No. 765,990. PATENTED JULY 26, 1904.

D. E. PHILLIPS.

CONVEYER CHAIN.

APPLICATION FILED NOV. 4, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

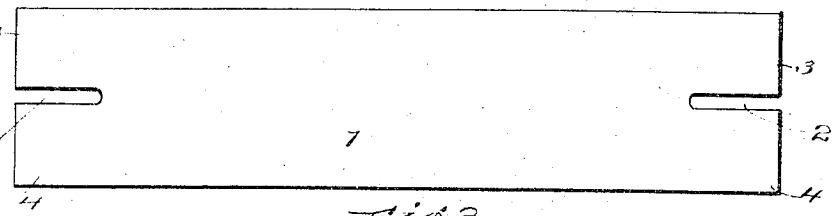


Fig. 2.

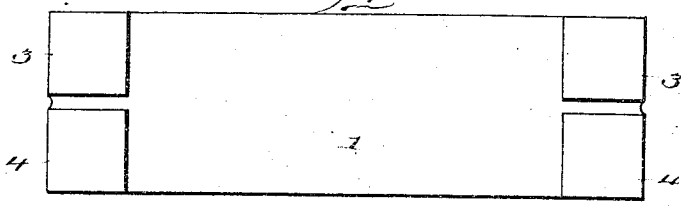


Fig. 3.

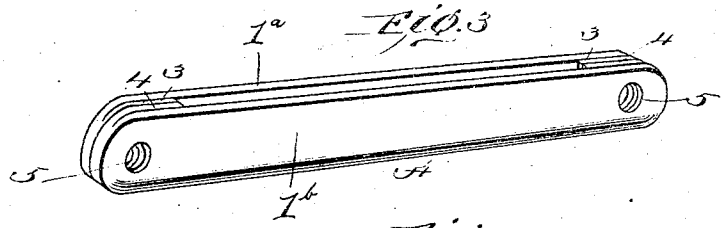


Fig. 4.

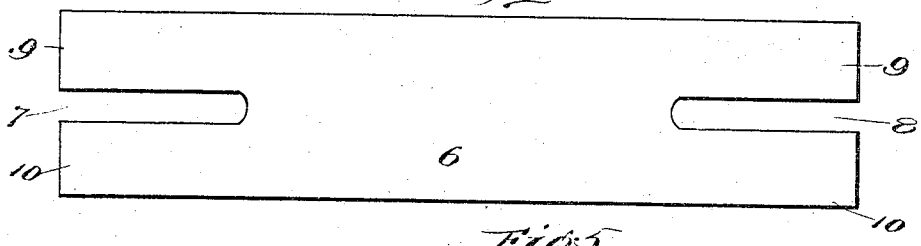


Fig. 5.

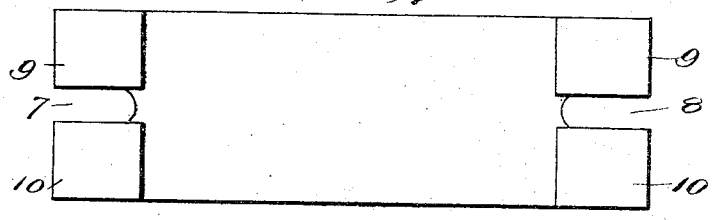
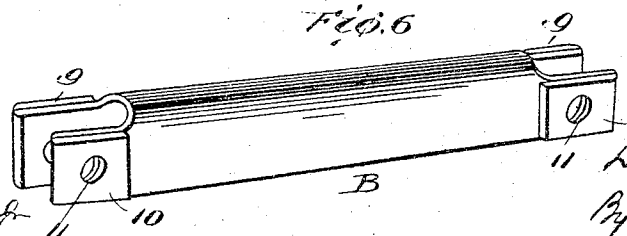


Fig. 6.



