(No Model.)

4 Sheets—Sheet 1.

M. MASTERS.

BELT GEARING.

No. 446,407. Patented Feb. 10, 1891.

Fig. 1.

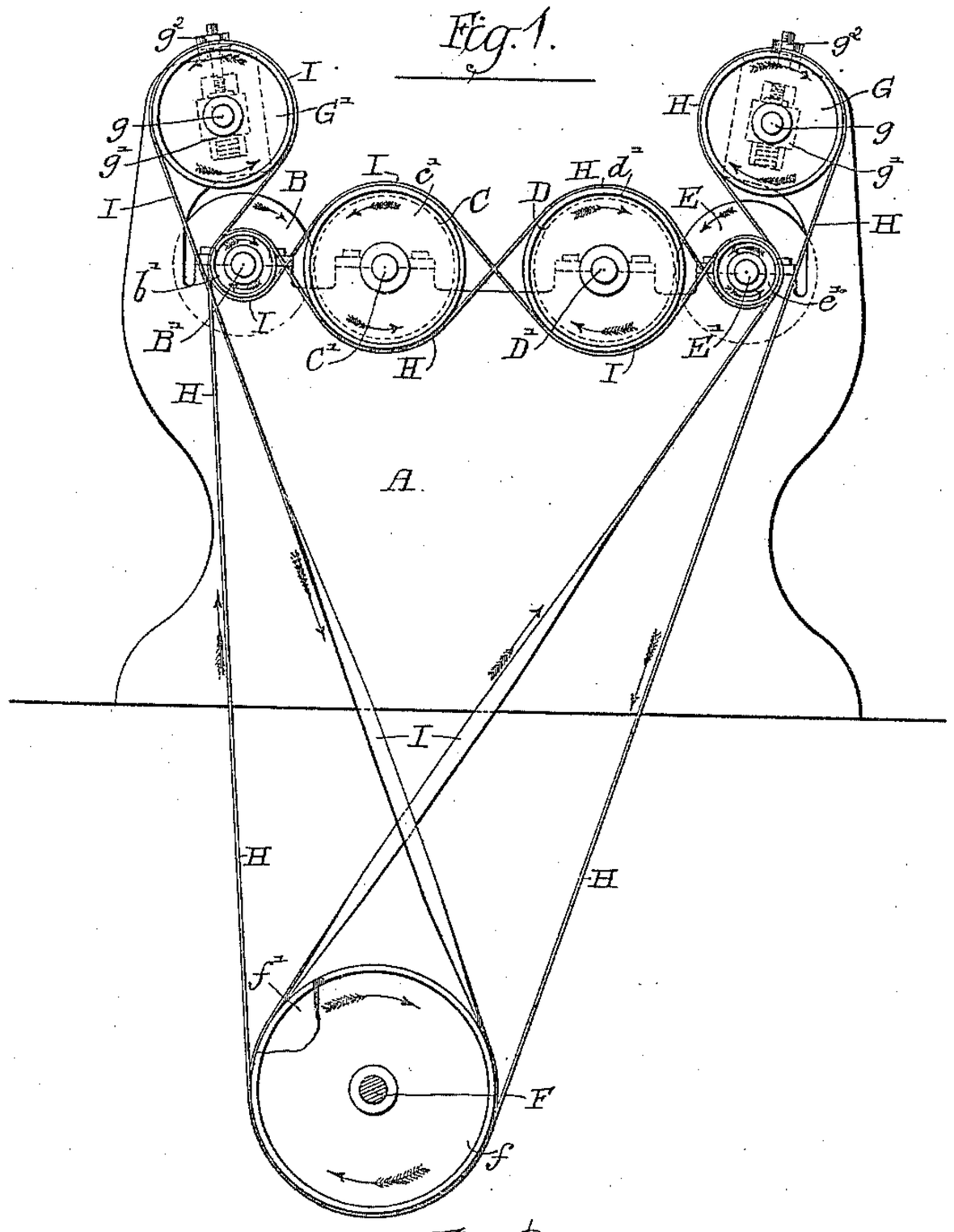
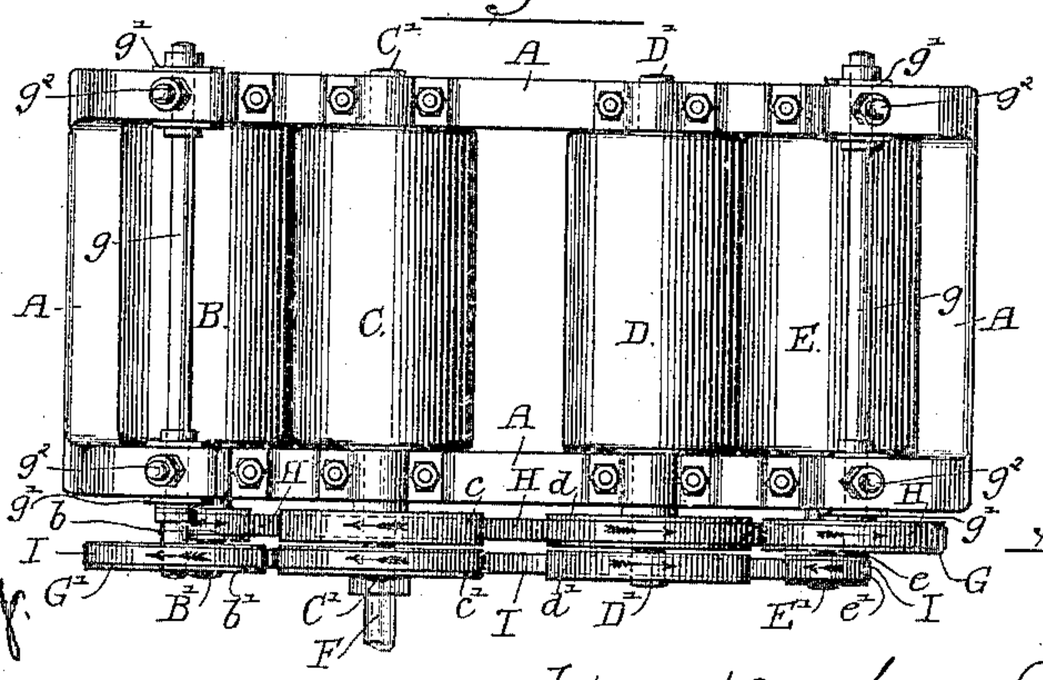


