No. 785,569. PATENTED MAR. 21, 1905.

D. D. D. PLUNKET.

EXTENSION CONVEYER.

APPLICATION FILED SEPT. 9, 1904.

6 SHEETS—SHEET 1.

Fig. 1.

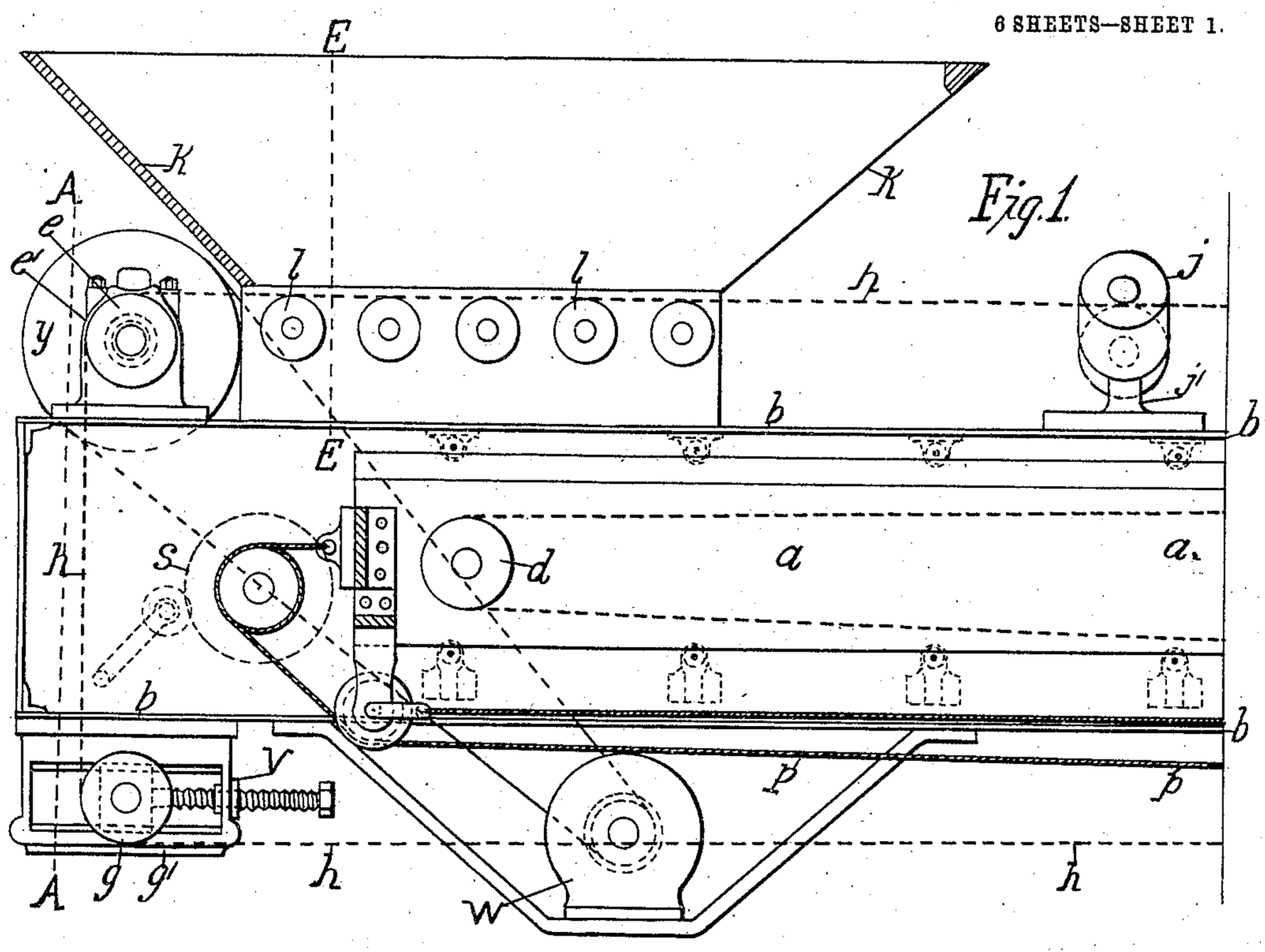
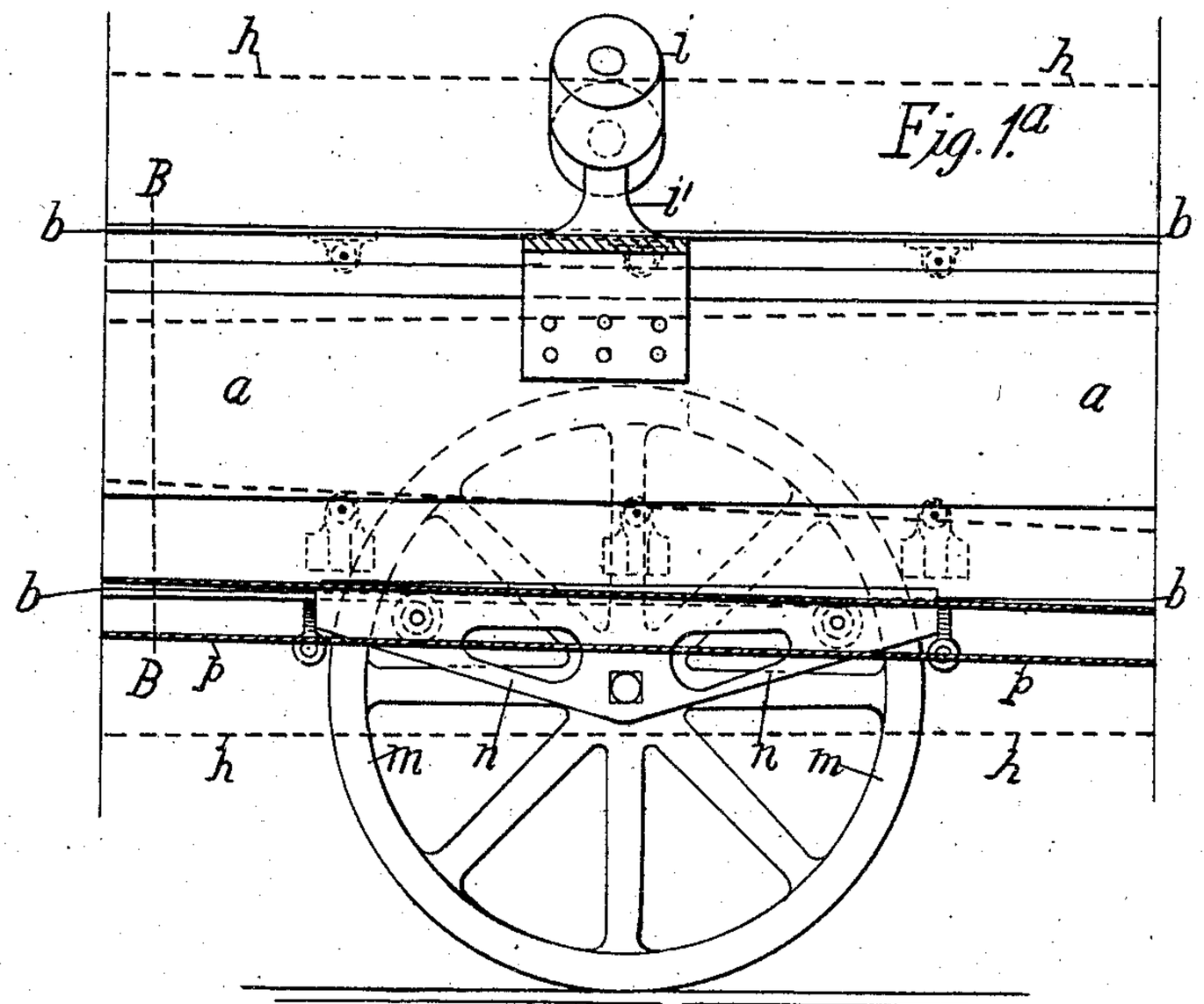


Fig. 1a.



