No. 816,096. PATENTED MAR. 27, 1906.

H. A. HOUSE.

CHAIN.

APPLICATION FILED SEPT. 26, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

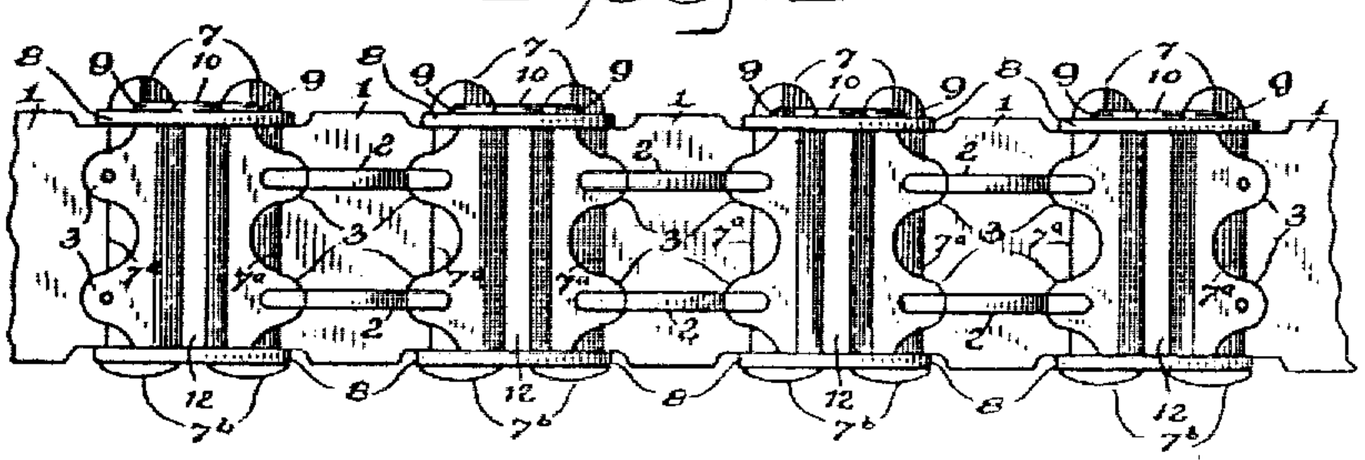


Fig. 2

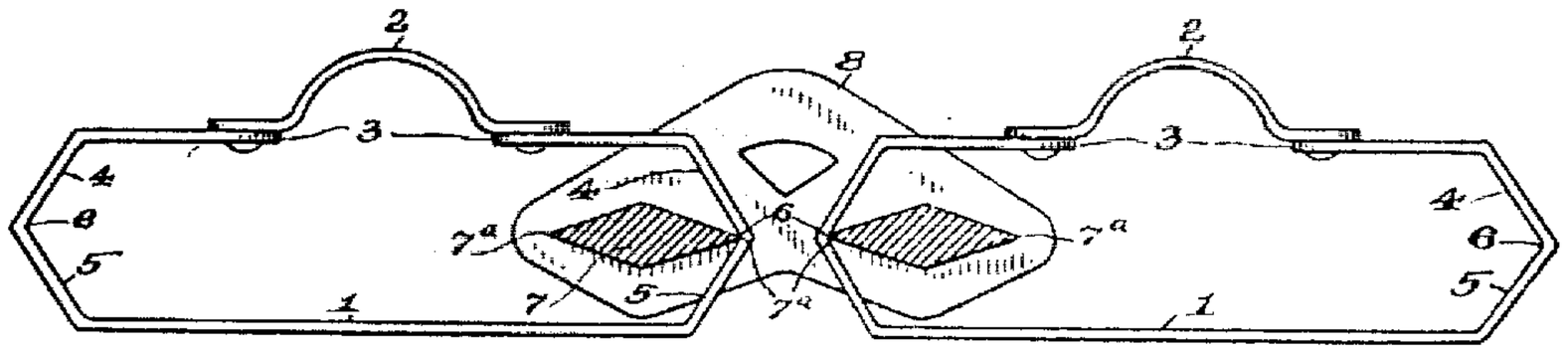


Fig. 3.

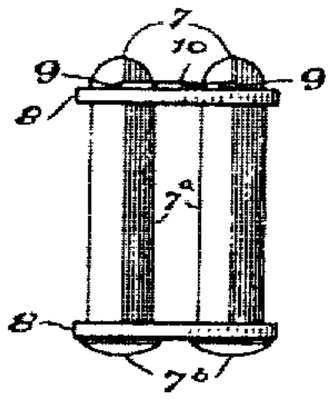


Fig. 4.

