

MICHAEL F. LYONS.
Improvement in Apparatus for Elevating and Carrying
Materials for Buildings.

No. 126,890.

Patented May 21, 1872.

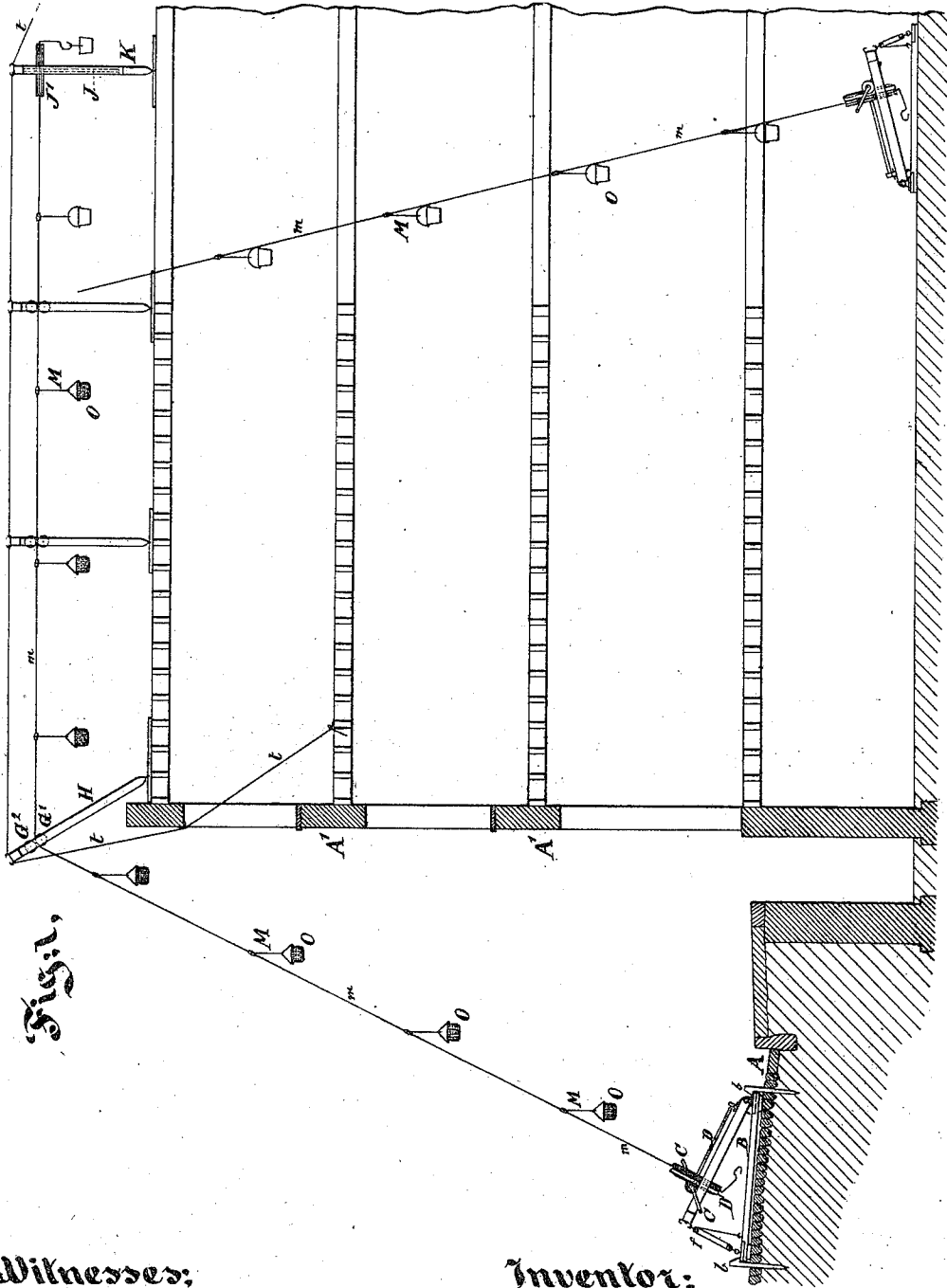


Fig. 1.