Witnesses
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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 7

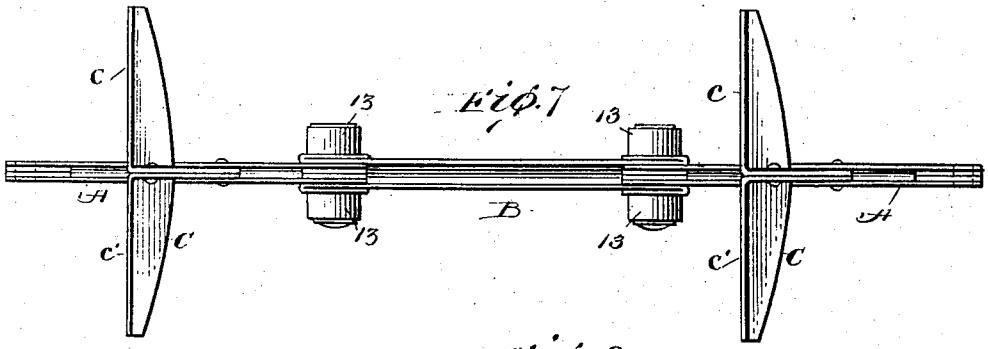
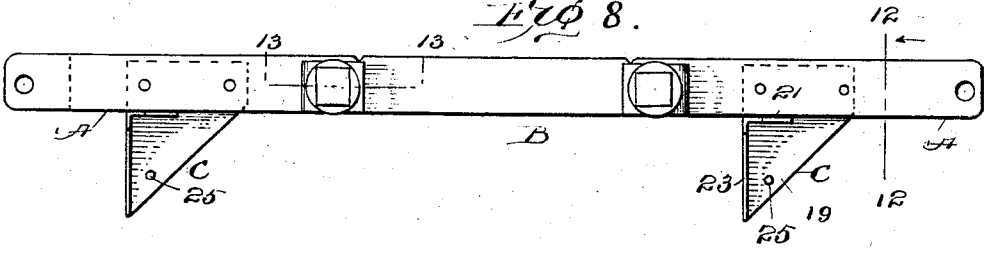


Fig. 8.



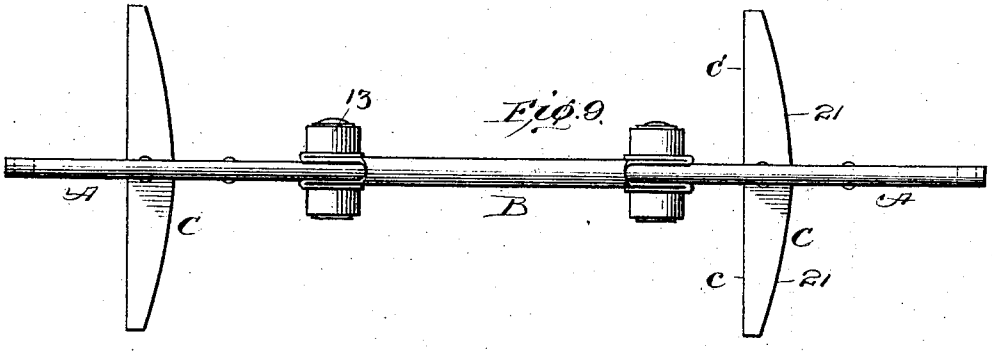


Fig. 10

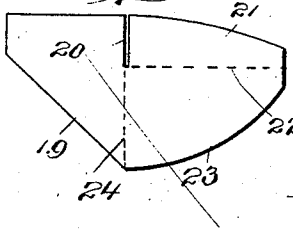


Fig. 11.

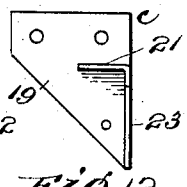


Fig. 13.

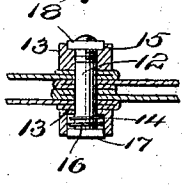
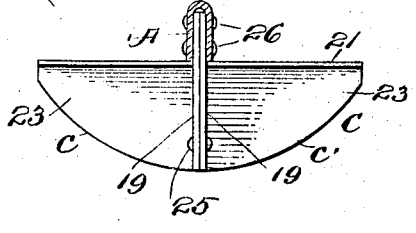


Fig. 12



Witnesses

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No. 765,990. Patented July 26, 1904.

UNITED STATES PATENT OFFICE.

DAVID E. PHILLIPS, OF MAHANOY CITY, PENNSYLVANIA.