Witnesses

James L. Norris, Jr.

Robert Ewalt.

Inventor

David D. D. Plunket.

By James L. Norris.

Atty.

No. 785,569. PATENTED MAR. 21, 1905.

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6 SHEETS—SHEET 2.

Fig. 1b

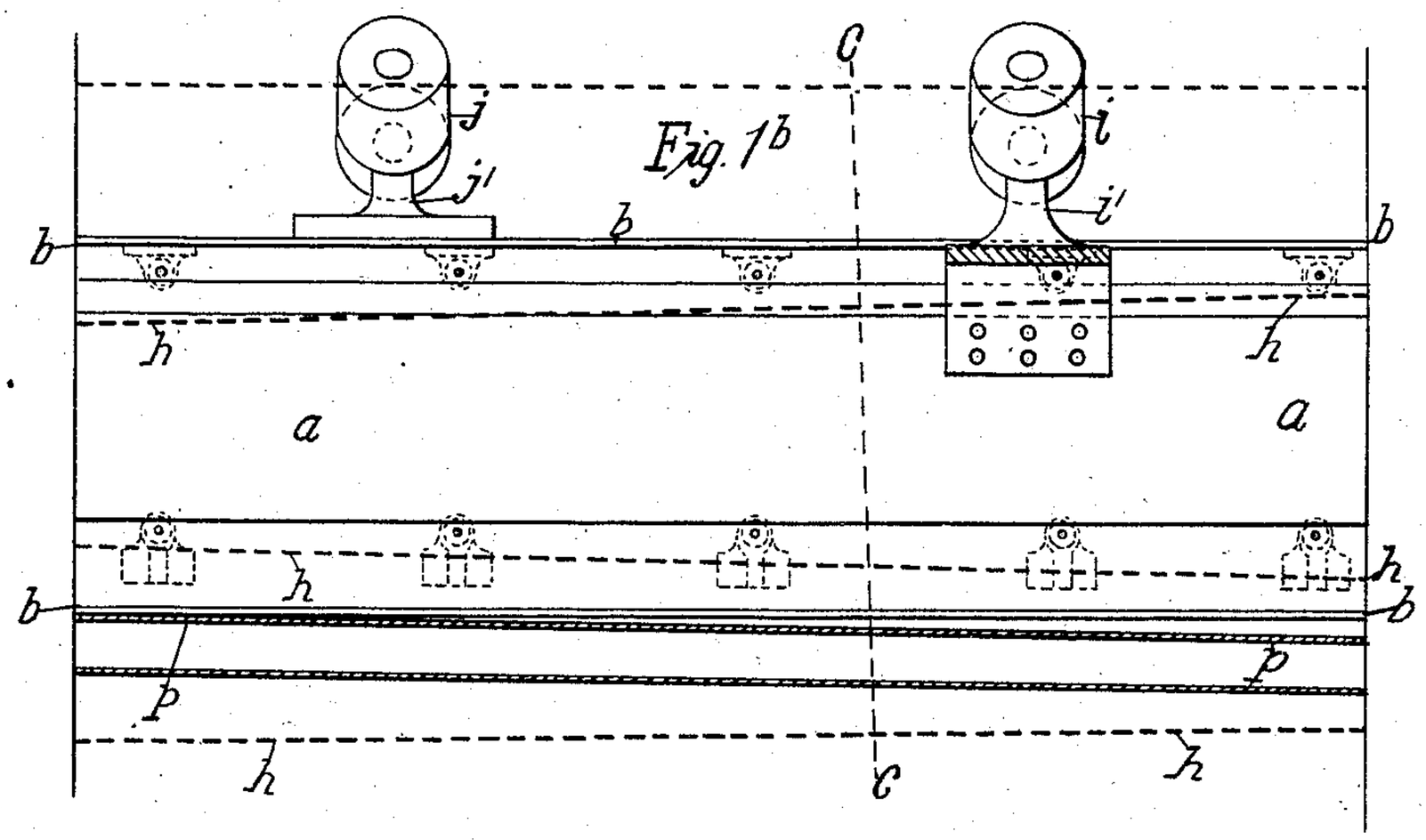


Fig. 1c

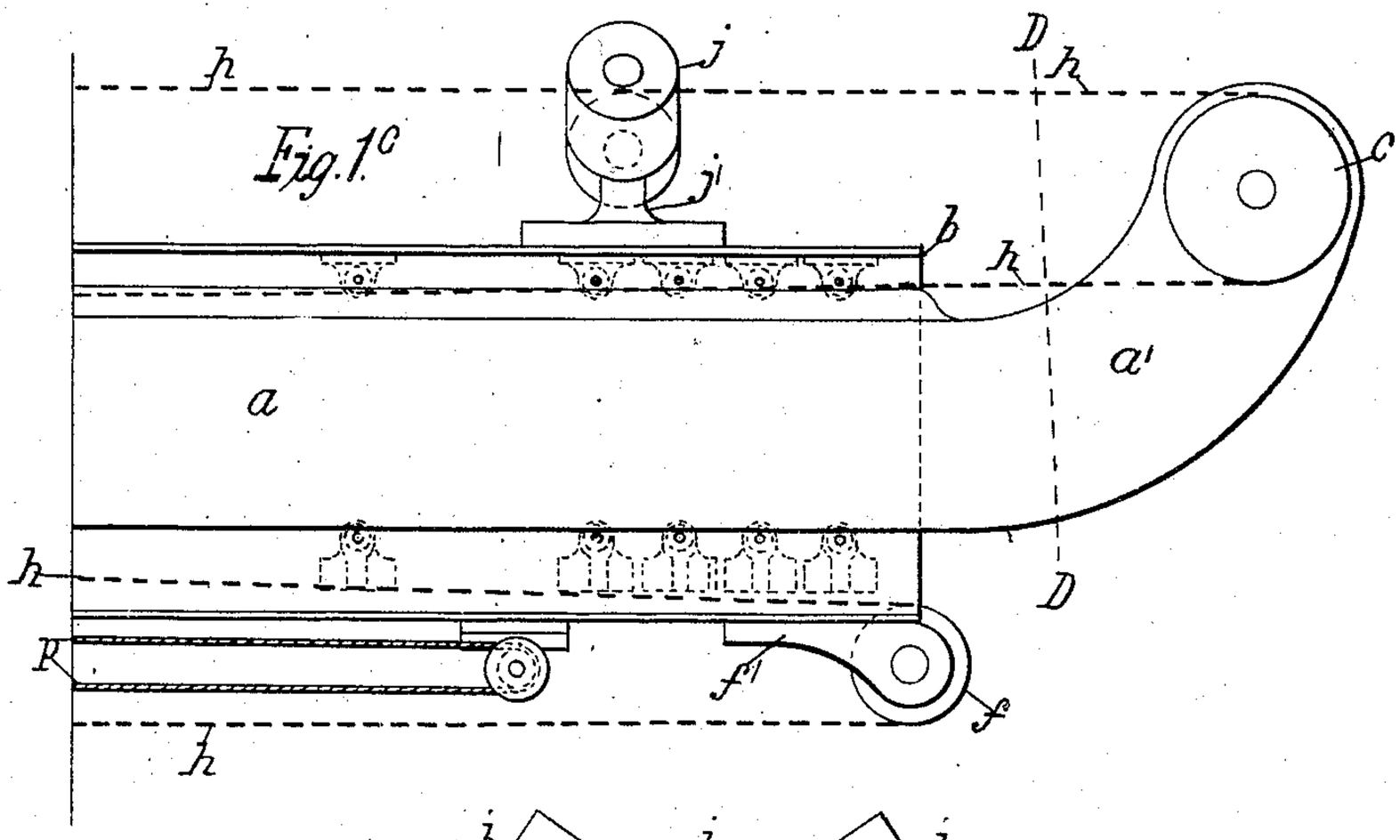