Witnesses:

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Inventor:

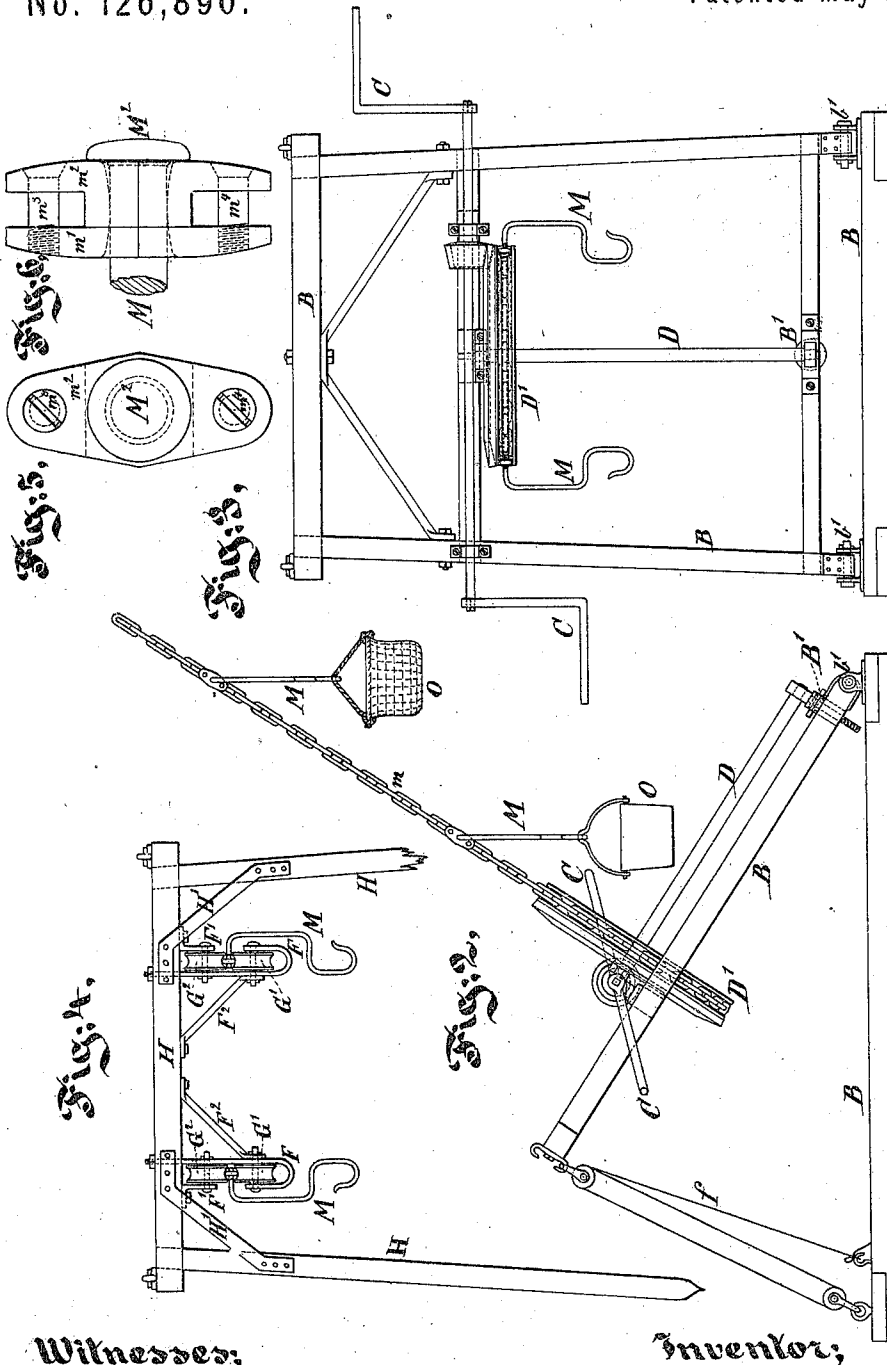
Michael F. Lyons
By his attorney J. H. Nelson