Fig. 2.



Witnesses:-

Louis M. T. Whitehead.

Wm. T. Fleming.

Inventor:-

Miles Masters.

By:- Clayton, Poole & Brown

Attorneys.-

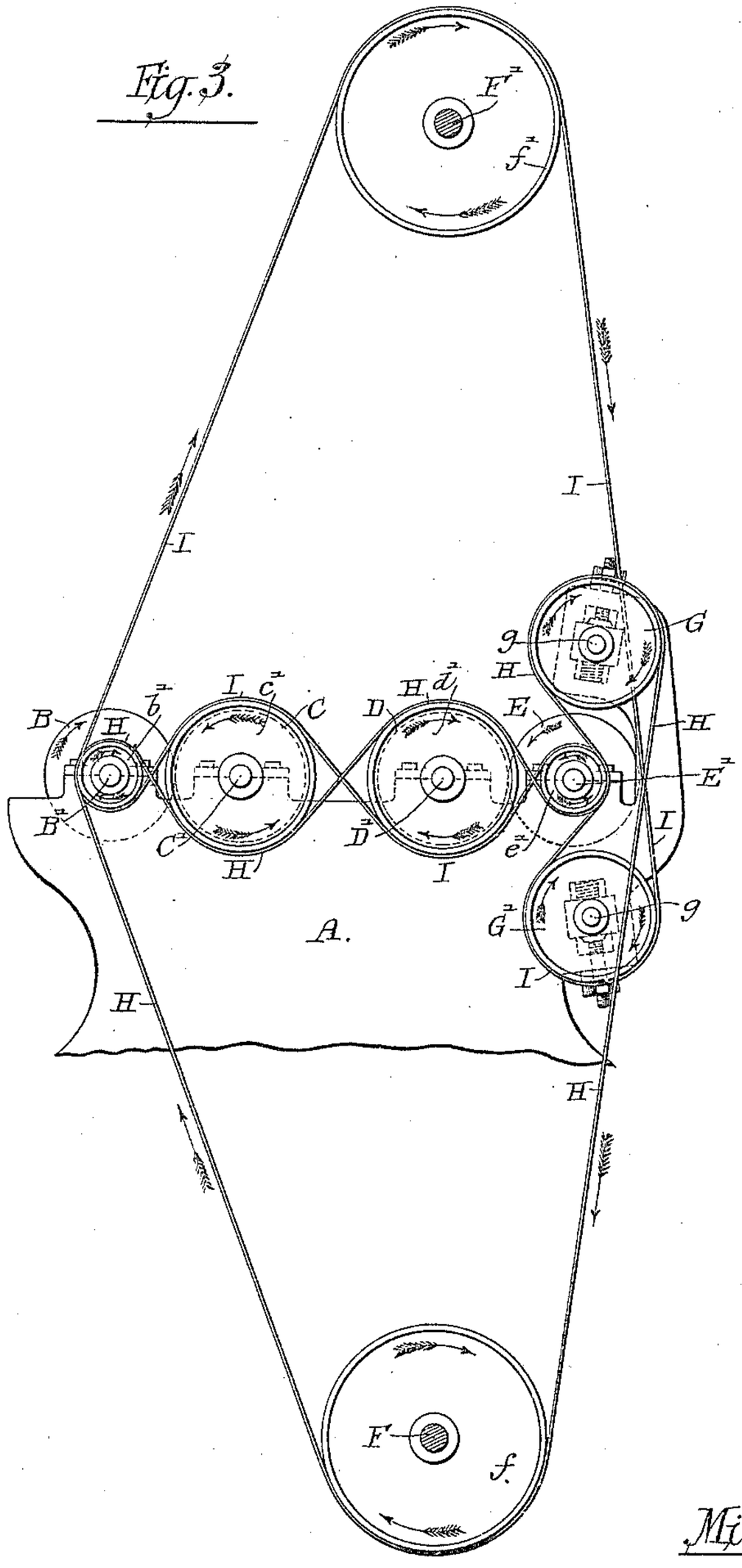
(No Model.) 4 Sheets—Sheet 2.