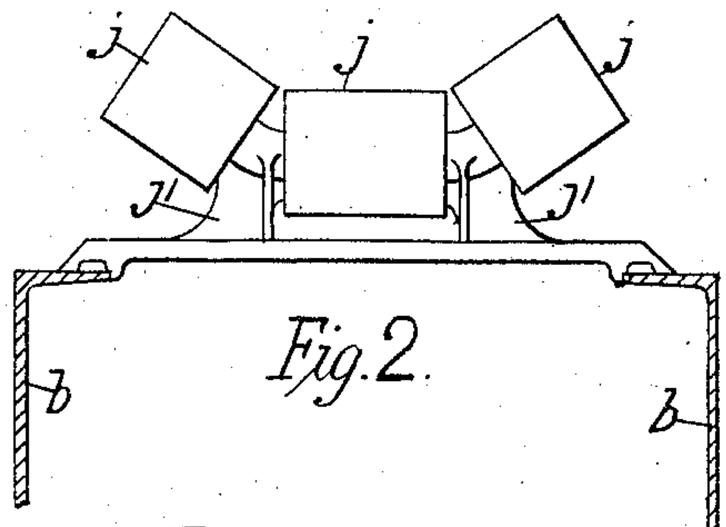


Fig. 2.



Witnesses.
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6 SHEETS—SHEET 3.

Fig. 3.

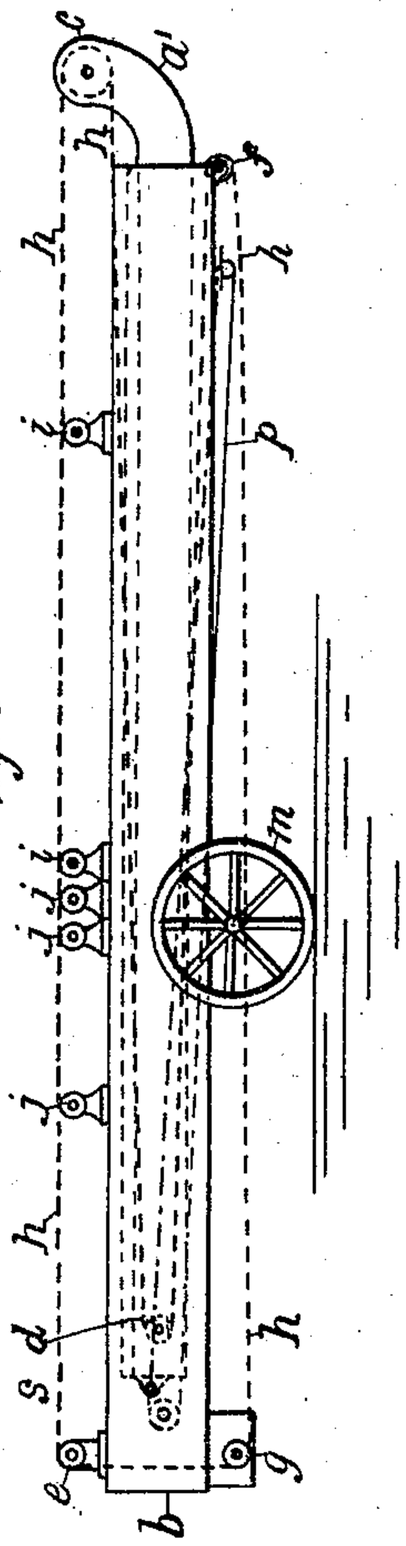
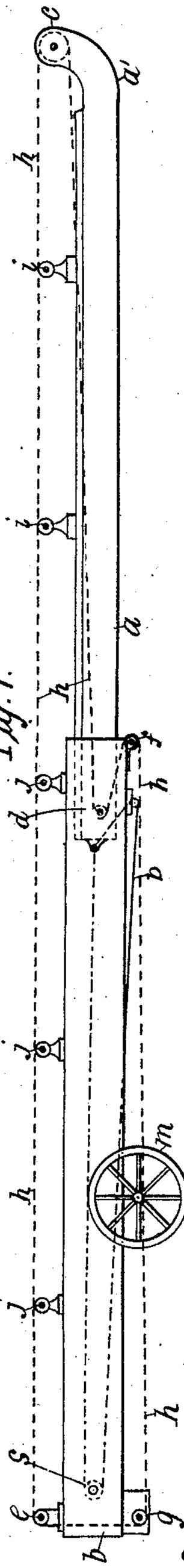


Fig. 4.



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6 SHEETS—SHEET 4.