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Witnesses;

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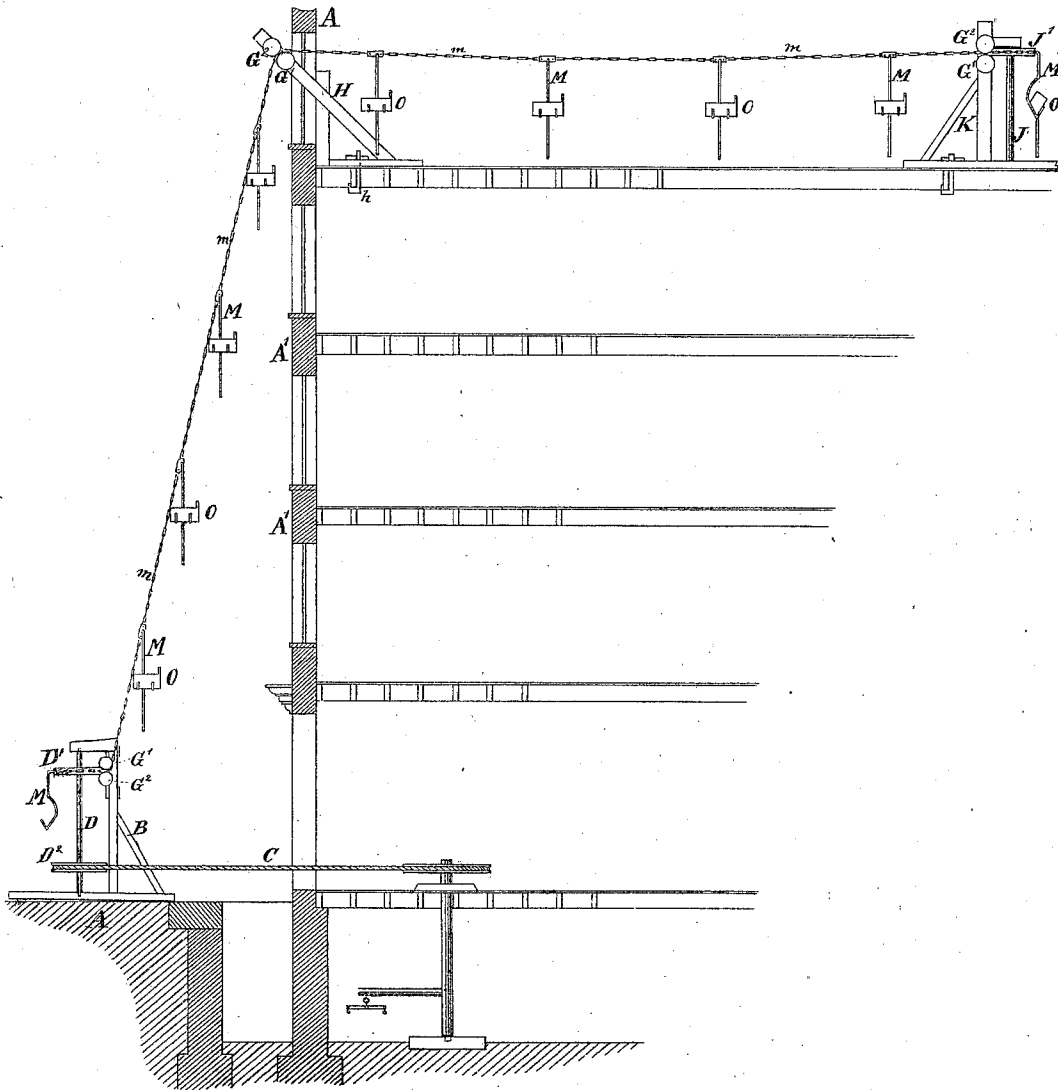
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Witnesses,

