

No. 897,756.

PATENTED SEPT. 1, 1908.

I. W. MARSHALL.  
FLEXIBLY INTERMITTENT CHAIN DRIVE.

APPLICATION FILED OCT. 8, 1907.

2 SHEETS—SHEET 1.

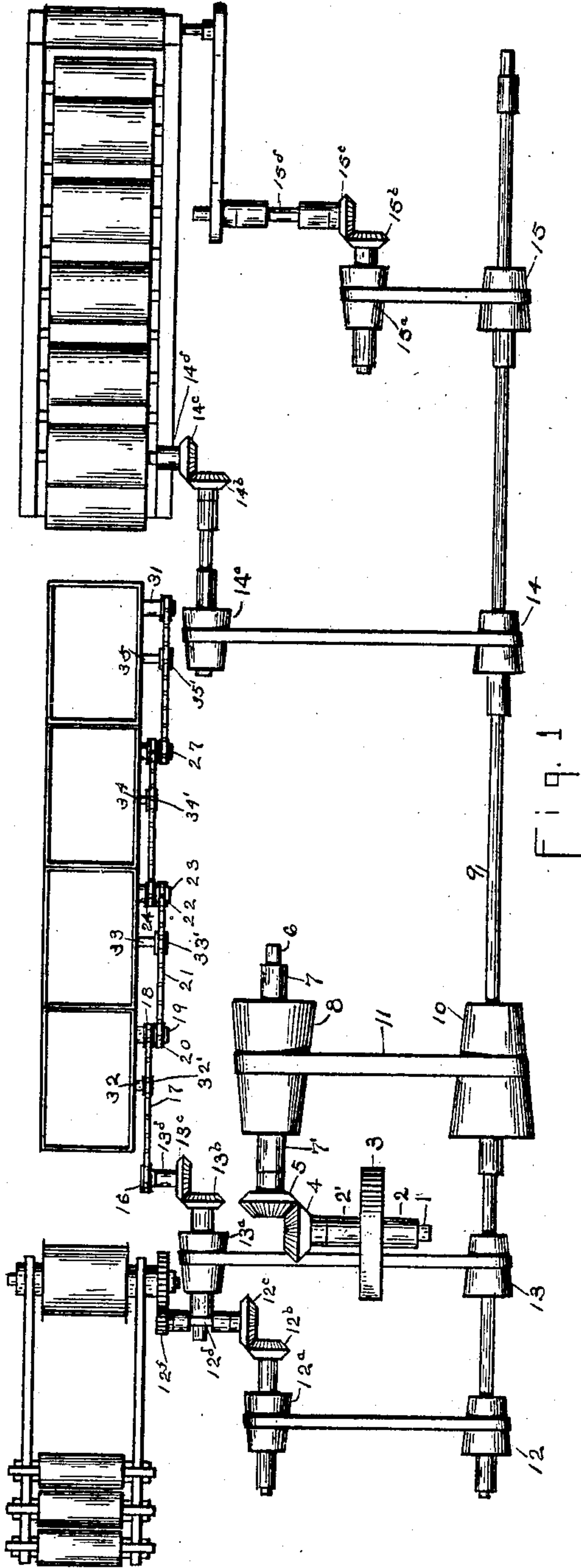


Fig. 1