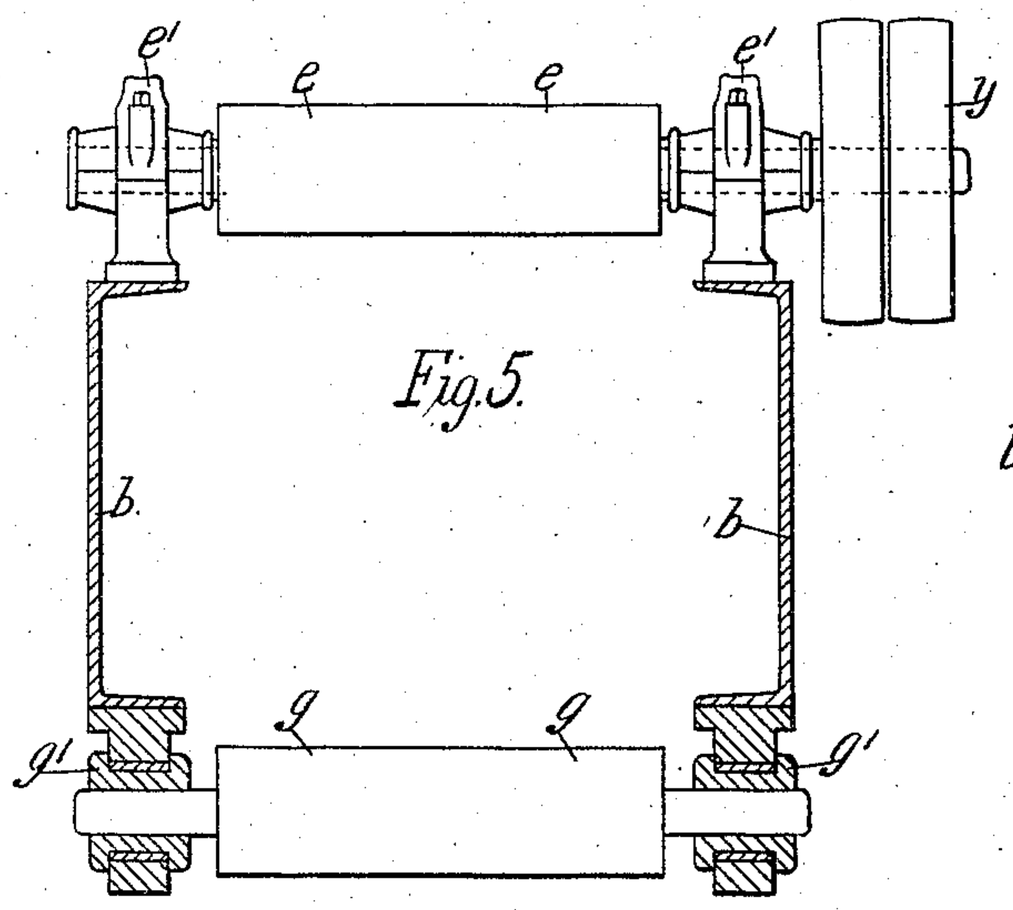


Fig. 5.

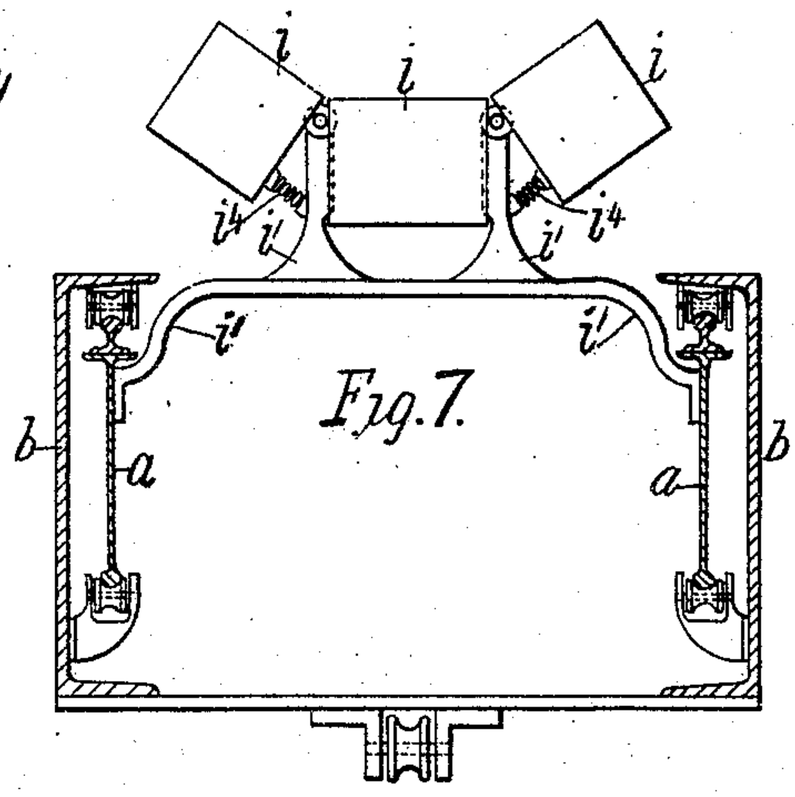


Fig. 7.

Fig. 6.

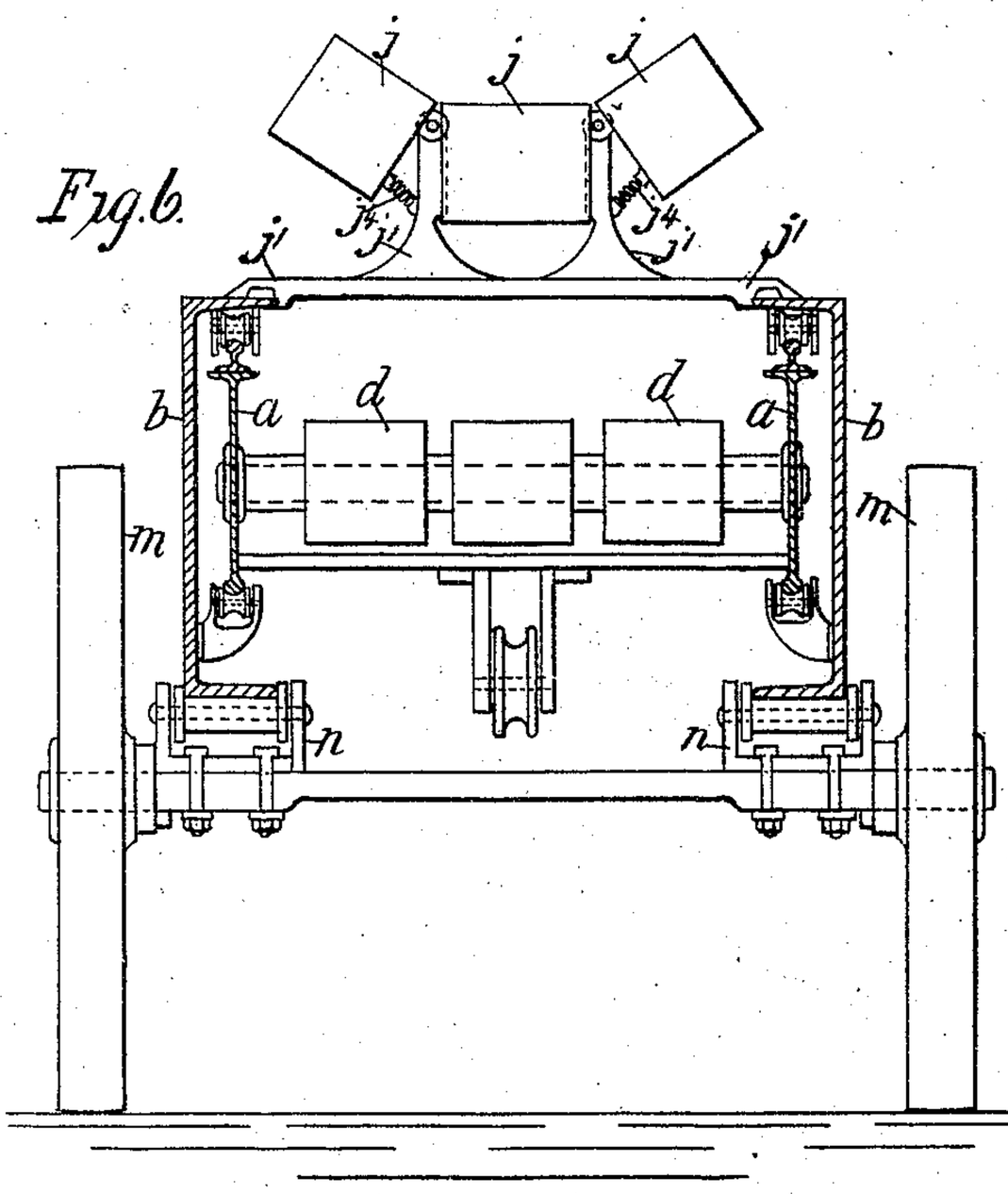
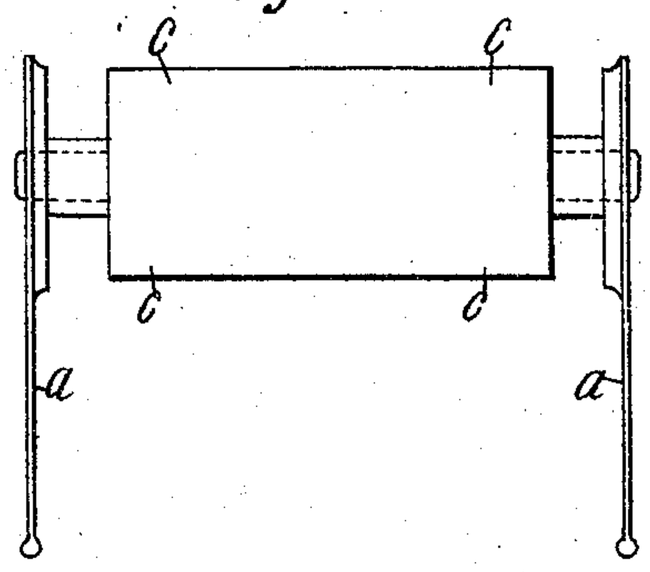