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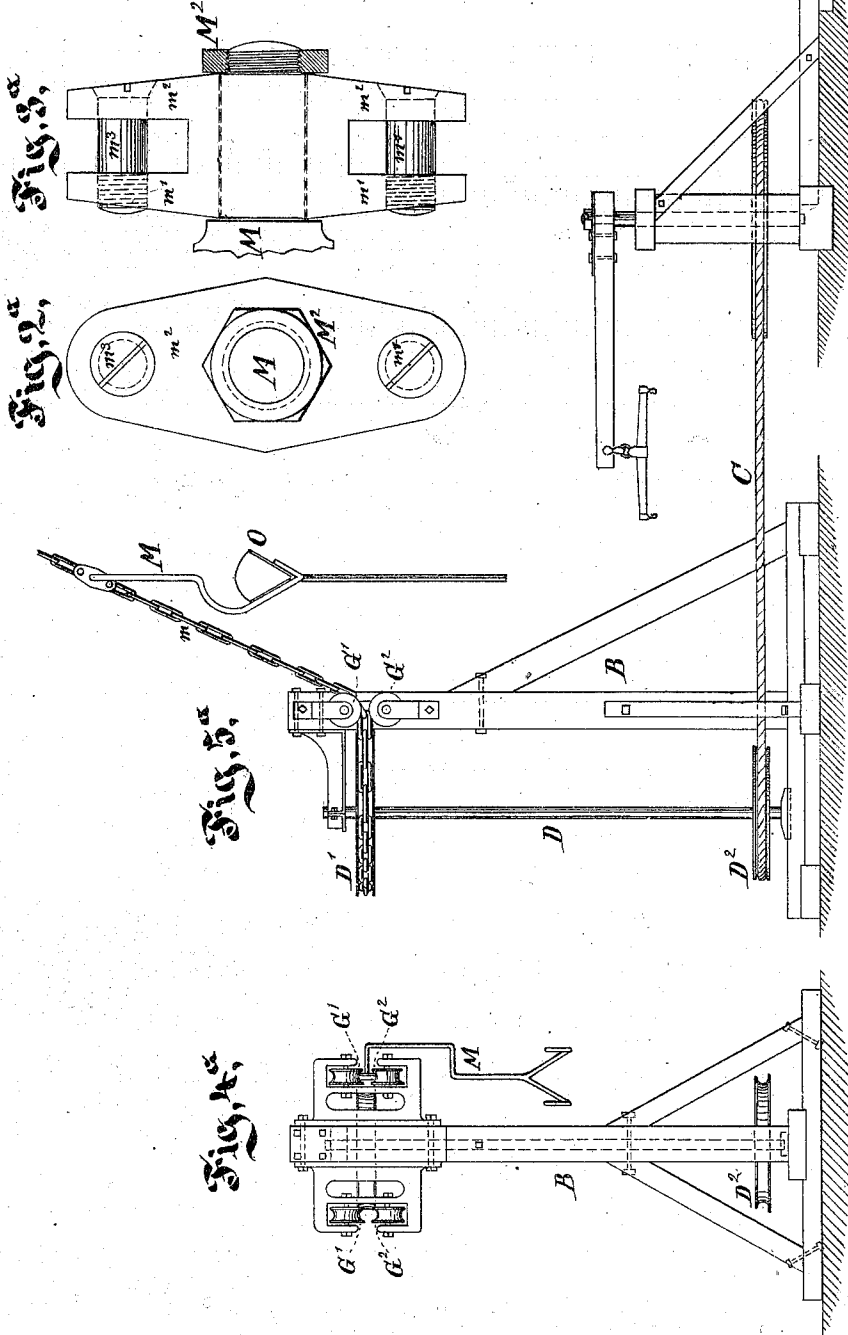
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UNITED STATES PATENT OFFICE.

MICHAEL F. LYONS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN APPARATUS FOR ELEVATING AND CARRYING MATERIALS FOR BUILDINGS.

Specification forming part of Letters Patent No. 126,890, dated May 21, 1872.

Specification describing an Improvement in the Apparatus for Elevating and Carrying Materials—more especially materials for buildings—invented by MICHAEL F. LYONS, of Brooklyn, E. D., in the county of Kings and State of New York.