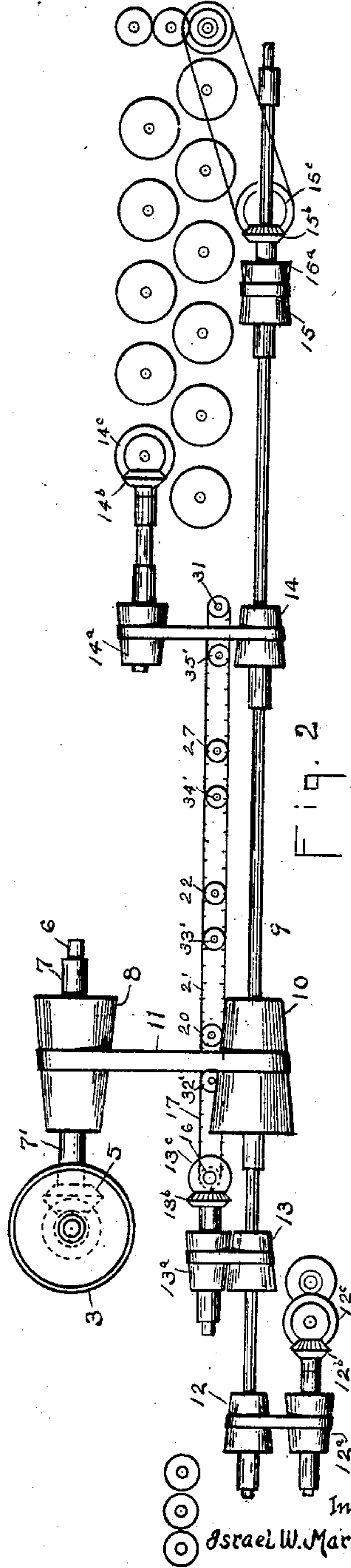


Fig. 2

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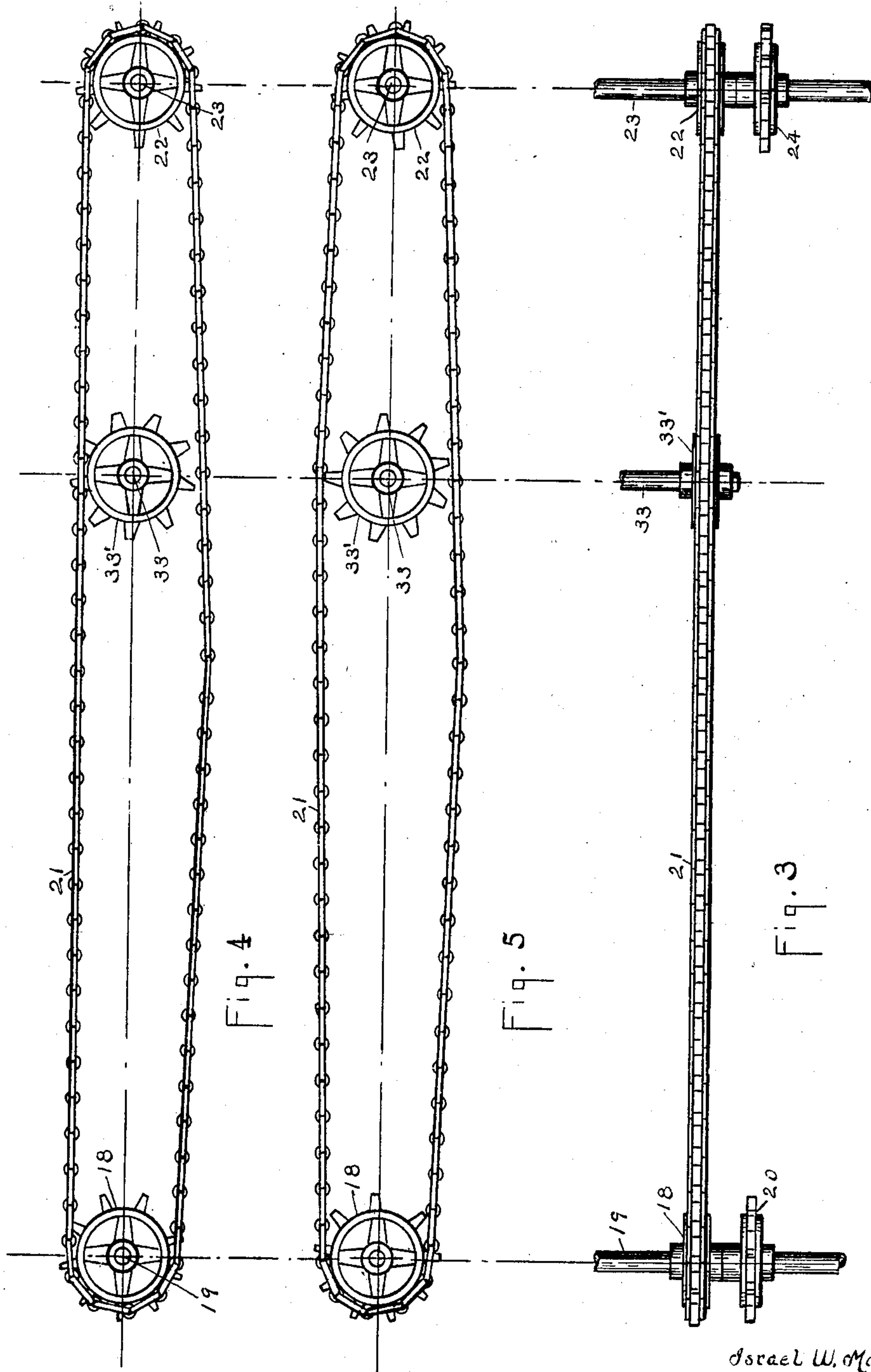
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

