(No Model.) 2 Sheets—Sheet 1.

W. A. SAWYER.

ELEVATOR.

No. 424,904. Patented Apr. 1, 1890.

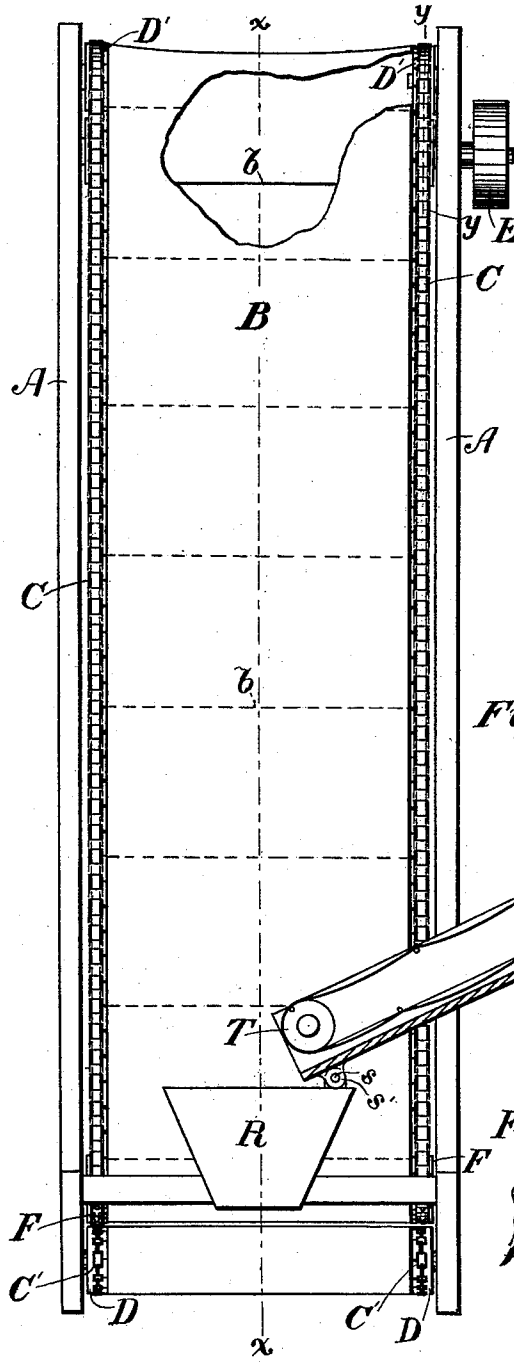


Fig. 1

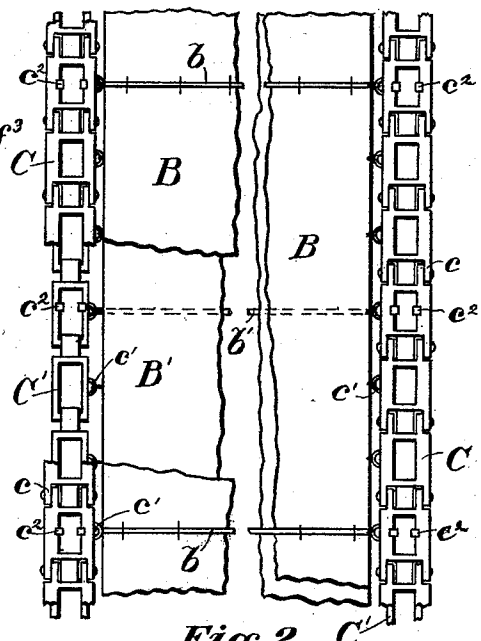


Fig. 2.

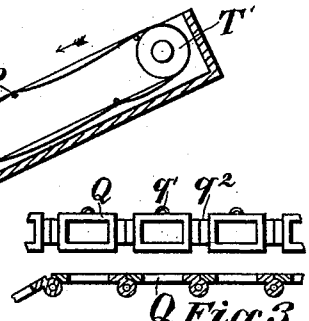


Fig. 3.

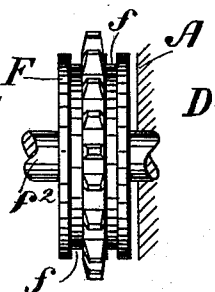


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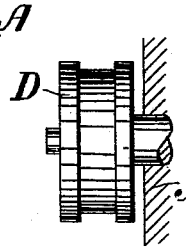


Fig. 5.