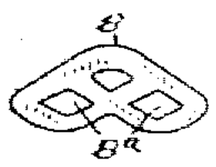


Fig. 5.

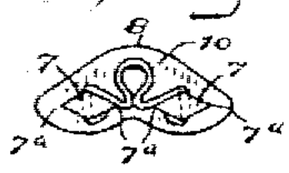


Fig. 6.

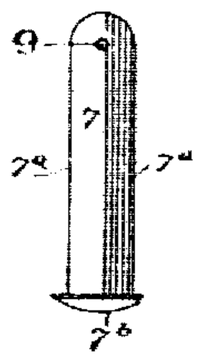
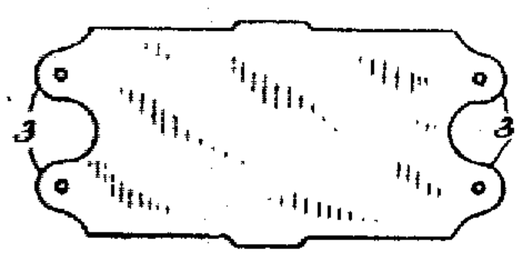


Fig. 11.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 7.

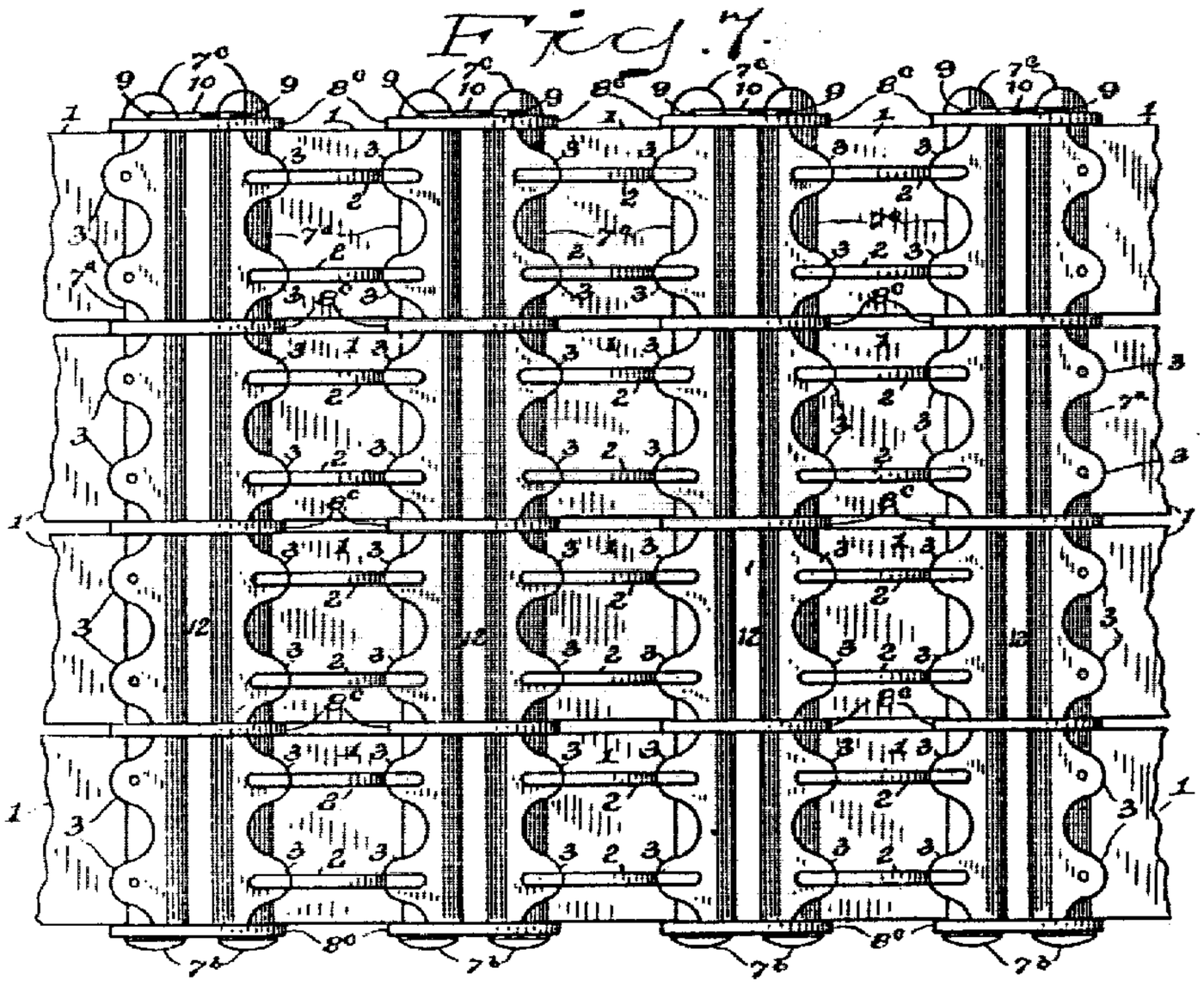


Fig. 8.

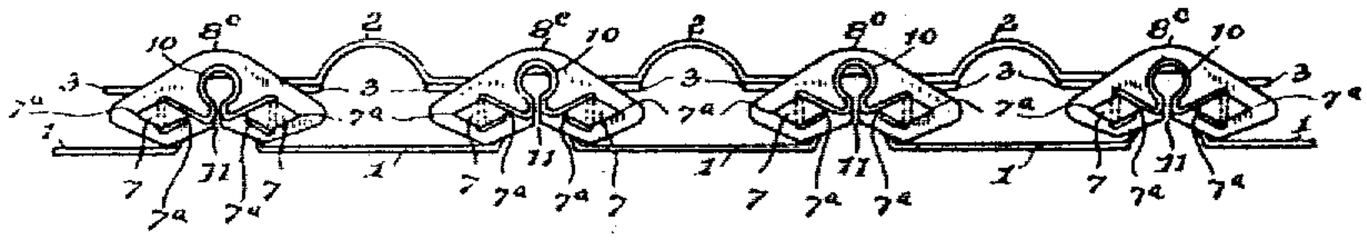


Fig. 9

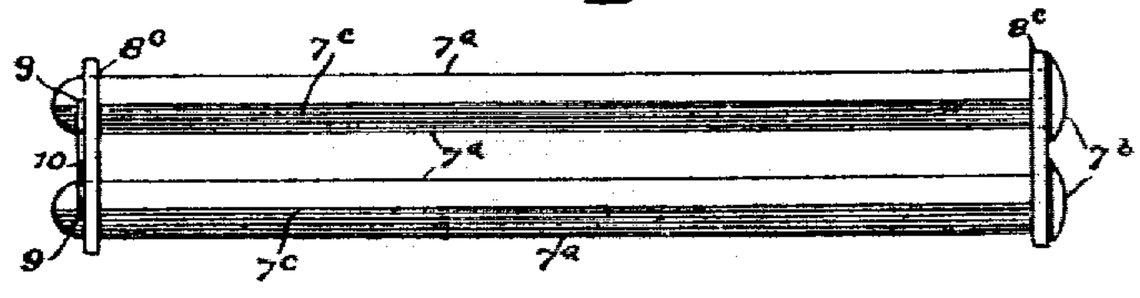
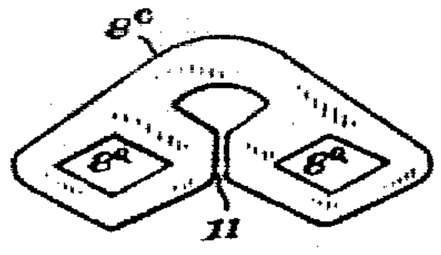


Fig. 10.



WITNESSES

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HENRY A. HOUSE, OF BRIDGEPORT, CONNECTICUT.

CHAIN.

No. 816,096. Specification of Letters Patent. Patented March 27, 1906.

Application filed September 26, 1905. Serial No. 280,184.

To all whom it may concern:

Be it known that I, HENRY A. HOUSE, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Chains, of which the following is a specification.

My invention relates to chains, and in this application it relates more particularly to sheet-metal chains, although the principle involved in my construction is also applicable to other forms.

The weak point in the construction of all kinds of drive-chains of the belt-and-sprocket variety is that the pivotal joint or connecting-point of the links is subject to more or less friction and consequent wear, resulting in stretching or lengthening of the chain. With sprocket-chains this stretching changes the pitch of the chain, while the pitch of the sprocket remains practically the same, and the inevitable result is the riding or climbing of the chain upon the sprocket-wheel, due to improper meshing, and the inevitable result of this condition is the breaking of the chain.

In my improved chain all tendency to stretch or lengthen is overcome by making a scale or knife-joint that requires no oiling and develops no wear and under these conditions is absolutely frictionless.