ISRAEL W. MARSHALL, OF YORKLYN, DELAWARE, ASSIGNOR OF ONE-HALF TO THOMAS E. MARSHALL, OF YORKLYN, DELAWARE.

## FLEXIBLY-INTERMITTENT CHAIN-DRIVE.

No. 897,756.

Specification of Letters Patent.

Patented Sept. 1, 1908.

Application filed October 8, 1907. Serial No. 396,401.

*To all whom it may concern:*

Be it known that I, ISRAEL W. MARSHALL, a citizen of the United States, residing at Yorklyn, in the county of Newcastle and State of Delaware, have invented certain new and useful Improvements in Flexibly-Intermittent Chain-Drives, of which the following is a specification.

This invention relates to improvements in means for driving mechanisms in which at times a certain amount of inaction, or an irregular intermittance, is desirable. Its primary object is to provide devices which in themselves have a constant uniform action, but will transmit power in such manner that an indefinite cessation of rotation may take place in the driven member, consequent upon an unusual retardation of the same, such cessation having a period of duration coincident with the length of time said retardation exists.

A secondary object, dependent upon the fulfilment of the first, is to prevent the breaking, tearing or undesirable stretching of webs, films or sheets of fibrous textile or felted material in its passage through mechanisms and baths adapted to wash, dry, cure or otherwise operate and in which the said material may shrink to such an extent that the advance end must of necessity move at a slightly different rate of speed than the other, dependent upon the nature of the material, its thickness and other variable and constantly changing conditions that cannot be accurately gaged and compensated for.

These objects are attained by the novel, yet simple, arrangement of parts, hereinafter fully described and shown in the accompanying drawings forming part of these specifications and in which:—

Figure 1, is a general plan view of my improved drive as applied in the process of making indurated fiber. Fig. 2, is a side elevation of the same. Fig. 3, is a plan view of a unit in the drive. Fig. 4, is a side elevation of the same, and, Fig. 5, is a similar view, but showing the drive member disengaged.

In the manufacture of such material as indurated fiber, machinery is employed that extends longitudinally of the sheet for distances approximated at 200 feet and the necessity is obvious that no one of the machines in the series employed operates either more or less rapidly relatively than any other,

else trouble arises immediately; if one machine operates at a normal speed and the succeeding machine moves relatively slower, the sheet is caused to buckle, crimp and collect in a mass, which if not remedied at once, causes loss of product and delay in the process; if, on the other hand, a succeeding machine moves at a disproportionately rapid speed it is likely to tear the sheet, causing a break in its continuity or so stretch it that it is valueless. If these sheets were of a material that would neither stretch or shrink in the process of manufacture, it would be a comparatively easy matter to adjust and govern the speed of each machine proportionately, but as the sheets will contract, according to the material used, rapidity of the process, relative thickness, temperature, degree of saturation and for various other reasons which cannot be foretold with any assurance and which may change appreciably from time to time even in parts of the same sheet, the value of an appliance that will automatically compensate for these unavoidable variations becomes manifest.