Fig. 8.



Witnesses

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6 SHEETS—SHEET 5.

Fig. 9.

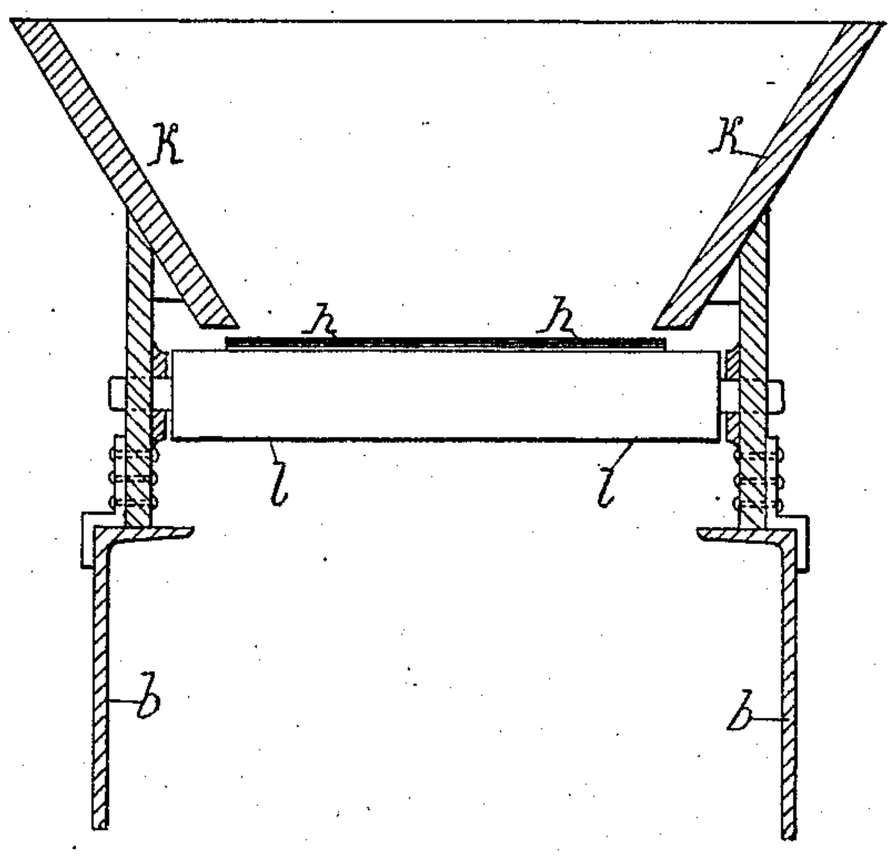
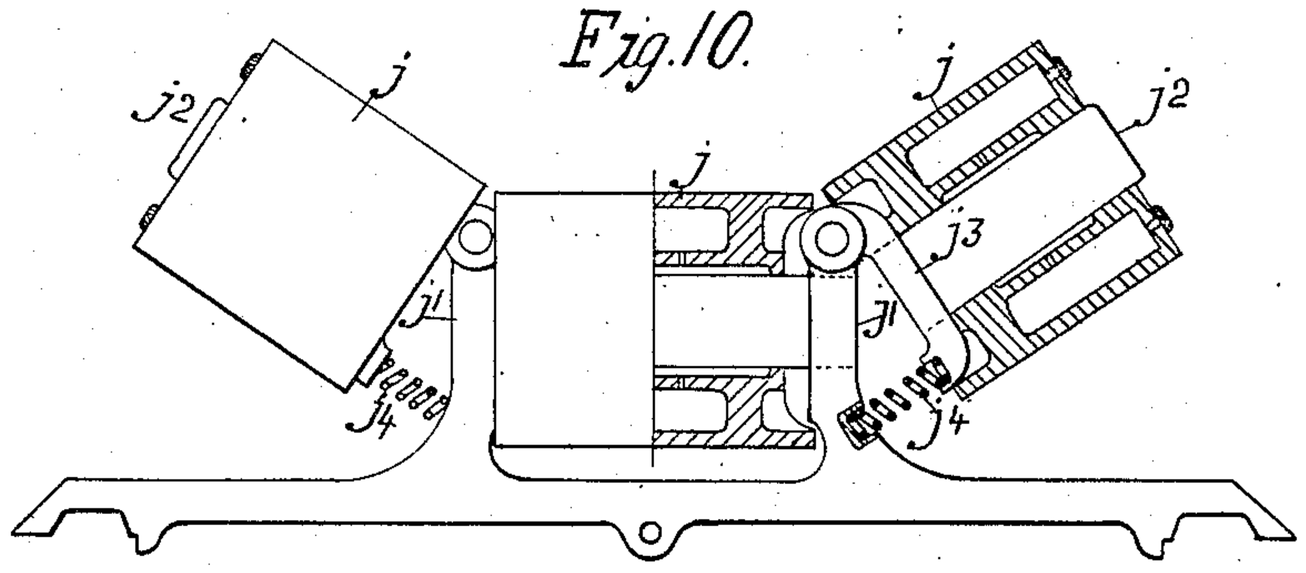


Fig. 10.



Witnesses.

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No. 785,569. PATENTED MAR. 21, 1905.

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EXTENSION CONVEYER.

APPLICATION FILED SEPT. 9, 1904.

6 SHEETS—SHEET 6.

Fig. 11.