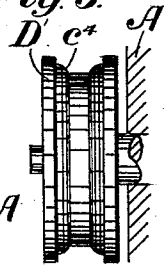


Fig. 6.

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(No Model.) 2 Sheets—Sheet 2.

W. A. SAWYER.

ELEVATOR.

No. 424,904. Patented Apr. 1, 1890.

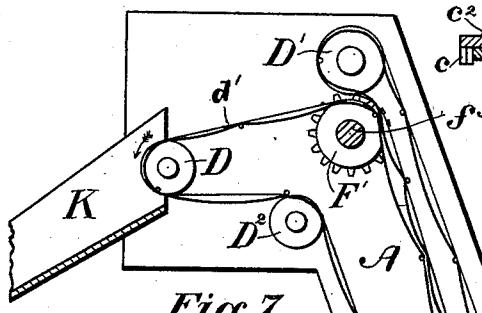


Fig. 7.

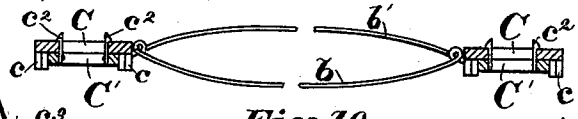


Fig. 10.

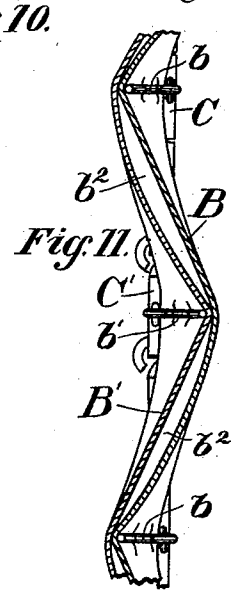


Fig. 11.

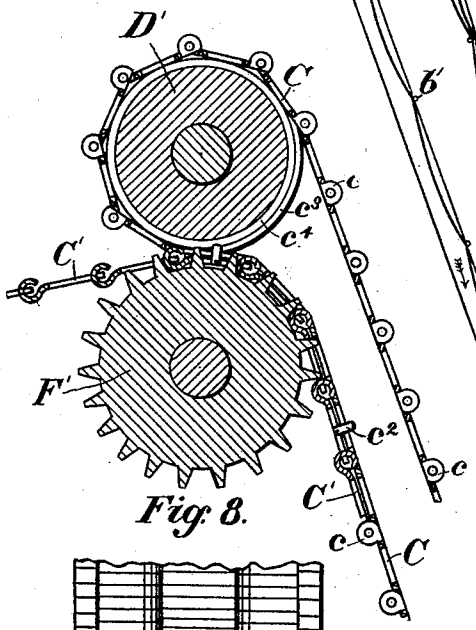


Fig. 8.

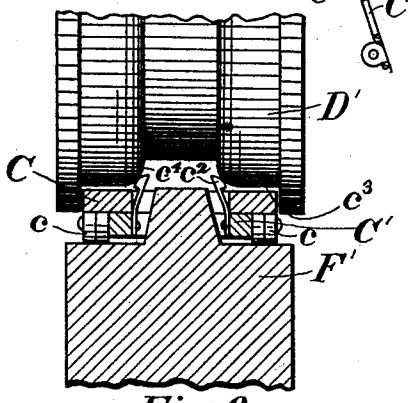


Fig. 9.

Fig. 7.

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UNITED STATES PATENT OFFICE.

WILLIAM A. SAWYER, OF BRIDGEWATER, NEW HAMPSHIRE, ASSIGNOR TO THE METROPOLITAN ELEVATOR COMPANY, OF PORTLAND, MAINE.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 424,904, dated April 1, 1890.

Application filed July 22, 1889. Serial No. 318,213. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. SAWYER, a citizen of the United States, residing at Bridgewater, in the county of Grafton and State of New Hampshire, have invented certain new and useful Improvements in Elevators, of which the following is a full specification.