To enable others to understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents an upper plan view of a section of a single-link chain embodying my improved features. Fig. 2 is an enlarged side elevation of two of the loop-links connected together by one of the stay or coupling links. Fig. 3 is a detail upper plan view of one of the stay-links. Fig. 4 is a detail side elevation of one of the stay or coupling links. Fig. 5 is a detail side elevation of one of the stay-link connections. Fig. 6 is a detail plan view of one of the stay-blades or cross-bars of the stay-links. Fig. 7 is an upper plan view of a section of a wide chain comprising multiple units of the chain shown at Fig. 1. Fig. 8 is a side elevation of the chain shown at Fig. 7. Fig. 9 is an upper plan view of the stay or coupling link used in the construction shown at Fig. 7. Fig. 10 is a detail side elevation of one of the stay-link connections shown at Fig. 7. Fig. 11 is a detail plan view of the blank of which the loop-links are formed.

Its construction is as follows: The loop-links are made of the sheet-metal blank shown at Fig. 11, and they are bent into the shape shown at Figs. 1, 2, 7, and 8. These loop-links comprise the straight bearing-surface 1, adapted to contact with the surface of a pulley. The upper surface of the link is open, and this open space is bridged by the flexible riding bows 2, whose ends are secured to the projections 3. The ends of the link have the two angular surfaces 4 and 5, which surfaces form an obtuse angle whose apex 6 forms a bearing-point for the knife-edges of the stay-blades presently to be described.

7, Fig. 6, is one of the stay-blades or cross-bars adapted to form a part of the stay or coupling link shown at Fig. 3. This blade or bar, which is a counterpart of all the other blades of the series, is diamond shape in cross-section, having the knife-edges 7^a, adapted to be seated in the apex 6 of the V-shaped ends of the loop-link.

8, Fig. 5, is one of the stay-link connections having the diamond-shaped openings 8^a, adapted to receive the body portion of the stay-blades or cross-bars. The head 7^b of the stay-blades rests against one of these connections, while the ends of said blades project through the opposite connection and are provided with the holes 9, adapted to receive the arms of the expansible cotter-pins 10.

In Fig. 2 is seen a clear illustration of the manner of connecting the loop-links by means of the stay-links.

It will be observed that the angular construction of the stay-blades in cross-section are much more acute than the angle of the ends of the loop-links. This is done to enable the chain to pass over a small pulley without cramping, which would occur were the angular sides of the stay-blades to come in contact with the angular sides of the V-shaped ends of the loop-links.

The multiple-unit chain (shown at Figs. 7 and 8) is composed of any number of the single chain-links, (shown at Fig. 1,) which are arranged side by side, so as to make a completed chain of any desired width. In this construction the only alteration or change will be in the lengthening of the stay-blades or cross-bars to form the stay or coupling links to suit the width of the multiple chain and a slight change of the connections that unite these stay-blades, presently to be described. At Fig. 9 is shown one of the stay-links for the multiple chain composed of the stay-blades 7^c, which, as before mentioned, are the

exact duplicate of the stay-blades shown at Figs. 3 and 6 except as to their length. The connections 8^c are the exact counterpart of the connections 8 (shown at Figs. 1, 2, 3, 4, and 5) except (see Fig. 10) that the connections 8^c are partially divided by the opening 11 on the under side to permit the chain to give and take, and thereby preserve a uniform strain on the wide belt. In other words, these bifurcated stay-link connections enable the wide belt to pull even and true under all conditions of load or strain which it would be difficult to do were these connections solid, as shown at Fig. 8.

A chain constructed on the lines above set forth can be made of much lighter stock than the ordinary drive or sprocket chain connected together by working pivotal bearings or joints whose diameter must be increased proportionate to the strain to which the chain is to be subjected. Such joints give an increased weight to the chain, and an additional strain is thereby put upon long lengths by this increased weight, which greatly decreases the factor of safety.

With my improved chain the point of contact between the loop-links and stay or coupling links is so slight that these engaging points are frictionless. Therefore as there is no friction there can be no wear, and consequently no oil is required. The knife-edge contact is always maintained under a load, for it is impossible for such contact to become disengaged, as the angular formation at the ends of the loop-links will counteract any tendency of the knife-edges of the stay-blade leaving their seats, located at the apex of such angular formation. In other words, these stay-blades cannot under a load leave their position.