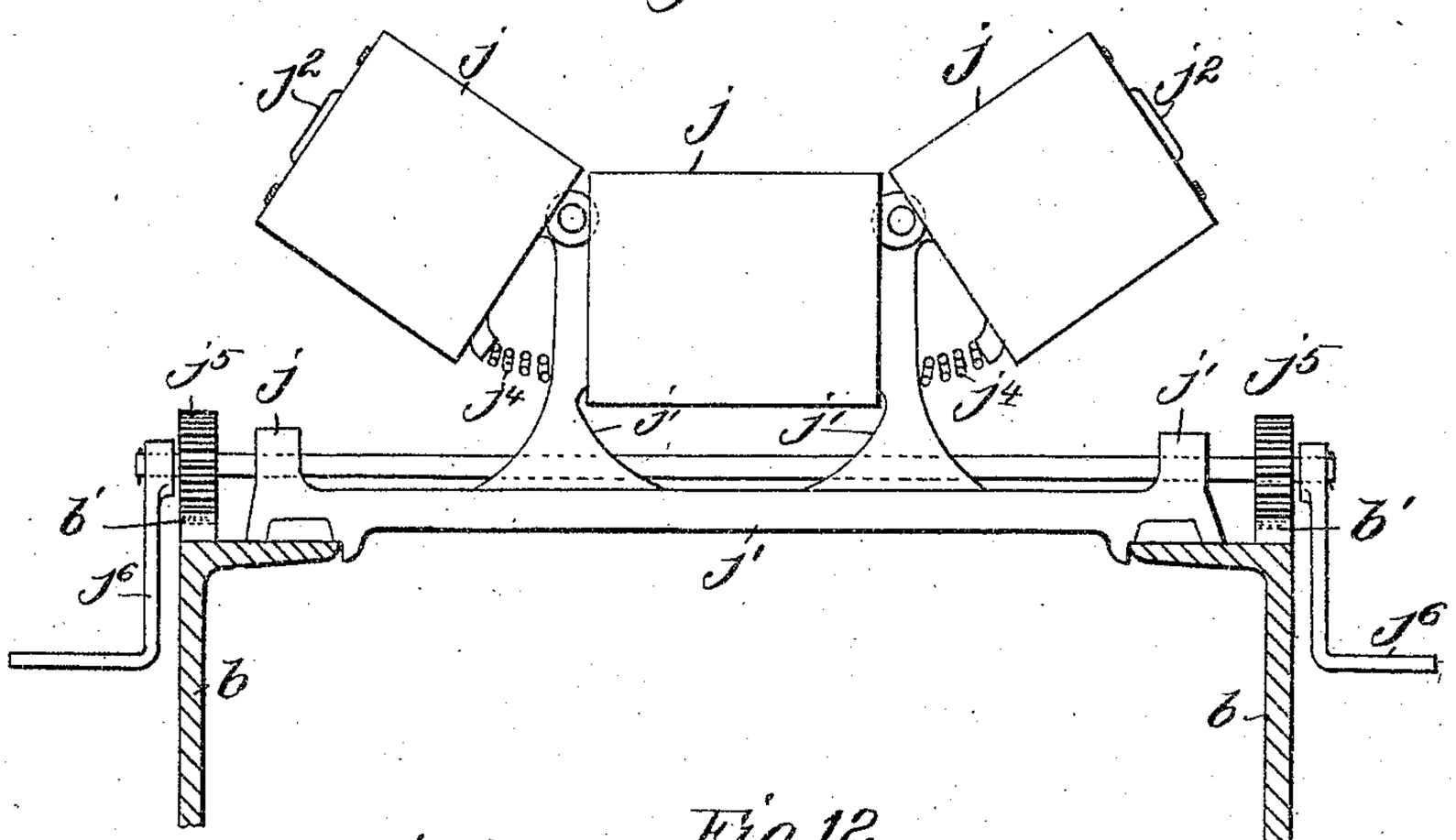


Fig. 12.

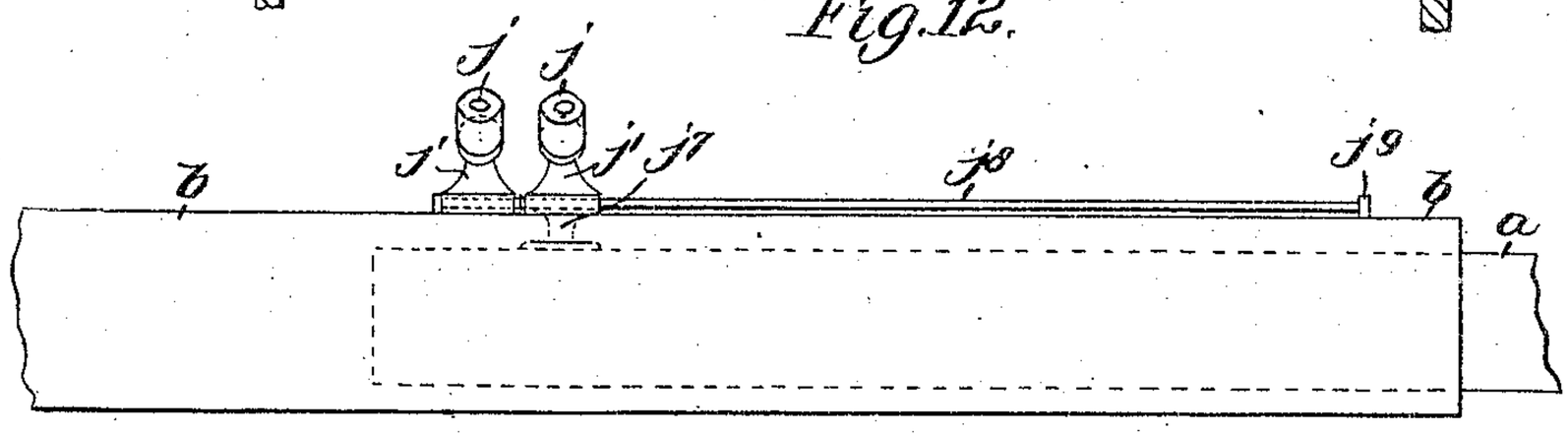
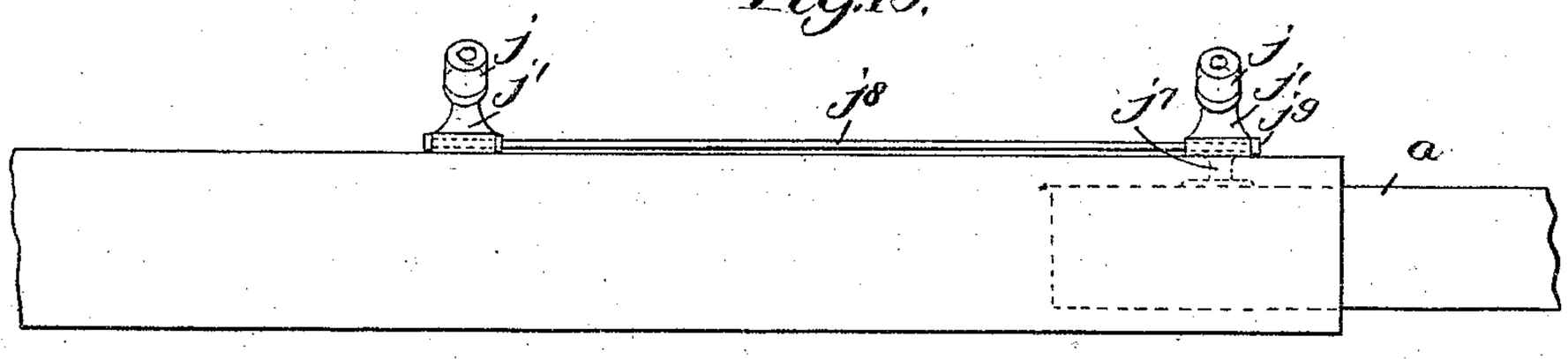


Fig. 13.