I employ an endless chain, peculiarly mounted, and adapted for the purposes required. The motive power may be of any ordinary or suitable character which will give either a lightness or intermittent motion to the endless chain. The loads are attached by means of peculiar hooks. The hooks may be adapted to receive ordinary hods.

Many attempts have been made to avoid the necessity for the laborious ascent and descent of men in elevating materials for building. The importance of the end to be attained has been long appreciated.

My invention is by no means the first which has attempted the general ends in view, but it involves important improvements in the details which conduce quickly to the success of the operation.

The following is a description of what I consider the best means of carrying out the invention. The accompanying drawing forms a part of this specification, and represents two forms of many portions of the apparatus.

Figures 1 to 6 represent the apparatus in full and in detail. I consider this form as preferable. Figs. 1^a to 5^a represent an apparatus in which horse-power is used to impart motion. Fig. 1 is a section of a house and a portion of a street. There are in this figure two sets of apparatus or two portions of the same apparatus, represented as distinct. Ignoring for the present that portion of the apparatus which carries up material obliquely within the house from a point in the cellar, and inviting attention only to the other part, it may be described as a hand apparatus, taking the material in buckets or baskets, and carrying it up to the fourth story and then backward, returning the empty buckets or baskets by the same means to the starting point. Figs. 2, 3, 4, 5, 6 represent details on a larger scale. Fig. 2 shows the frame on the street with the portion of the carrying-chain immediately adjacent. It shows one bucket and one basket carrying the material. It will be understood that either can be used, or that

they may be alternated, as here shown. Fig. 3 is a face view of the adjustable or swinging part of the frame, shown in Fig. 2. Fig. 4 is a front view of one of the frames at the top of the building. Figs. 5 and 6 are on a still larger scale. They represent one of the peculiar links of the chain which receives the carrying-hook. Fig. 5 is a side view, and Fig. 6 an edge view. Fig. 1^a is a vertical section through the front portion of a house with the adjacent portion of the street. It shows my invention applied to carry the material from the street in front of the house to the fifth story and back a considerable distance therein. The horse which operates it works in the cellar. Figs. 2^a, 3^a, 4^a, and 5^a represent details of the same, differing only in the fact that Fig. 5^a shows the horse working on the same level.

Similar letters of reference indicate corresponding parts in all the figures.

Referring to Figs. 1, 2, 3, 4, 5, 6, A is the street, and A¹ the fixed work of the house. B is an adjustable frame, secured firmly in place on the street by means of stakes *b*. These have been in my experiments made of wrought iron, pointed, and adapted to hook upon the frame at their upper end, as represented. D is a shaft mounted in bearings in the frame B, and adapted to be slowly and strongly turned, by means of the hand-cranks C and gear-wheels, as represented. There is a small beveled gear-wheel on the crank-shaft, which meshes into a larger beveled gear on the side of a large pulley. D¹ is what is sometimes designated a sprocket-wheel—that is to say, it is provided with indentations and projections adapted to match with approximate accuracy to the links of the endless chain *m*, which carries the loads, and which receives its motion from the rotation of the wheel D¹.

The chain *m* passes from the pulley D¹ up in an oblique direction over a pulley, G¹, in a movable framing, H, which is mounted in the front of the building at a proper elevation. After passing over the pulley G¹ the chain *m* passes backward horizontally, running over corresponding pulleys in corresponding movable frames till it has passed a desired distance backward, where it finds and passes half around a pulley, J¹, mounted on an upright shaft, J, and supported in a movable framing, K. From the pulley J¹ the endless chain *m* in its return

motion passes in a similar manner over pulleys which support it, back to the starting point at the pulley D^1 , but with the difference in condition that it usually goes back light—that is, with empty buckets, baskets, or hods—while it goes up with the same heavily loaded.

I provide lengths of chain adapted to be conveniently inserted and removed, so as to readily adapt the apparatus for the changes rendered necessary as the building advances, and provide for holding the frames H and K very stiffly in position by means of guy-ropes or chains t .