M. MASTERS.

BELT GEARING.

No. 446,407. Patented Feb. 10, 1891.

Fig. 3.



Witnesses:-
Louis M. Whitehead.
Wm. F. Fleming.

Inventor:-
Miles Masters.-

by:- Dayton, Poole & Brown

Attorneys.-

(No Model.) 4 Sheets—Sheet 3.

M. MASTERS.

BELT GEARING.

No. 446,407. Patented Feb. 10, 1891.

Fig. 4.

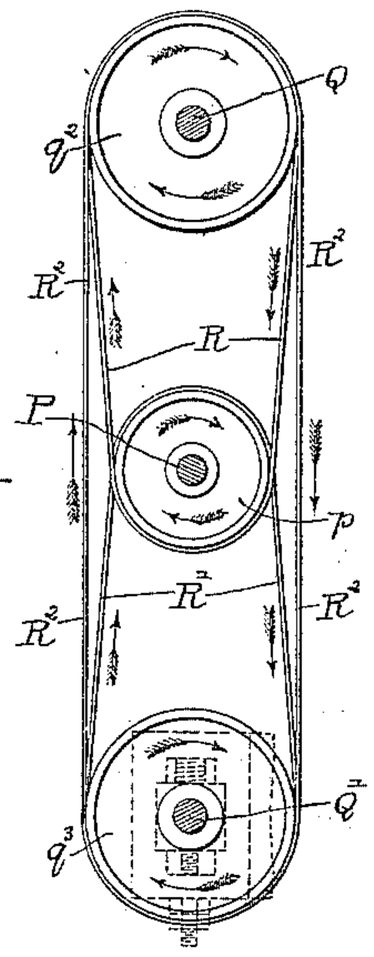


Fig. 5.