As the loop-links are made of thin metal, the lower or pulley-contact face 1 of the links wlil spring or curve inward to conform to the circumferential face of the pulley as they pass around it, while the upper surface of these links will be correspondingly lengthened through the medium of the riding bows 2. Consequently these links cannot be permanently distorted or stretched, but will return again to their normal position. The facility with which any number of units of a single chain may be coupled together to form a chain of any desired width enables it to be used in place of wide belting, and it is much superior to leather belting, as it will not stretch or abnormally lengthen.

My improved chain can readily be applied to sprocket-wheels by simply making the space 12 between the loop-links proportional to the size of the sprocket-teeth.

When used as a flat-surface transmission-chain, it might be desirable to cover the surface of the pulley with leather, rubber, or other flexible material, so that the metal links may form a proper contact and not slip.

To readily and fully appreciate the advantages of my knife-edge joint, it is only necessary to consider that the same principle is used as balancing-points on all platform-scales, and as there is no friction on these points they never wear or require oiling.

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

1. A chain comprising sheet-metal loop-links with angular-shaped ends, stay,-links comprising angular stay-blades to contact with said angular-shaped ends, connections for said blades, for the purpose set forth.

2. A chain comprising sheet-metal loop-links having angular-shaped ends on said links, stay-links comprising stay-blades angular in cross-section to contact with said angular-shaped ends, connections for said blades, for the purpose set forth.

3. A chain comprising alternate sheet-metal loop-links having angular-shaped ends, coupling-links connecting the loop-links, said coupling-links comprising angular-shaped stay-blades and connections for said blades, for the purpose set forth.

4. A chain comprising sheet-metal loop-links having angular-shaped ends, stay-links comprising angular stay-blades to contact with said angular-shaped ends, removable connections for said blades, for the purpose set forth.

5. A chain comprising sheet-metal loop-links having angular-shaped ends, stay-links comprising angular stay-blades, removable connections having angular openings to admit said blades, for the purpose set forth.

6. A chain comprising sheet-metal links having angular-shaped ends or seats, diamond-shaped stay-blades adapted to engage with said seats, means for yoking or connecting said blades together, for the purpose set forth.

7. A chain comprising alternate links of sheet metal with angular ends, links having angular edges adapted to engage with the apexes of said angular ends, for the purpose set forth.

8. A frictionless jointed chain comprising alternate flexible sheet-metal links having angular bearing-points in their ends, combined with angular-shaped coupling-links, for the purpose set forth.

9. A flexible sheet-metal link having a pulley-contact lower surface adapted to spring inward to conform to a pulley, and having an opening in its upper surface, a flexible bridge to span said opening, for the purpose set forth.

10. A chain comprising alternate flexible and angular-ended sheet-metal loop-links having an opening on one side and a flexible bridge spanning said opening so as to prevent abnormal expansion or stretching of said links, stay-links for coupling said loop-links

together comprising stay-blades angular in cross-section, connections for said blades having angular openings to admit said blades, said blades adapted to be automatically seated at the apexes of the angular-ended loop-links, for the purpose set forth.

11. A chain comprising alternate flexible and angularly-ended loop-links having an opening in one side, a flexible bridge to span said opening, stay-links for coupling said loop-links together comprising stay-blades angular in cross-section, connections for said blades having angular openings to admit said blades, means to prevent accidental withdrawal of said blades, for the purpose set forth.

12. A chain comprising links whose inner ends are provided with angular-shaped seats, coupling-links having stay-blades or cross-bars angular in cross-section, the edges of said bars adapted to engage with the apexes of the said angular-shaped seats, expansible connections for said bars, for the purpose set forth.

13. A chain comprising alternate sheet-metal loop-links having angular-shaped ends, coupling-links therefor comprising angular-shaped stay-blades, removable connections having angular-shaped openings for said blades, expansible cotter-pins for said blades, for the purpose set forth.

14. An angular-jointed sheet-metal chain comprising flexible loop-links adapted to bow in on one side and expand on the other so as to conform to a curved surface, angular coupling-links connecting the loop-links, for the purpose set forth.

15. A multiple-link chain comprising flexible sheet-metal loop-links having angular end seats, means on the upper side of said links to permit said upper surface to lengthen while the under side conforms to the curvature of a pulley, coupling-links comprising stay-blades angular in cross-section to contact with the angular seats of the loop-links, expansible connections embracing said stay-blades, for the purpose set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut this 11th day of September, A. D. 1905.

HENRY A. HOUSE.

Witnesses:

FRANK B. FILTON,

C. J. ROACH.