I can tighten the chain by moving the framing K, which may have hook-bolts or other means, not represented, for holding its foundation very firmly in position.

I can adjust the inclination of the shaft D and also within small limits tighten the chain m , by means of the tackle or tackles f . I have in my experiments used two of these tackles, one to each corner of the foundation of the frame-work, the framing being an open frame of considerable width, as shown clearly in Fig. 3.

I have discovered that although the weight depending would seem to keep the chain m strongly down upon the sheaves G^1 there is still a liability in high winds and under the varying circumstances in practice, that the chain m may get off the sheaves. Instead of making the sheaves G^1 very deeply grooved I prefer to mount over them other sheaves G^2 , which shall serve as an effectual safeguard.

M are the hooks which receive and allow the ready engagement and disengagement of the loads. The construction and attachment of these hooks M to the chain m involves the necessity for considerable care in order to allow them to fulfil all their duties and pass properly around both the pulleys D^1 and J^1 , over the sheaves G^1 , and between them and the guard-sheaves G^2 .

Figs. 5 and 6 show on a large scale one of the links of the chain m , which receives the hook M. The parts are marked $m^1 m^2$, and are held firmly together by means of the bolts or screw-studs $m^3 m^4$. The hook M is forged with a head, M^2 , which is too large to pass through the hole which receives the body of the hook. The hook M is inserted point foremost through the hole in the center of the parts $m^1 m^2$, and the curves in the hook are so gradual that the whole of the hook except the head M^2 will pass readily through. The form of the hook M is very clearly shown, and with reasonable skill in the adaptation thereof to the different thicknesses or proportions of the other parts of the apparatus it will pass, if mounted as shown in the parts $m^1 m^2$, through all the conditions which it has to fulfil.

The baskets or buckets which contain the mortar, brick, or other material are marked O. They are filled and emptied by the obvious means, and are very easily engaged on or disengaged from the hooks M.

The construction of the frames B, H, and K is so fully shown in the drawing as to require little description. It is important that they allow the loads to pass freely, and that the sheaves G^1 and G^2 are held strongly in position with a clear space on the one side for the hooks M to pass.

Referring to Fig. 4, F is a stout strap of wrought-iron, which descends on the inner side of the sheaves $G^1 G^2$, and bending around below the sheave G^1 , rises again high enough to support the pivot of this principal sheave. The sheave G^2 is only useful in occasional emergencies, but it is important that the outer end of its center be also supported. I effect this by means of a short strap, F^1 . I brace the strap F by the brace F^2 .

The whole frame H is stiffened by diagonal braces H^1 , near the corners, so arranged as to be entirely out of the way of the passing hooks.

The operation, as has been already intimated, consists in turning the cranks C, loading the filled baskets or other vessels upon the hooks M, at or near their lowest positions, disengaging and emptying them at or near their highest positions, and again fixing them upon the hooks M, to allow them to return. On their return to the street the empty baskets are taken off and full ones supplied. Baskets, buckets, boxes, hods—ordinary hods used for carrying on the shoulder—and various other forms of vessels may be employed to engage upon the hooks M; but it is important, when hods or the like are employed, that the hooks be correspondingly modified at their lower or hook ends.

Fig. 1 shows another set or partial set of the apparatus, leading from the cellar upward, which has been before referred to. This may be an independent set, operated by independent workmen, and this may be in practice preferred in most cases where the work is done on a large scale; but for small jobs I consider it practicable to extend the same chain m from the street-frame B over the several sheaves G^1 down into the cellar, and thence upward, to return again to the street, applying the power either at the cellar-frame or at the street-frame, or at both ends, as may be preferred. In either case the cellar will, as building is ordinarily conducted, be the point from which the mortar will start on its ascent, and the street the point from which the bricks or stones will start.

