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E. G. THOMAS.

BELT CONVEYER.

APPLICATION FILED SEPT. 27, 1906.

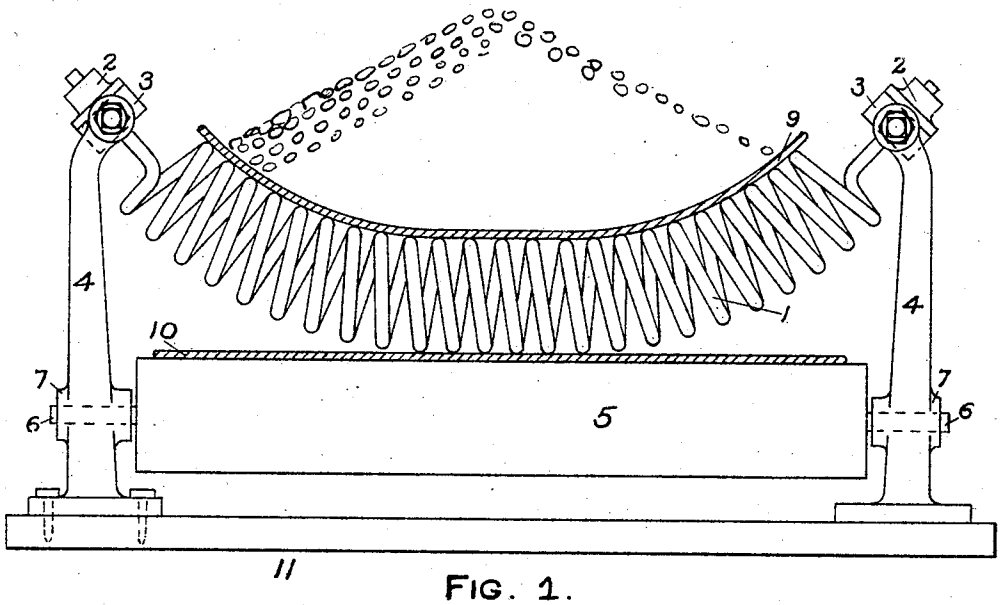

FIG. 1.

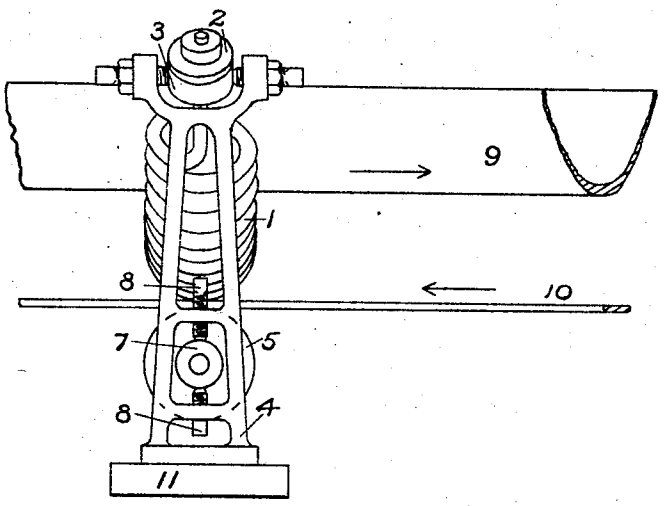

FIG. 2.

WITNESSES

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BELT CONVEYER.

No. 857,771. Specification of Letters Patent. Patented June 25, 1907.

Application filed September 27, 1906. Serial No. 336,398.

To all whom it may concern:

Be it known that I, EDWARD G. THOMAS, of Brookline, county of Norfolk, State of Massachusetts, have invented and produced certain new and useful Improvements in Belt Conveyers, of which the following is a specification.

The transportation of material of all kinds by means of moving belts supported by rotatable rollers, is an extensive practice in all branches of the arts. When this device is applied to the carrying of granulated material, the amount which can be transported is limited, by the tendency of the material to spread to the edge of the belt and fall from it. No greater amount can be carried than that which will form a pile, highest in the center of the belt and having an angle of repose, under the operating conditions of the belt, insufficient to cause the edge of the pile to extend to the edge of the belt. In order to increase the capacity of a given width of belt, it is common practice to raise the edges of the belt above the center by means of inclined rollers, usually termed "troughing idlers". When this is done, it is obvious that a greater amount of material can be placed on belt before the edges of the pile will extend to the edges of the belt.

When troughing idlers, consisting of two or more pulleys, turning on axes inclined to one another, are used, the belt is forced by its weight and that of its load to make a bend at the point where the surfaces of the pulleys meet, as each portion of the belt passes over the idlers, while between them the belt will take a flatter and more evenly distributed curve. A bending strain, due to a forward and back motion, is therefore put on that portion of the belt which registers with the meeting angle of the pulleys, as many times per minute as the distance between idlers is contained in the speed of the belt per minute. The result of this repeated strain concentrated along a line of the belt, is the rapid destruction of the belt on this line long before other portions of the belt are worn out. A variety of devices for adding to the strength, or increasing the pliability of the belt at these points of greatest wear, have been tried with varying degrees of success.