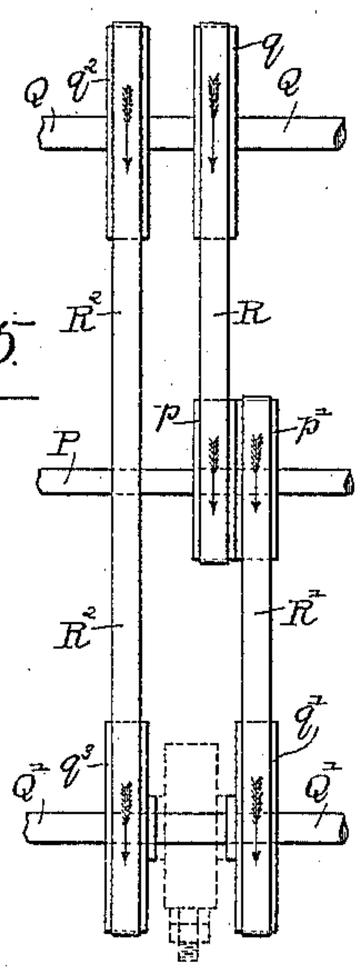


Fig. 6

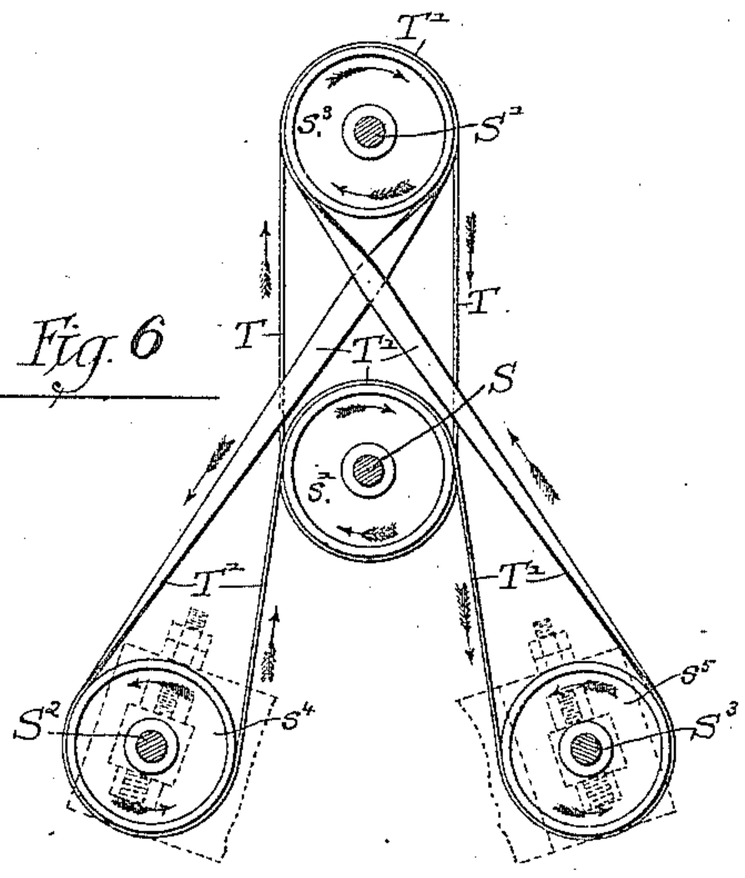
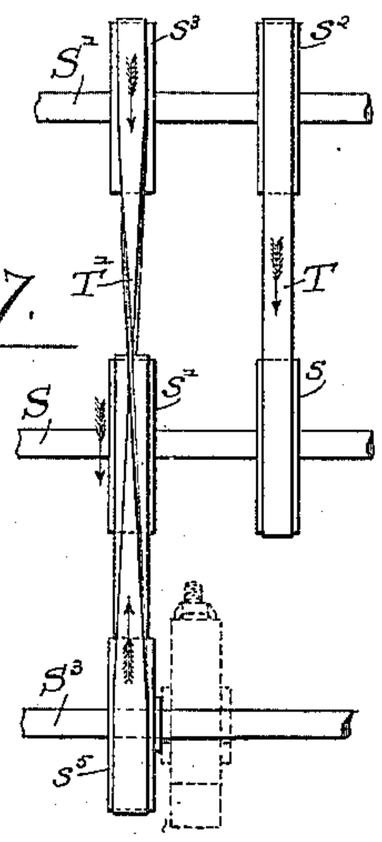


Fig. 7.



Witnesses:-
Louis M. Whitehead.
Wm. F. Henning.

Inventor:-
Miles Masters.-
By:- Dayton, Poole & Brown
Attorneys.-

(No Model.) 4 Sheets—Sheet 4.

M. MASTERS.

BELT GEARING.

No. 446,407. Patented Feb. 10, 1891.