The Figs. 1^a 2^a 3^a 4^a 5^a represent several modifications of the apparatus which I will describe very briefly. Instead of the crank for giving motion, C, in this case, represents a belt or rope coming from a large pulley on a horse-power, conveniently situated. The hooks M are formed to receive hods. Their branched construction precludes their being introduced, as before described, through the links of the chain m . They are therefore made with a threaded end, where the head is in the other form of the chain, and the hook being

inserted in the opposite direction, a thin nut is put in at the point M^2 . This nut may be secured by riveting, or by a set-screw going through the side of the nut, or by both these means; but it is obviously important that the ordinary means of the nut, jam-nut, or any other construction which will cause a considerable projection from the side of the link, be avoided.

There may be any desired coupling devices introduced at intervals in the chain m , to facilitate the insertion or removal of parts of the chain; but I believe the peculiar construction of the links $m^1 m^2$, with their screws or screw-studs $m^3 m^4$, will allow these to serve admirably as coupling-pieces. One hook with a portion of chain between it and the next hook may at any time be removed, and the chain shortened or lengthened to that extent.

I consider it important that the ascending and descending stretch of the chain m be not perfectly vertical, but inclined about as represented, in order to insure that the hooks M with their dependent loads hang clear of the chain, and will by no possibility become entangled therewith. As represented, they mount and pass the pulleys $G^1 G^2$ with perfect certainty. An absolutely taut condition of the chain m is not essential nor desirable, but it is well to keep it strained tolerably straight. The lengths of chain to be added from time to time in changing the work from one story to another may be all uniform or of several previously-determined lengths, according to convenience.

I do not deem it essential to the success of my invention that the sheaves $G^1 G^2$ be corrugated or indented on their peripheries so as to exactly match the links of the chain m , but I consider it vitally important that they be so deeply grooved as to allow the chain to pass freely without binding, and to hold the chain firmly against any wind or other force tending to displace it laterally. The chain cannot get out of the firm hold and gripe induced by the relation of the sheaves $G^1 G^2$, although the hooks M can pass freely without being nipped between the rims or edges of the sheaves.

The necessity for changing the obliquity of the shaft B within wide limits comes from the great deviation in the conditions, as the work proceeds from a low story to a high one.

In constructing a low building, or in the early part of constructing a high one, the chain m extends from the street-framing B in a much more horizontal position than in the latter part of the construction of a high building. The anchoring of the framing B on the street should be permanent, and never subject

to disturbance. The framing B having the capacity for turning, with its supported shaft D and its connections on the hinges or joints b^1 , and being adjusted nicely by the tackles f , allow for a very wide range of inclination, and the varying tightness of the chain m may induce the adjustment of the tackles f at such a point that the shaft D will not stand exactly at right angles to the plane of the chain m . In such case it may be important to be able to make a small amount of correction of the position. I esteem it important to run the shaft D as near as possible at right angles to the plane of the chain m . I can adjust the foot or step of the shaft D several inches out or in, by means of the hand-wheel or nut B^1 . This nut, held down by a strap, as represented, receives the thread of the eye which forms the step of the shaft D . Turning it in one direction runs the step outward and upward; turning it in the other direction runs the step inward and downward. I can by its means adjust the position of the shaft with great delicacy.

Although the apparatus is described as used on buildings, and many of its features are peculiarly adapted to overcome the difficulties in that particular work, I believe it may be used with advantage, in many cases, in the latter part of the digging of deep cellars.

I claim as my invention—

1. The endless chain m and hooks M , operating-pulley D^1 , supporting-pulleys $G^1 G^2$, and terminal pulley J^1 , mounted on removable or adjustable frames, and serving to carry up material, and also to move it horizontally and allow its ready connection and disconnection, as specified.

2. The construction of the links $m^1 m^2 m^3 m^4$, adapted to serve the triple functions of a link of the chain m , and a coupling or disconnecting and connecting piece thereof, and a support for the swivel-hook M , as specified.

3. The adjustable frame B with its adjusting-nut B^1 , arranged as represented relatively to the shaft D , and pulley D^1 with its operating means, so as to allow the chain m to be tightened by the tackles f and thus thrown slightly out of position and be again adjusted in position by the hand-nut or wheel B^1 , as specified.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

MICHAEL F. LYONS.

Witnesses:

WM. C. DEY,
ARNOLD HOERMANN.