Referring to the accompanying drawings, Figure 1 is a front elevation of an elevator embodying the principle of my invention. Fig. 2 is an enlarged plan view of the elevator bands and chains. Fig. 3 shows in plan and section the construction of the conveyer-chain. Figs. 4, 5, and 6 are enlarged views of various wheels and pulleys employed. Fig. 7 is a sectional view on *x x*, Fig. 1. Fig. 8 is a sectional view in the plane *y y*, Fig. 1, through one of the driving sprocket-wheels and the unlocking-pulley. Fig. 9 shows, on an enlarged scale, the arrangement whereby the elevator-chains are unlocked. Fig. 10 is a transverse section through the two chains, showing one form of stays employed. Fig. 11 is a longitudinal section through the middle of the band, on an enlarged scale, showing the action of the stays in forming compartments between the bands.

My invention consists of an elevator constructed in such a manner as to convey and elevate from a lower to a higher level in a steady stream grain, coal, dirt, and other substances, the details of the construction being as hereinafter set forth.

A A are the sides of a suitable frame-work, between which the elevator runs, and in these sides are journaled a number of sprocket-wheels and sheave-pulleys, as clearly shown in Fig. 7, arranged in pairs. Over these wheels and pulleys run endless chains C C′, which are bound along the edges of two elevator-bands B B′, made of canvas or other suitable flexible material. To the edges of the band B are secured the chains C, and to the edges of the band B′ are secured the chains C′, the position of the wheels and pulleys being such that the two bands through a portion of their path move contiguously one above the other. The wheels and pulleys are arranged in pairs, one of each pair being shown in the sectional view, Fig. 7, those on the other side being, of course, similarly situated, the faces of the pulleys being of sufficient width to carry the chains, while the bands secured to said chains are hung between them. As shown in the drawings, the upper chains C (bound to the edges of the band B) run over the sprocket-wheels F at the bottom and the sheave-pulleys D′ at the top, while the lower chains C′ (bound along the edges of the band B′) run over the sheave-pulleys D D^2 D^3 D^4, under the sprocket-wheels F, and over the sprocket-wheels F′, the arrangement being such that each pair of chains C C′ are in contact between the sprocket-wheels F F′, the chains and bands moving in the direction indicated by the arrows. The lower pair of sprocket-wheels F F are preferably fixed on the same shaft f^2, while the upper pair F′ F′ are preferably fixed on the shaft f^3, the two shafts f^2 f^3 passing from one side to the other of the frame. The sheave-pulleys forming the various pairs are, however, preferably mounted on short spindles independent of each other on each side of the machine.

On the shaft f^3 is fixed the driving-pulley E, by which motion is conveyed to the machine.

The lower pair of chains C′ are of the ordinary construction of sprocket-chains; but the upper pair C differ materially therefrom, being so constructed as to lie flat upon the lower chains with the pivots of the upper links in line with the pivots of the lower, whereby the chains, moving contiguously, engage with the same sprocket-wheels. To this end the links of the chains C are preferably wider than those of the links C′ and have downwardly-projecting ears *c*, through which ears the links forming the upper chains C are pivoted together in the same line with but outside of the pivots of the lower links forming the chains C′, as clearly shown in Figs. 2 and 8. The two chains thus act as guides to the bands, which themselves do not run over any pulley or roller, the edges of the bands being kept comparatively straight by the chains to which they are bound, while the bands naturally sag somewhat in the center.

At intervals between corresponding links

of each pair of chains run stays b b', which consist, preferably, of spring-wires or metal rods, the ends of which are attached to ears c' on the inner edges of the links of both chains, these ears serving also as means whereby the chains may be bound to the bands. The stays b b', either straight or curved, are preferably covered with canvas, cloth, or other suitable covering and bound on either surface of the bands B B', but preferably on the outer surfaces of the same, and serve the purpose of preventing too much sagging of the bands, of keeping the chains separated apart between the pulleys, and of forming compartments b^2 between the contiguously-moving bands to aid in elevating the substance in question. I prefer to have the stays b' of the lower chains come midway between the stays of the upper, in order the better to form these compartments, as shown in Figs. 7 and 11. In Fig. 7 straight stays are shown. When curved stays are employed, they are preferably bent in such manner that the lower stays b' curve upward into the upper band B, while the upper stays b curve downward into the lower band B', as shown in Figs. 10 and 11, thereby holding the substance to be elevated more securely. The lower band B' is so arranged that before passing under the sprocket-wheel F it passes for a short distance in a horizontal position, as shown at d, Fig. 7, on which horizontal portion the grain or other substance is deposited, the band B' carrying it along under the band B. The two bands B B', moving contiguously, serve to elevate it from a lower to a higher level. The band B' then passes, preferably with a slight downward incline, along the portion d', over the sheave-pulley D, and is discharged into the spout or chute K, which carries it to any desired point. In this manner a steady stream of grain, if loaded on at the lower end, will be discharged at the upper.