CONVEYER-CHAIN.

SPECIFICATION forming part of Letters Patent No. 765,990, dated July 26, 1904.

Application filed November 4, 1903. Serial No. 179,830. (No model.)

To all whom it may concern:

Be it known that I, DAVID E. PHILLIPS, a citizen of the United States, residing at Mahanoy City, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Conveyer-Chains, of which the following is a specification.

My invention comprises improvements in conveyer-chains and in the method of making the same.

According to my invention conveyer-chains of comparatively light weight and great strength may be made from sheet metal, and for this purpose remnants of steel plates used in the manufacture of coal-screens, &c., may be employed to advantage, for the reason that the chain-links are made from narrow strips of metal and no very large parts are required either for the links or the flights.

In the accompanying drawings, Figure 1 is a plan view of the metal blank from which the chain-link which carries the flight is formed. Fig. 2 is a similar view of the same with the tongues at the ends of the blank folded back against one of its sides. Fig. 3 is a perspective view of the blank folded to form a complete link and having the eyes drilled at the ends. Fig. 4 is a plan view of the blank from which the links intermediate of the flight-carrying links are formed. Fig. 5 is a similar view of the same blank with the tongues at the ends folded against one of its sides. Fig. 6 is a top perspective view of the complete link formed by doubling the blank shown in Fig. 5 longitudinally. Fig. 7 is a bottom plan view showing two of the flight-links with flights attached and an intermediate link. Figs. 8 and 9 are side and top views of the same, respectively. Fig. 10 is a plan view of one of the blanks which forms half of the flight. Fig. 11 is a side view of the flight-blank bent into shape to form one-half of a flight. Fig. 12 is a section on the line 12 12 of Fig. 8; and Fig. 13 is a section on the line 13 13 of Fig. 8, showing one of the connecting-bolts for the links.

In Fig. 1 of the drawings, 1 indicates a strip of metal having the requisite length and width to form a chain-link and having slots 2 extending longitudinally inward from its ends along the central line of the strip. The rectangular blanks may first be punched from sheet metal and the slots 2 afterward formed therein, or the slots may be formed simultaneously with the forming of the blank. These slots are somewhat greater in width than twice the thickness of the metal. The purpose of slotting the ends of the blank is to provide tongues 3 and 4 at each end, which are then bent over at or near the inner ends of the slots and folded flat against one side of the body of the strip, as shown in Fig. 2. The strip is then doubled upon itself along its longitudinal center, bringing the tongues 3 and 4 face to face and forming the link A U shape in cross-section. (Shown in Fig. 3.) The eyes 5 for the bolts are then drilled or punched through the ends of the link. The tongues 3 and 4 form a solid head for the completed link and also space the walls 1^a and 1^b of the link a suitable distance apart for the insertion of the shank or attaching portion of the flight, which is secured to the link in the manner hereinafter described. The tongues 3 and 4 are preferably welded to the side walls of the link, and this may be done when the strip is flat, as shown in Fig. 2, or after the strip has been folded, as shown in Fig. 3. Preferably the welding operation is performed after the link is formed and the tongues 3 and 4 brought together, so that the welding operation will unite the tongues with one another and with the walls of the link, forming solid reinforcements or heads at the ends of the link. The eyes might be punched in the ends before the strip is folded longitudinally; but preferably the eyes are formed after the link is bent into shape and the ends welded. The corners at the ends of the link are rounded off, as shown, so that the link will work properly with the adjacent links in the chain.

Fig. 4 shows one of the slotted blanks 6 from which the intermediate or connecting links between the flight-carrying links are

formed. This blank is a trifle longer than the blank shown in Fig. 1 and is somewhat wider, and the slots 7 and 8, formed in its ends, are approximately twice as wide and twice as long as the slots in the strip shown in Fig. 1. The width of the slots 7 and 8 is somewhat greater than four times the thickness of the metal in the strip. The tongues 9 and 10 at the ends of the strip are folded back upon themselves, as shown in Fig. 5, upon the same side of the strip, and preferably they are so folded that the ends of the tongues will extend backward upon the strip to a short distance beyond the inner ends of the slots. The strip is then folded longitudinally along its central line, so as to bring the tongues 9 and 10 upon the outer and opposite sides of the complete link B, as shown in Fig. 6. Either before or after bending the strip longitudinally the folded portions of the tongues are preferably welded to the adjacent portions which form the walls of the link. The eyes 11 are preferably drilled after the link is formed. The complete link B has a U form in cross-section, with forked ends reinforced by the tongues 9 and 10, and the distance between the walls of the link B is just sufficient to receive the ends of the link A. When both links are made from metal of the same thickness, this distance will be slightly greater than four times the thickness of the metal.