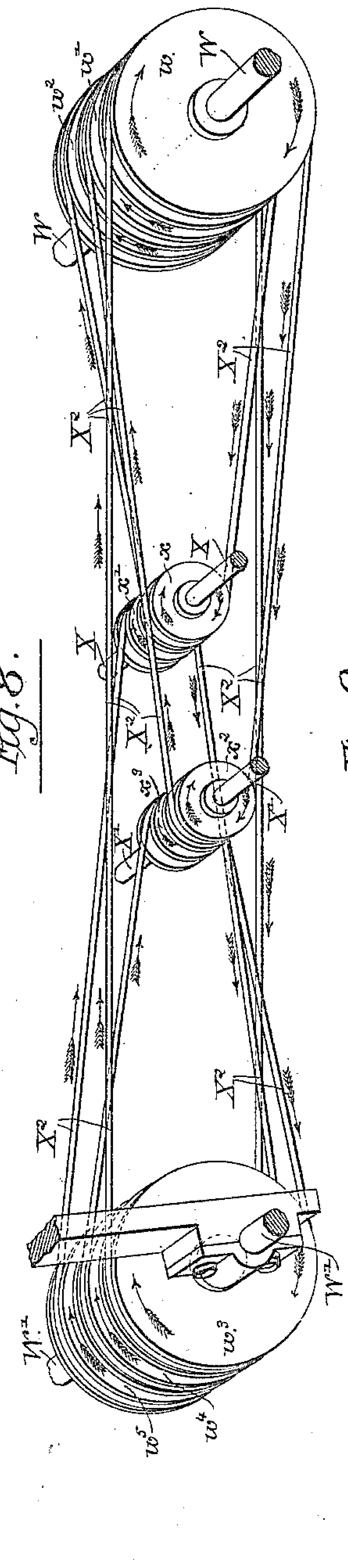


Fig. 8.

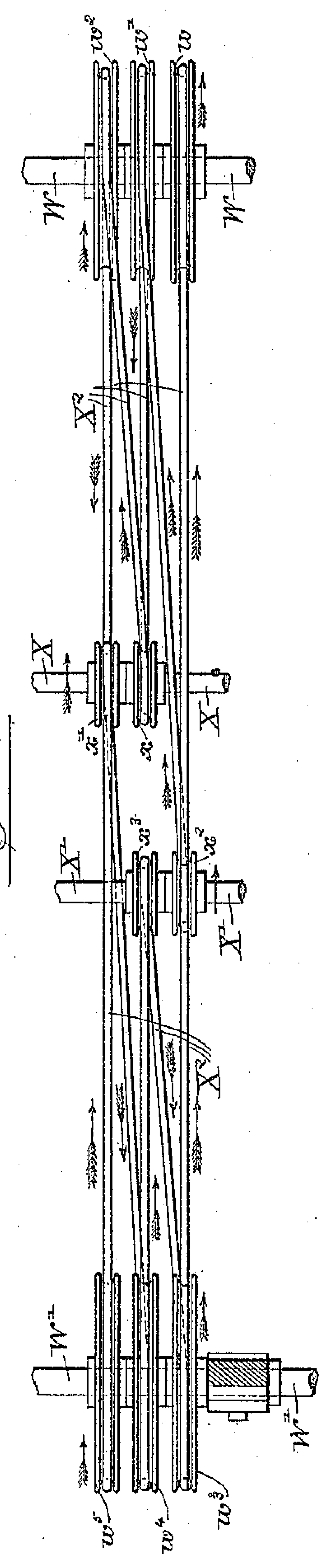


Fig. 9.

Witnesses:-
Louis M. F. Whitehead.
Wm. J. Henning.

Inventor:-
Miles Masters.

by:- Dayton, Poole & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

MILES MASTERS, OF SHEFFIELD, ILLINOIS.

BELT-GEARING.

SPECIFICATION forming part of Letters Patent No. 446,407, dated February 10, 1891.

Application filed September 16, 1889. Serial No. 324,096. (No model.)

To all whom it may concern:

Be it known that I, MILES MASTERS, of Sheffield, in the county of Bureau and State of Illinois, have invented certain new and useful Improvements in Belt-Gearing; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in belt-gears or power-transmitting devices of that class embracing driving belts and pulleys.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In devices for transmitting power by belts and pulleys as heretofore commonly arranged all of the pulleys are subjected to a side pull or draft due to the fact that the belt approaches the pulley from one side thereof, and the tension of the belt necessary to produce frictional contact between the belt and pulley operates to draw or pull the pulley sidewise, and to thereby exert a constant lateral or side pressure upon the bearing which supports the pulley. This lateral or side pressure upon the bearings not only greatly increases the frictional resistance to the turning of the shaft carrying the pulley, but in all machines in which the shaft carries operative parts—as, for instance, in roller-mills, planers, circular saws, and other wood-working machinery, and in a great many other kinds of machines—the side pull upon the shaft tends to shift the position of the same, thereby preventing the accurate working of such operative parts.