Witnesses.
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C. D. Kesler

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by James Z. Norris
Atty

PHOTO-LITHOGRAPHED BY SACHETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

No. 785,569. Patented March 21, 1905.

UNITED STATES PATENT OFFICE.

DAVID D. D. PLUNKET, OF NEW SOUTHAMPTON, ENGLAND.

EXTENSION-CONVEYER.

SPECIFICATION forming part of Letters Patent No. 785,569, dated March 21, 1905.

Application filed September 9, 1904. Serial No. 223,912.

To all whom it may concern:

Be it known that I, DAVID DARLEY DONNYBROOK PLUNKET, colliery representative, a subject of the King of Great Britain, residing at St. Rumons, Bitterne, New Southampton, Hampshire, England, have invented certain new and useful Improvements in Extension-Conveyers, of which the following is a specification.

This invention relates to improvements in telescopic conveyers, and in particular to the application of plain conveyer-belts and troughing-rollers to telescopic conveyers in such a manner as to provide a portable conveyer having a large range of telescopic extension and giving direct discharge to the material conveyed, while securing adequate support to the belt and a straight travel of the material in all degrees of extension of the conveyer.

Troughed belt conveyers with moving trippers or movable points of discharge as hitherto constructed necessitate a main frame of the maximum length, said frame having troughing-rollers fixed at equal distances along its entire length and having a moving tripper consisting of suitable rollers supported in a moving frame, whereby the belt is lifted from off the main troughing-rollers and caused to take an **S**-shaped lead, so as to discharge the material laterally at the desired point by means of a suitable chute, direct discharge being impossible, owing to the interposition of the return portion of the belt.

According to my invention I employ a movable or extendible frame of such length that its discharge end projects beyond the main frame even in its most retracted position, so that the discharge of the material may be direct or lateral, as desired. This extendible frame carries two or more flat rollers separated by a distance somewhat greater than the telescopic travel required, of which the level of the outer (discharge) roller is coincident with that of the inner roller below the line of the rollers which support the material to be conveyed.

Troughing-rollers spaced at about five feet apart are provided along the line of frame and fixed either on the main frame or on the extensible frame, or partly on each. At the point of separation there are provided additional troughing-rollers on the same level as the former and mounted so as to be movable longitudinally along the main frame or the telescopic frame, the object of these rollers being to occupy the space left on the extension of the telescopic frame and support the belt.

As the telescopic frame is drawn in, the movable troughing-rollers are made to slide back out of the way of the contiguous discharge-roller or troughing-rollers, as the case may be, of the telescopic frame, so that when the conveyer is at its shortest these movable rollers lie close together, but are separated again on the extension of the conveyer. This assembling and separating of the additional movable troughing-rollers is preferably given automatically by the extension and retraction of the telescopic frame. The gear for this purpose may consist, for example, of rope, screwed rod and nut, worm and wheel, rack and pinion, or of a longitudinal rod or rods, rigid or telescopic, having suitable stops, or of any other device whereby on extension of the telescopic frame the sliding members carrying the movable troughing-rollers are successively or simultaneously drawn out to the required distance apart, retained in position during operation, and returned to their former position on retraction.

It will be understood that the receiving, discharging, back-bend, and other lead-idlers of the telescopic conveyer are plain rollers.

Instead of mounting the additional troughing-rollers so as to slide in the line of travel they may be made removable and taken from or returned to fixed positions on the main or telescopic frame, according to the degree of extension employed; but I prefer the sliding arrangement first described.

In order to provide for and in the case of conveying material of unequal size, such as coal, subject to containing large lumps, I mount the troughing-idlers so that the inclined rollers thereof will compensate or approach a horizontal position when receiving a lump of large size that may, for example, lie transversely in the troughed belt, and thereby impede the free travel of the belt. I pref-

erably effect this compensating action of the inclined rollers by pivoting or hinging the shafts or spindles on which they run to vertical or inclined arms which project from the bracket or bearing which carries the shaft or spindle of the horizontal rollers, or said arms may be formed on the shaft or spindle itself in such a way that the inner edges of the inclined rollers and the outer edges of the horizontal roller always keep in line no matter what the angle of compensation of the inclined rollers, or either of them, may be. The compensating and recovering action is obtained by means of springs or balanced weights.

Instead of mounting the rollers of the troughing-idlers in the same transverse line the inclined compensating-rollers may be mounted in the rear of or in the front of the horizontal roller.

To receive the material and feed it to the traveling belt, I provide the rear end of the conveyer-frame with a sliding hopper having a series of rollers placed close together at the under side or mouth. These rollers come underneath the traveling belt and serve to take any shock due to the material being thrown onto the belt. The rollers are preferably mounted on springs or rubber to give yielding support, or the rollers may be rubber-covered. The sliding hopper is slid by hand.

By constructing the hopper to slide on the conveyer I provide for feeding the conveyer from the end, the side, or at any angle.

To enable the conveyer to be moved from place to place, it is provided with wheels, and in order to allow for the conveyer to be worked at a varying incline or on the level I mount the wheels on a slide or carriage that can be moved to the rear or front of the main frame of the conveyer, as required to effect such incline. A rack and pinion, screw-jack, or like device carried on the main frame can be employed as a means for raising the frame off the axle, so as to regulate the incline, or the carriage is moved by hand.

The telescopic extension of the conveyer is worked and governed by a winch, which works a rope or chain connected to the extending member.

A tension device is also provided to take up any slack in the belt.

The endless movement of the conveyer-belt is obtained from a suitable motor and gear, which may be mounted on the frame, or by a belt or other connection from a winch or other motor.

The full construction and details of a telescopic endless-band conveyer according to my invention are set forth in the accompanying drawings, which are marked with letters of reference, like letters denoting like or corresponding parts throughout the various views, and which correspond with those used in the following explanation.

In the drawings, Figures 1, 1[a], 1[b], and 1[c] when taken together illustrate a longitudinal elevation of a telescopic endless-band conveyer, taken in section through the center of the apparatus, showing the conveyer in a retracted condition, the sliding troughing-rollers on the main frame being shown in full extended position, the troughing-rollers on the extendible frame being fixed on such frame. Fig. 2 illustrates the sliding troughing-rollers of the conveyer. Fig. 3 illustrates in longitudinal elevation the telescopic conveyer in a retracted condition, showing the sliding troughing-rollers on the main frame drawn back out of the way of the fixed troughing-rollers on the extendible frame. Fig. 4 illustrates in longitudinal elevation the telescopic conveyer in an extended condition. Fig. 5 is a cross-section of the apparatus, taken at A A, Fig. 1. Fig. 6 is a cross-section of the apparatus, taken at B B, Fig. 1[a]. Fig. 7 is a cross-section of the apparatus, taken at C C, Fig. 1[b]. Fig. 8 is a cross-section of the apparatus, taken at D D, Fig. 1[c]. Fig. 9 is a cross-section of the apparatus, taken at E E, Fig. 1. Fig. 10 illustrates the compensating troughing-rollers. Fig. 11 illustrates a rack-and-pinion gear by means of which the assembling and separating of the additional troughing-rollers are effected by hand. Fig. 12 illustrates in side elevation in a retracted position a means of automatically assembling and separating the additional troughing-rollers, consisting of a direct connection between the telescopic frame and one set of troughing-rollers and a rod connection between such troughing-rollers and the next or adjacent set of troughing-rollers; and Fig. 13 illustrates the same in an extended position.