Both links have curved backs, as shown, which will not carry dirt to the sprocket-wheels, and as the curved back or top of the link B is cut away at the ends by reason of the slots 7 and 8 the inner links A when connected, as shown in Figs. 7, 8, and 9, can turn freely upon the pivot-bolts to a limited extent between the forked ends of the link B.

In Figs. 7, 8, and 9 two of the links A, each carrying a flight C and connected by an intermediate link B, are shown in bottom plan, side, and top plan views, respectively. The heads of the adjacent links are detachably connected in the manner shown in Fig. 13. A bolt 12 extends through the eyes in the adjacent heads of the links A and B and also through a pair of solid studs or washers 13, arranged on opposite sides of the forked end of the link B. These studs or projections in the practical use of the chain are engaged by the teeth upon the sprocket-wheels which move the chain. One of these washers has a deep angular socket 14 and the other a shallow angular socket 15. Within the socket 14 is arranged a spring 16, which normally presses the head 17 of the bolt outward and draws the nut 18 upon the opposite end of the bolt into the socket 15. To disconnect the links, the head 17 of the bolt is pressed into the socket 14 against the action of the spring 16, thereby forcing the nut 18 out of the angular socket 15, so that the nut can be turned off of the bolt and the latter removed.

The flight C is made in two similar halves, which are formed from sheet metal of the same thickness as the metal in the links A and after being shaped are secured together and attached to the link. Fig. 10 is a plan view of the blank from which one-half of the flight is formed. This blank has a triangular portion 19, by which it is attached to the chain-link, and it also has a vertical slot 20 extending downwardly from its upper edge. In forming one half of the flight a part 21 is bent at right angles to the body of the blank upon a line 22, extending at right angles to the slot 20 to form a flange, and the part 23 is then bent at right angles to the part 19 upon the dotted line 24, which is in line with the slot 20. As shown in Fig. 11, which represents one half, *c*, of a complete flight, the flange portion 21 will then bear against the side of the part 19 and form a brace for the portion 23, having a curved lower edge which fits into the trough. The complementary half *c'* of the flight is similarly formed; but of course the bends in the blank are the reverse of the bends in the part *c*. As shown in Fig. 12, the parts 19 of both halves of the flight are connected by one or more rivets 25, and the upper portions of these parts above the flanges project upwardly between the walls of the link A and are secured together and to the link by rivets 26. The upper ends of the parts 19 have a bearing against the curved back of the link.

It will be noted that where the link A and flight C are made of metal having the same thickness the shank or attaching portion of the flight, which has a double thickness of metal, will fit snugly between the walls of the link, as the latter are separated by two thicknesses of metal at the ends. Flights may of course be attached to the links B instead of to the links A by having a sufficient thickness of metal upon the shanks of the flights to fit within the walls of the link; but this is not so desirable as the arrangement shown, in which the flights are made of metal having the same thickness as the links, in which case all of the parts fit harmoniously together.

It is obvious that chain-links similar in form to those hereinbefore described may be made by forging or casting the metal, and the flights may also be made in cast metal, and, so far as the form and arrangement of the links and the flights are concerned, I do not care to limit myself to the sheet-metal construction.

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

1. A conveyer-chain link comprising a U-shaped bar having laterally-reinforced ends.

2. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally into U form and having reinforced ends.

3. A conveyer-chain link comprising a sheet-

metal plate doubled longitudinally into U form and having its end portions folded backward against its side walls.

4. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally into U form and having its end portions folded backward against its side walls and welded thereto.

5. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally into U form and having its end portions slotted along the longitudinal bend in the plate, forming tongues, said tongues being folded against the side walls of the link.

6. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally into U form and having its end portions slotted along the longitudinal bend in the plate, forming tongues, said tongues being folded against the side walls of the link and welded thereto.

7. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally upon itself to form a bar U-shaped in cross-section, and a metal filling between the side walls of the bar at each end.

8. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally upon itself to form a bar U-shaped in cross-section, a metal filling between the side walls of the bar at each end, and a flight having a shank or attaching part fitting between the side walls of the bar and secured thereto.

9. A flight for conveyer-chains comprising two similar metal pieces secured together and having shanks adapted to be secured to a chain, parts extending at right angles to the shanks and adapted to fit within a conveyer-trough, and flanges projecting horizontally rearward from said latter parts and abutting against said shanks.

10. The combination with a chain-link, U-shaped in cross-section, of a flight having an attaching portion or shank secured between the walls of the bar.

11. The combination with a chain-link, U-shaped in cross-section, of a flight consisting of two similar parts each having an attaching portion or shank secured between the walls of the link, and a part at right angles thereto adapted to fit within a conveyer-trough.

12. The combination with a chain-link, U-shaped in cross-section, of a flight consisting of two similar parts each having an attaching portion or shank secured between the walls of the link, a part at right angles thereto adapted to fit within a conveyer-trough, and a flange extending rearwardly at right angles to said latter part and having one edge abutting against said shank.

13. The combination with a chain-link, U-shaped in cross-section and having a metal filling between its walls at its ends, of a flight comprising two similar parts each having a shank fitting between the walls of the link, a part at right angles to the shank adapted to fit within a conveyer-trough, and a flange projecting rearwardly from said latter part and having one of its lateral edges abutting against said shank.

14. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally upon itself to form a bar U-shaped in cross-section, and having tongues at its ends folded between the sides of the bar, in combination with a flight comprising two similar parts having shanks fitting between and secured to the walls of the bar, and parts extending at right angles to the bar and adapted to fit within a conveyer-trough.

15. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally upon itself to form a bar U-shaped in cross-section, and having tongues at its ends folded between the sides of the bar, in combination with a flight comprising two similar parts having shanks fitting between and secured to the walls of the bar, parts extending at right angles to the bar and adapted to fit within a conveyer-trough, and flanges projecting rearwardly from said latter parts and having edges abutting against said shanks.

16. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally upon itself to form a bar U-shaped in cross-section, and having tongues at its ends folded inward between the walls of the bar.

17. A conveyer-chain link comprising a sheet-metal plate doubled longitudinally upon itself to form a bar U-shaped in cross-section, and having tongues at its ends folded inward between the walls of the bar, said tongues being welded to the walls of the bar.

18. A chain-link comprising a sheet-metal plate bent upon itself longitudinally into U form and having its ends slotted in line with the bend, forming tongues at the ends of the bar, said tongues being folded backward upon themselves at the outer sides of the link.

19. A chain-link comprising a sheet-metal plate bent upon itself longitudinally into U form and having its ends slotted in line with the bend, forming tongues at the ends of the bar, said tongues being folded backward upon themselves at the outer sides of the link and welded thereto.

20. A conveyer-chain comprising links U-shaped in cross-section and having metal fillings between their side walls at their ends, and alternate links U-shaped in cross-section and having metal reinforcements on the outer sides of their walls at their ends.

21. A conveyer-chain comprising links of sheet metal doubled longitudinally into U form and having tongues at their ends folded inwardly between the side walls of said links, and alternate sheet-metal links doubled longitudinally into U form and having tongues at

their ends, said tongues being folded backward upon themselves at the outer sides of the link.

22. The combination with a pair of chain-links, of a bolt passing through and connecting the ends of said links, said bolt having an angular head at one end and a threaded nut at its opposite end, a pair of studs or washers arranged upon said bolt at opposite sides of the link-heads, one of said studs having a comparatively deep socket adapted to receive the head of the bolt, and a spring within said socket, and the other stud having a comparatively shallow socket adapted to receive the nut.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID E. PHILLIPS.

Witnesses:
JOHN W. PHILLIPS,
JOHN B. REESE.