In a belt-driving gear embodying my invention I employ, in connection with a belt pulley or pulleys upon a shaft, a belt or belts so trained about the pulley or pulleys as to bear upon opposite sides thereof and to exert pressure in opposite directions thereon, so that the pulley-shaft is practically relieved of lateral pressure.

In the accompanying drawings, illustrating my invention, Figure 1 is a side elevation of a driving-gear embodying my invention, shown as applied to a roller-mill. Fig. 2 is a plan view of the same. Fig. 3 is a view similar to Fig. 1, showing the driving-shafts arranged both above and below devices to be driven. Fig. 4 is a side elevation of a similar form of belt-gearing for driving a single shaft. Fig. 5 is a face view of the parts shown in Fig. 4. Fig. 6 is a side elevation of another similar form of belt-gearing for driving a single shaft. Fig. 7 is a face view of the parts shown in Fig. 6. Fig. 8 is a perspective view of another form of gearing for driving parallel shafts. Fig. 9 is a plan view of the parts shown in Fig. 8.

As illustrated in Figs. 1 and 2, A indicates the frame of a roller-mill, provided with usual rollers B, C, D, and E, arranged in two pairs. Said rollers are mounted upon shafts B′, C′, D′, and E′, having bearings in the frame of the mill in the usual manner. Mounted upon each of said shafts are two fixed pulleys *b b′ c c′ d d′ e e′*.

F is a driving-shaft arranged parallel with the shafts of the rollers and provided with two driving-pulleys *f f′*.

G G′ are two tightener-pulleys, one of which G is located in the same plane with one set of pulleys *b c d e*, and the other G′ is located in the same plane with the other set of pulleys *b′ c′ d′ e′*, said tightener-pulleys being conveniently mounted on adjustable bearing-shafts *g g*, mounted in adjustable bearings *g′ g′*, and moved by adjusting-screws g^2 g^2.

H is a driving-belt placed around the pulley *f* on the driving-shaft over one of the tighteners G and over the belt-pulleys *b c d e*. I is another belt, which passes over the tightener G′ and over the belt-pulleys *b′ c′ d′ e′*. One of said belts I is crossed, so that its part adjacent to the driving-pulleys moves in a direction opposite to the belt H, and by reason of the opposite movement of the belts and arrangement thereof on the opposite sides of the several driven pulleys both belts act together in turning or driving said pulleys. An important advantage gained by this arrangement of the belts is that all side strain or pressure is taken from the shaft-bearings, thereby greatly lessening the friction by reason of the fact that all of the friction which is usually due to the side pressure on the shaft-bearings caused by the tension of the belts is avoided, while at the same

time perfect accuracy of movement in the rollers is afforded, for the reason that the strain of the belts has no tendency to move or shift the shafts, and thereby bring the same out of line and the rollers out of their proper relative position. Another important advantage gained by the construction described is that the necessary power may be transmitted with narrower or smaller pulleys than heretofore used, owing to the fact that by the arrangement described a much larger area of contact between the pulleys on each shaft and the belts which drive the said pulleys is attained than when only a single belt is used. By reason of the increase of belt-contact obtained by the construction set forth therefore the pulleys may be made smaller both in diameter and width, so that the belts are shorter and run with less speed, while the entire driving apparatus is lighter in weight and therefore less power is absorbed to keep in motion its moving parts.

In Fig. 3 is shown another arrangement of belts and pulleys embodying my invention. In this construction two driving-shafts are used, one of which F′ is located overhead and provided with a drive-pulley f', while the other F is located in a similar manner to that shown in Figs. 1 and 2. The rollers B, C, D, and E, the pulleys b c d e and b' c' d' e', and the tightener-pulleys G G′ are the same as shown in said figures, although the tightener G′ is located on the opposite side of the frame and below the shaft E′. The belt H is trained over the driving-pulley f, the driven pulleys b c d e, and the tightener G, as heretofore described. The belt I is trained over the pulley f', driven pulleys b' c' d' e', and tightener G′, it being obvious that it is unnecessary to twist the same to obtain an opposite movement to the belt H, as in the case in the form shown in Figs. 1 and 2.

It is obvious that more than two belts can be employed without departing from the spirit of my invention, in which case it would only be necessary to mount additional pulleys upon each of the shafts. If three belts were used, it would be preferable to have the middle belt double the width of the outside belts.

