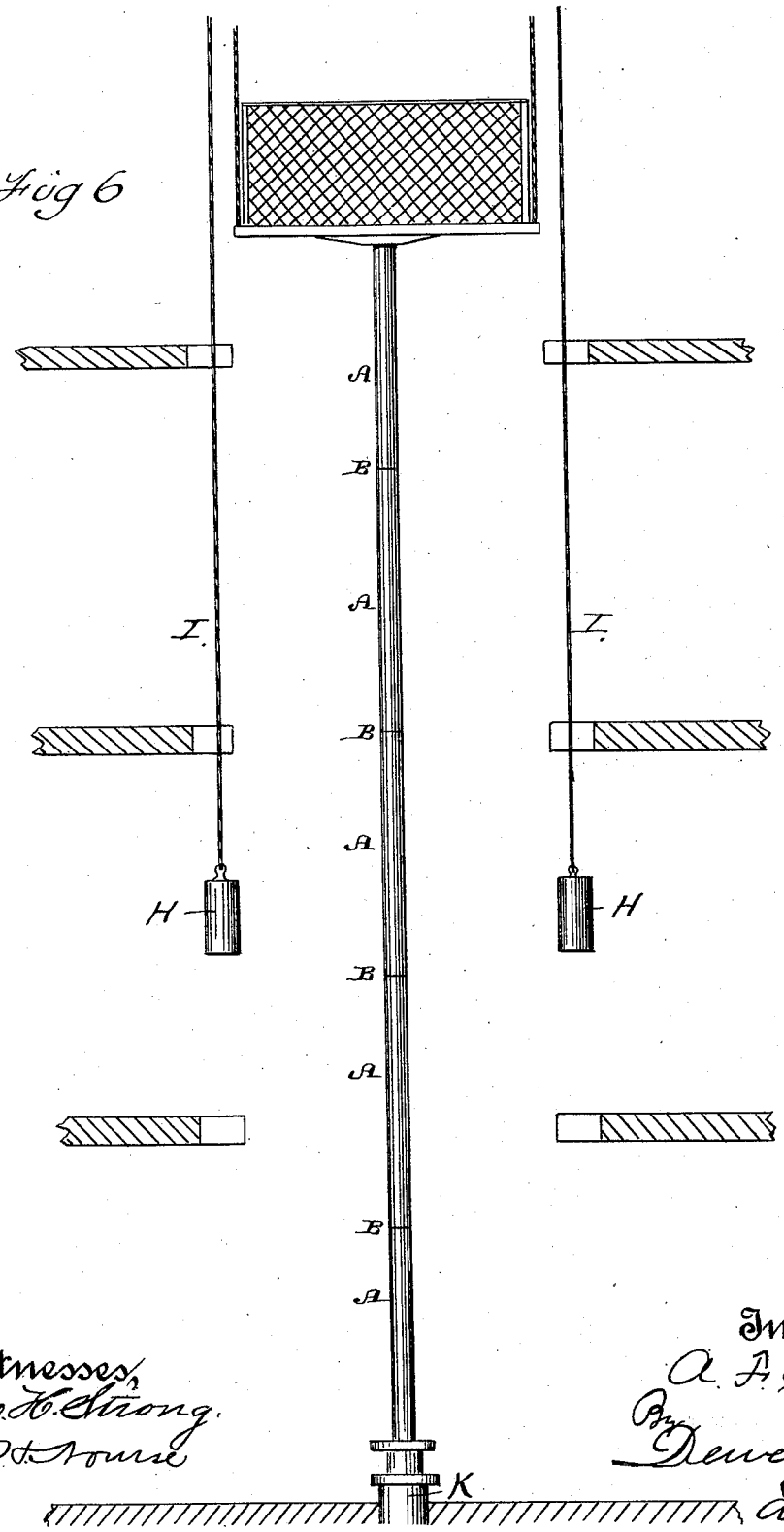
(No Model.) 2 Sheets—Sheet 2.