My invention is an improvement in belt conveyers by means of which the bending strain of troughing is distributed over the greater part of the width of the belt, so that no part will be bent to such a degree as to strain it or to cause excessive wear at that point.

It consists in substituting for the pulleys, set at an angle, ordinarily used, a flexible roller supported at the ends in bearings, upon which the upper or working side of the belt may run, in combination with an inflexible roller, supporting the lower or return side of the belt in such relation to the flexible roller, that the application of a moderate load upon the upper side of the belt will cause the flexible roller to bend downward under the weight of the belt and its load, until it comes in contact with, and is supported by the lower side of the belt, which in turn rests upon the lower roller.

My invention is illustrated by the drawings which accompany and form a part of this specification.

In these drawings Figure I is a side elevation of the conveyer, illustrating the position it will occupy when the belt is loaded with material. Fig. II is an end elevation of a similar conveyer, in which an arrangement for adjusting certain parts is shown.

The idler consists of a flexible and extensible roller 1, formed preferably by a steel spring. Each end of this roller 1 is secured to a rotatable flange 2, in which the axially projecting ends of the spring can be securely fastened. Said flange 2 is supported by box 3, which is pivotally mounted in a supporting bracket 4, secured to the framework of the conveyer. Below the flexible roller 1 is mounted an inflexible roller 5, rotating upon a shaft 6 in boxes 7, secured to brackets 4.

In Fig. II the same parts are shown and are similarly numbered, except that the boxes 7 instead of being rigidly secured to brackets 4, are supported by it through adjusting screws 8, by means of which the relative heights of the flexible and stiff rollers may be varied. The working side of the belt 9 rests upon the flexible roller 1 and its return side 10 upon the inflexible roller 5.

I prefer in the construction of this device to put the spring roller in place with a slight initial tension, so that it may support the belt and a light load, without bending downward enough to come in contact with the return side of the belt 10. The pressure upon bearings 3 will obviously be in the direction of the axis of rotation of the flange 2, so that these bearings will be thrust bearings at all times. Further weight upon the belt will produce a greater deflection at the center of

the roller until it is bent sufficiently to come in contact with the return side of the belt below it, and I prefer to locate the stiff roller at such a height as to support several of the central turns of the spring when the maximum load is upon the belt, thus giving the spring roller approximately the form shown in Fig. I.

There will obviously be no point along the spring roller at which a sharp bend will occur, so that the belt will be bent at an easy curve, and no point need be strained beyond the ability of the material of the belt to stand the work. A very much lighter spring can be used for the flexible roller, if supported in accordance with my invention, than if no support is given it at the center, so that the cost of construction and the weight of parts can be materially reduced. A certain amount of the weight will be transferred from wearing surfaces between flange 2 and box 3 to the bearings 7 of shaft 6, thus equalizing the wear upon the bearings.

Inflexible rollers for the purpose of supporting only the flexible roller may be used without modifying the spirit of my invention, where it is necessary for any reason to bring the return side of the belt back in a different path from that illustrated, but the obvious construction for simplicity and low cost is that illustrated in the drawings. Where a perfectly constant load is carried by the belt, the bearings of the flexible roller may be made fixed instead of pivoted, if set at a proper angle to admit the easy rotation of the flexible roller.

Having thus fully described my invention, I desire to claim and secure by Letters Patent of the United States, the following:

1. In a belt conveyer support, the combination of a flexible roller, means for supporting the same; an inflexible roller beneath said flexible roller, and adjustable means for supporting said inflexible roller, substantially as described.

2. In a belt conveyer support the combination of a flexible roller, bearings for said roller; an inflexible roller, vertically adjustable bearings for said inflexible roller, and supporting means for the bearings of both rollers, substantially as described.

3. In a belt conveyer a troughing idler consisting of a flexible roller, pivoted bearings for said roller; an inflexible roller supporting said flexible roller, and bearings for said inflexible roller, substantially as described.

4. In a belt conveyer a troughing idler consisting of a spiral spring, flanges secured thereto and supported in rotational relation by pivoted bearings; an inflexible roller situated beneath said spiral spring, so as to support said spring when deflected under load, substantially as described.

5. In a conveyer the combination of a belt, flexible rollers supporting the working side of the belt and partially supported by the return side, pivoted bearings for said rollers, and inflexible rollers for supporting the return side.

6. In a belt conveyer support a troughing roller, consisting of a spiral spring, having axially projecting ends integral with the coils of the spring, in combination with flanges attached to the ends of the spring, bearings for said flanges and supporting means, substantially as described.

7. An idle roll for belt conveyers consisting of a spiral spring, having axially projecting ends integral with the coils of the spring, substantially as described.

8. A belt conveyer having a load-carrying side, supported on flexible rollers, consisting of spiral springs, and a return side supporting said rollers, substantially as described.

9. In a conveyer-belt support, a flexible roller, means for supporting the same, an inflexible roller, bearings for said inflexible roller and means for varying the distance between the bearings of said flexible and said inflexible roller, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of the two subscribing witnesses.

EDWARD G. THOMAS.

Witnesses:

HOWARD C. FORBES,

HENRY DOCKER JACKSON.