The invention as illustrated by the drawings has been chiefly worked out as a self-contained portable telescopic endless-band conveyer; but I would have it understood that the main features as set forth in the claims at the end of this specification may be applied to stationary telescopic conveyers of any required length.

With reference to the drawings, *a* designates a movable or extendible frame composed of two members securely stayed together in a vertically-parallel position and of such length that its discharge end *a'* projects beyond the main or carrying frame *b*, which is also composed of two members stayed together even in its most retracted position. This extendible frame *a* carries two rollers *c* and *d*, separated by a distance somewhat greater than the telescopic travel of the frame *a* on the frame *b*. The roller *c* is at the discharge end of the frame *a*, and its level is coincident with the roller *d*, which is carried on and near the inner end of the frame *a* below the line of rollers which support the material to be conveyed.

e designates the receiving-roller, *f* the front

back-bend roller, and g the rear back-lead roller. These are plain rollers, the rollers e and f being mounted on bearings e' and f', fixed on the main frame b, and the roller g being mounted on adjustable bearings g' on the main frame b.

The endless conveyer-belt is designated h and is led from the receiving-roller e over the hopper-rollers l and troughing-idlers $i\,j$, hereinafter described, round the discharging-roller c and back in a bend round the roller d on the rear of the frame a, thence round the lead-rollers f and g to the receiving-roller e.

The troughing rollers or idlers on the telescopic frame a are designated i and are in the example shown arranged to run on bearings i', fixed on the said frame a. The troughing rollers or idlers on the main frame b are designated j and are in the example shown arranged to run on bearings j', constructed to be movable and slide on the said frame b, so that from the point of separation of the frames a and b the rollers j will slide back out of the way of the contiguous rollers l as the frame a is retracted on the frame b and will slide forward when the frame a is extended from the frame b. This retraction and extension of the rollers is caused by rope and winch or other known means, or by hand, or instead of sliding the rollers j out of the way they may be lifted off from the frame b altogether. For example, the retraction and extension or assembling and separating of the additional troughing-rollers j can be effected by toothed pinions j^5, carried on the bearings j'' and gearing into toothed racks b', fitted on the frame b and worked by handles j^6, or the rollers j can be moved automatically by the extension and retraction of the frame a. In this case the frame a is connected by an arm j^7 to the bearing j'' of the outer troughing-roller j, which is connected to the bearings of the next inner set of rollers j by a rod or rods j^8, having stops or heads j^9. The rod or rods j^8 are fixed to the said inner bearing j'' and pass through holes in the bearing of the outer rollers, which are thus free to travel inward on such rod or rods. On extension the frame a pulls out the outer set of rollers j alone for the whole length of the rod or rods j^8, and on the stops or heads j^9 coming in contact with the bearing j'' the frame a then pulls out both sets of rollers to the full extent. On retraction the frame a pushes back first the outer rollers and then the next in order. The number of rod connections required will vary with the number of sets of rollers to be moved.

In the case of conveying material of unequal size, such as coal containing large lumps, I construct the troughing-rollers $i\,j$ so as to provide a compensating action. To this end I hinge the spindles i^2 or j^2, as the case may be, of the inclined rollers of the troughing-idlers $i\,j$ by arms $i^3\,j^3$, which project from the brackets or bearings $i''\,j''$, as the case may be, in such a way that the inner edges of the inclined rollers and the outer edges of the horizontal roller always keep in line no matter what the angle of compensation may be. This compensating and recovering action is obtained by springs $i^4\,j^4$.

At the rear end of the main frame b I provide a sliding hopper k to receive and feed the material to the belt h. The under part of this hopper k has a series of rollers l placed close together under the belt h, which serve to take the shock due to the material being thrown on. This sliding hopper k provides for feeding the belt h from the end, the side, or at an angle and is slid by hand.

The frame b in the case of portable conveyers is provided with wheels m, and to provide for the conveyer being worked at a varying incline the wheels m are mounted on a sliding carriage n, that can be moved by hand to the rear or front of the frame b, as required to effect such incline.

The telescopic extension and retraction of the conveyer are effected by a rope p and winch s, and the tension of the belt is regulated by the tension device v.

The movement of the belt is obtained from a motor w, mounted on the frame b, geared to the pulley y, or from a belt or other connection from an independent winch or other motor.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An extendible conveyer comprising a movable or extendible frame mounted and free to telescope on a main or carrying frame, said extendible frame being of such length that its discharge end projects beyond said main frame even in its most retracted position, two or more rollers mounted on said extendible frame separated by a distance greater than the telescopic travel thereof and the level of the outer or discharge roller being coincident with that of the inner roller and below the line of the rollers which support the material to be conveyed, a receiving-roller at the rear end of said main frame, troughing rollers or idlers spaced along the line of the conveyer-frames so mounted as to slide or be movable out of the way of the contiguous discharge or fixed troughing-rollers as the case may be and lie close together when the conveyer is at its shortest and move out on the extension of the same, back-bend and other lead-rollers mounted on the main frame, and an endless conveyer-belt adapted to travel on said conveyer supported by said rollers as set forth.

2. An extendible conveyer comprising a movable or extendible frame mounted and telescoping on a carrying-frame said extendible frame being of such length that its discharge end projects beyond said main frame even in its most retracted position, a discharge-roller at the outer end and a return lead-roller at the rear end of said extendible frame, a receiving-

roller at the rear end of the carrying-frame, movable compensating troughing-rollers on said carrying-frame, fixed compensating troughing-rollers on said extendible frame, back-bend and other lead-rollers on said carrying-frame, and an endless conveyer-belt supported by and led over and round said rollers as set forth.

3. In an extendible conveyer as herein described the combination with an extendible frame having discharge and return lead-rollers mounted as described, and fixed troughing-rollers as described, of a carrying-frame provided with movable troughing-rollers adapted to slide out of the way of the fixed troughing-rollers on the retraction of said extendible frame and move out on the extension of said frame, receiving and return lead-rollers, a sliding feeding-hopper provided with rollers placed close together adapted to receive any shock due to the material being thrown onto the endless conveyer-belt which is led and runs over the rollers of the apparatus as set forth.

4. In a portable extensible conveyer, the combination with an extensible frame, of a series of troughing-rollers, each comprising an intermediate roller and yieldably-mounted rollers on opposite sides thereof, the axes of which are oblique to the intermediate roller, and means for controlling the operation of the troughing-rollers, the latter being movable automatically by the expansion and contraction of the frame.

5. The combination in a portable extendible conveyer substantially as herein described of an extendible frame free to telescope on a carrying-frame, troughing-rollers adapted to slide out of the way of contiguous fixed rollers on the conveyer, receiving and lead rollers, an endless belt supported and traveling on the several rollers of the apparatus, a sliding hopper having rollers adapted to receive the impact of the material thrown on said belt, a wheeled carriage adapted to slide on said conveyer and whereby it can be set to work at varying inclines or on the level, as set forth.

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

DAVID D. D. PLUNKET.

Witnesses:

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FRANK JOHNSON.