In Figs. 4 and 5 is shown a form of gearing for driving a single shaft. In said figures P indicates the shaft to be driven, and p p' are pulleys mounted thereon. Q is an overhead drive-shaft having a drive-pulley q mounted thereon in the same vertical plane with the pulley p on the shaft P to be driven. Q′ is a tightener-shaft located below the driven shaft P, said shaft Q′ being provided with a pulley q' in the same vertical plane with the pulley p' upon the shaft P. R is a drive-belt placed around the pulleys q and p, and R′ is another belt placed around the pulleys q' and p'. q^2 and q^3 are two pulleys mounted, respectively, upon the shafts Q and Q′ and in the same vertical plane. The said pulleys q^2 and q^3 are of the same diameter, and a drive-belt R^2 is placed around the same, so that the shaft Q′ will be driven at the same speed as the shaft Q. The pairs of pulleys q q' and p p' have the same diameters, respectively, so that the belts R and R′ will run at the same speed. The operation of this form of my invention in the prevention of side pressure or strain upon the shaft P will be obvious.

In Figs. 6 and 7 is shown another similar form of belt-gearing for driving a single shaft. In this instance S indicates the driven shaft, upon which are mounted pulleys s s', having the same diameters. S′ is an overhead drive-shaft having drive-pulleys s^2 s^3 mounted thereon, said drive-pulleys being of the same diameter and located, respectively, in the same vertical planes with the pulleys s s'. S^2 and S^3 are two parallel tightener-shafts located below the shaft S and a considerable distance on either side thereof. s^4 s^5 are two tightener-pulleys mounted upon the shafts S^2 and S^3, respectively, and in the same vertical plane with the pulleys s' and s^3. T is a drive-belt placed around the pulleys s and s^2 and adapted to drive the shaft S. T′ is another belt acting against the pulley s' in a direction opposite to that at which the belt T acts against the pulley s. The said belt T′ passes around the tightener-pulleys s^4 s^5, and is twisted and placed over the pulley s^3, so that it will travel upon the pulley s' in an opposite direction to the belt T upon pulleys. It is obvious that the said belts traveling in opposite directions upon the driven pulleys s and s' will drive or turn the shaft S, and the arrangement of said belts will prevent any side strain or pressure thereon.

In Figs. 8 and 9 is shown another form of belt-gearing for driving parallel shafts in the same direction. I have shown the sa m ranged for driving two shafts; but it is obvious that by multiplying the gearing, as hereinbefore described, the same can be adapted for driving three or more shafts, or a larger number of drive-pulleys can be employed for driving the same number of shafts, in which the tightener-pulleys can be increased accordingly, and it would only necessitate a slight difference in the training of the belts around the pulleys. In said figures W indicates the drive-shaft provided with three drive pulleys or sheaves w w' w^2. W′ indicates a tightener-shaft having three tightener pulleys or sheaves w^3 w^4 w^5. X and X′ are the driven shafts provided, respectively, with pulleys or sheaves x x' and x^2 x^3, said driven shafts and pulleys being located between the drive and tightener pulleys. X^2 is a rope or cable, which is trained over said pulleys or sheaves in the following manner: After passing around the drive-pulley w it is trained over the driven pulley x^2, then around drive-pulley w', and around the driven pulley x, drive-pulley w^2, the tightener-pulley w^5, the driven pulley x', the tightener-pulley w^4, the driven pulley x^3, the tightener-pulley w^3, and then around the drive-pulley w. It will thus be seen that the

rope or cable G passes over each of the pulleys on the driven shafts and on opposite sides thereof with the same result as hereinbefore described.

I claim as my invention—

1. A device for transmitting power by means of belts and pulleys, consisting of a driven pulley, a driving-pulley, one or more idlers, and two belts, both of which pass over the driven pulley and which engage the driving-pulley and the idler or idlers, said driving-pulley and the idlers being arranged a part on one side and a part on the other side of a straight line passing through the center of the driven pulley, and the belts being arranged to approach the driven pulley from opposite sides of said line, whereby each driving-belt may engage one-half or more of the circumference of the driven pulley, substantially as described.

2. A belt-gear for roller-mills, consisting of four driven pulleys, two driving-pulleys attached to the same shaft, two idlers located at the side of the driven pulleys opposite to that at which the driving-pulleys are located, and straight and cross belts trained over said driving and driven pulleys and idlers, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

MILES MASTERS.

Witnesses:
J. F. HALE,
G. F. BOYDEN.