In order to insure a close contact of the upper and lower chains in their passage between the sprocket-wheels F F', and thus prevent the grain or other substance from sifting out at the edges of the bands, I employ an automatic locking device arranged in such a way as to lock the two chains together at the moment when they come in contact under the sprocket-wheels F and to unlock them just before they separate above the sprocket-wheels F'. To accomplish this I provide the links of the lower chains at intervals with locking-springs c^2, so arranged as to pass upward into the central openings of the links of the upper chains and by means of the cam-shaped heads at the top of the locking-springs automatically lock the two links together when the link of the upper chains is pressed down upon that of the lower, which takes place under the sprocket-wheels F. The sheave-pulley D', in addition to the groove c^3, in which run the upper chains C', has a deeper central groove c^4, the edges of which are curved, as plainly shown in Fig. 9, in such a manner as to engage with the cam-shaped tops of the locking-springs c^2 the moment the two chains move under the said pulley D', and the two chains are separated without resistance. The lower sprocket-wheel F is provided with grooves f, arranged in such a manner that the said locking-springs may pass freely along when the chain has reached the said sprocket-wheel and snap over the links of the upper chain.

In order to convey the grain or other substance to or from the elevator, I preferably provide it with an automatic conveyer, a front view of which is shown in Fig. 7 and a sectional view in Fig. 1.

R is a hopper held between the sides of the elevator-frame, preferably over the middle of the lower band B', the hopper being of such a size and shape as to discharge upon the band B' the proper quantity of grain or other substance which the elevator is capable of carrying.

To the hopper is pivotally secured the trough S, containing two pairs of sheave-pulleys T T', over which run the pair of endless chains Q, bound to the edges of a conveying-band P in a somewhat similar manner to the regular elevator-bands. These bands are also provided with stays p, bound thereto, passing across the band from one chain to the other, which serve the same purpose as the stays on the elevator-bands B B' and in addition form hollows in the band in which the grain rests. The links of the chain are, however, made in such a way as to open only in one direction, as shown clearly in plan and section in Fig. 3, so that the chains do not sag between the pulleys T T', but run perfectly true. The trough S being inclined to the hopper, when the grain is placed on the band P by shoveling or otherwise the band will move automatically by gravity in the direction of the arrows, discharging the grain into the hopper R. The trough may be elevated at any angle, as shown, but naturally rests upon the pile of grain, coal, or other substance, gradually settling down as the pile diminishes, and the sheave-pulleys T T' are arranged to move so easily that even when the angle of inclination is very slight gravity will serve to move the bands when loaded.

The hopper R serves the function of delivering to the endless bands of the elevator a uniform and given amount of material, and for this purpose its size varies to suit the capacity of the elevator and the material which is to be elevated.

I claim—

1. In an elevator, two contiguously-movable flexible bands provided with chains along their edges and stays passing across said bands whereby compartments are formed between the bands, substantially as and for the purposes described.

2. The combination, with pulleys and sprocket-wheels, of two contiguously-movable flexible endless bands provided along their

edges with endless chains connected with said sprocket-wheels and compartment-forming stays connecting said chains, substantially as described.

3. In an elevator, two contiguously-movable endless bands provided along their edges with an automatic locking device, substantially as and for the purposes described.

4. In an elevator, two contiguously-movable endless bands provided with automatic locking devices, in combination with unlocking devices, substantially as and for the purposes described.

5. In an elevator, two contiguously-movable endless bands provided with stays alternately bent inward, substantially as and for the purposes described.

6. In an elevator, two contiguously-movable endless bands provided with chains, stays, and automatic locking devices, in combination with unlocking devices, all arranged and operating substantially as and for the purposes described.

In witness whereof I have hereunto set my hand.

WILLIAM A. SAWYER.

Witnesses:
WM. B. H. DOWSE,
ALBERT E. LEACH.