# A. F. KNORP.

## HYDRAULIC ELEVATOR.

No. 302,003. Patented July 15, 1884.

Fig 6

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# UNITED STATES PATENT OFFICE.

ALBERT F. KNORP, OF SAN FRANCISCO, CALIFORNIA.

## HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 302,003, dated July 15, 1884.

Application filed August 13, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT F. KNORP, of the city and county of San Francisco, and State of California, have invented an Improvement in Hydraulic-Ram Elevators; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain improvements in that class of elevators in which the cage or platform is supported upon the top of a vertically-moving column or piston-rod, which is forced up, so as to elevate the cage, by the pressure of a column of water; and it consists of a means for holding the sections together which form the column, and preventing their separation in case the joints become broken or detached.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a vertical section of a hollow ram-rod with my attachment. Fig. 2 is a similar section showing a solid ram with my device. Fig. 3 is a view of one of the end yokes. Fig. 4 is a view of one of the interior guides to steady the rod. Fig. 5 is an enlarged view showing one form of connection for the ends of the rods. Fig. 6 is an elevation showing the cage and counter-weights.

A A are tubular or solid sections forming an elevator-column, and having joints at B, by which the sections are united and held together in a single shaft. These sections may become separated by accident, and my invention is designed to prevent the lower part from becoming detached and falling down, or the cage from being carried up by the counter-weights.

It consists of a tube or rod, C, which extends up through the center of the column. When these rods are used, they may be made of solid lengths, having the ends bent into hook form, so as to be united, as shown at D. If the column be made of wood or other material and solid, as shown in Fig. 2, a hole is bored centrally through the length of each section, and the rods are passed through this hole, extending from top to bottom of the column. At the top and bottom of the column are fixed heads or yokes E, through which the rods pass, and where they may be drawn to the proper tension by nuts F, thus holding the whole rigidly together. The columns are usually made of hollow tubes, twelve or eighteen feet long, screwed together and turned to a smooth finish upon the outside, so as to pass water-tight through a stuffing-box, K, in the top of the tube in which they move. They are very heavy, and when the cage is near the third or fourth floor, with some sixty or seventy feet of the column forced out of the tube, the power necessary to force them up is greatly increased. To partly overcome this, heavy counter-weights H are attached to ropes I, passing over pulleys at the top of the building, and thence down to the cage, to which they are attached, the said cage resting upon the top of the column, as shown in Fig. 6.

Now the tubes forming the column are there, and the joints between the sections cannot be as strong as desired, either in a hollow or a solid column, and if by accident the column should separate, the lower part might sink rapidly into its tube; but the cage, released from its weight, would be shot upward by the action of the counter-weights, and thus render what appears at first sight the safest of elevators one of the most fatal. My invention serves to hold the whole length of the column together by means of these interior binding-rods extending from top to bottom, and so fixed at each end that even if the column should separate it could not fall or produce a dangerous accident. If the column be made tubular and hollow, guides or stays G are secured within it at intervals, through which the rods pass, and are thus prevented from swaying from side to side, and are held in their central position.

If desired, the central rod may be made of tubular iron pipes having stout couplings at their meeting ends, and secured in yokes at the ends of the column, as before described.

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

1. In an elevator consisting of a vertically-moving plunger or ram, a means for holding the sections together, consisting of a central rod extending from end to end, and secured in yokes or end pieces, substantially as herein described.

2. In an elevator consisting of plunger or ram sections united longitudinally, the central

longitudinal rods secured into end pieces or yokes, in combination with stays or guides surrounding the rods and braced to the inside of the column, substantially as herein described.

3. In an elevator or hoist, a cage-supporting column composed of sections jointed together, and moved in a vertical tube to raise or lower the cage by hydraulic pressure, with an interior rod extending through the column, and secured in yokes or end pieces, so that the tensile strain is exerted to hold the sections of the column together.

In witness whereof I have hereunto set my hand.

ALBERT F. KNORP.

Witnesses:
S. H. NOURSE,
JOS. A. BAYLESS.