In the drawings 1, represents the power driving shaft carried in bearings 2 and 2', and having the main belt wheel 3, which directly connects with an engine or other prime motor; and also centered on this shaft is a miter bevel gear 4, meshing with its mate 5, centered on the shaft 6, positioned at right angles to the driving shaft, and running in bearings 7 and 7', between which the cone 8, is secured on the shaft. A line shaft 9, is disposed parallel to shaft 6, the same having an opposite angled cone 10, connected by a belt 11, or analogous friction device, in such manner that the speed of the line shaft 9, may be varied from that of the power driving shaft 1, but relatively to it, by shifting the connecting means along the angular surface of the cones 8 and 10. At various points along on the line shaft 9, opposite to the several machines it is desired to drive, are arranged similar but smaller cones, as at 12, 13, 14 and 15, provided with connecting means engaging with duplicate cones 12<sup>a</sup>, 13<sup>a</sup>, 14<sup>a</sup>, and 15<sup>a</sup>, secured to relatively short shafts disposed parallel to the line shaft and having centered thereon bevel gears 12<sup>b</sup>, 13<sup>b</sup>, 14<sup>b</sup>, and 15<sup>b</sup>, meshing with corresponding bevel gears 12<sup>c</sup>, 13<sup>c</sup>, 14<sup>c</sup>, and 15<sup>c</sup>, centered on the counter shafts 12<sup>d</sup>, 13<sup>d</sup>, 14<sup>d</sup>, and 15<sup>d</sup>, which are



arranged to drive the several machines through belt or gear transmission as at 12<sup>f</sup>.

The counter shaft 13<sup>d</sup>, transmits the power to the particular subject of this invention, which consists of an ordinary link belt or chain sprocket wheel 16, centered on the aforesaid shaft and driving the endless chain belt 17, which passes over and communicates uninterrupted rotary motion to a similar sprocket 18, centered on the shaft 19, carrying a duplicate sprocket 20, having a chain 21, leading to sprocket 22, on the shaft 23, and so on to as many as may be desired in the series.

From the foregoing and an inspection of the drawings, (see Fig. 1.) it will be understood that the chains all travel without intermission and cause the several shafts, through the sprockets to revolve regularly and at a uniform speed precisely that of the counter shaft 13<sup>d</sup>, all sprockets being alike. These shafts do not connect with the operative mechanism of any of the machines, acting as idlers and intermediates only. The center distance of the several shafts 13<sup>d</sup>, 19, 23, 27, and 31, is made as great as possible for the purpose of using long chain belts, loosely applied and with a maximum amount of slack.

At a distance from the driving sprockets, preferably approximating two thirds of the entire center distance between the aforesaid shafts, are positioned the working shafts 32, 33, 34, and 35, the same being so arranged with reference to the power conveying chains that the sprockets 32', 33', 34' and 35', shall be engaged thereby and have rotation transmitted to them under normal working conditions, the said corresponding shafts being provided with the usual driving means connecting with the several mechanisms adjacent to them.

If any of the several mechanisms stick, bind or are momentarily retarded from any of the causes previously enumerated, the chain belt, because of its length and slack application, will rise over the sprocket riding on the cogs until the impediment causing the retardation ceases to exist. If the retardation is caused by the shrinking of a sheet, undergoing treatment in the mechanism, the slip of a single cog usually suffices to compensate for it, whereupon the chain again drops into place on the sprocket and imparts revolution, making a continuous process.

In order to facilitate the raising of the chain it may be preferable to form the teeth

as indicated, with a slight angle on the approaching side, the other as usual.

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

1. In a driving mechanism of the class described, the combination of driving and driven sprocket wheels, a chain engaging therewith and communicating uniform rotary motion, an intermediate sprocket arranged between said sprockets adapted to be engaged by the driving chain under normal conditions, whereby upon encountering unusual resistance and for a period depending upon the duration of such resistance, said chain is caused to move out of rotative connection with said intermediate sprocket.

2. In an irregularly intermittent chain belt driving mechanism, the combination with a driving shaft, a driven shaft, and common chain sprocket wheels secured on each shaft, of a chain mounted on said sprocket wheels, a power conveying sprocket wheel positioned intermediately in the path of chain travel, the latter named sprocket having teeth formed with an obtuse angle on the side of the chain approach, whereby said chain may rise and pass over said sprocket upon abnormal resistance to rotation being encountered and during such interval as it exists, all substantially as shown and described.

3. In a driving mechanism of the class described, the combination with driving and driven sprockets, of a slack chain mounted on said sprockets, and an intermediate sprocket arranged between said sprockets, adapted to be engaged by said chain under normal conditions, and to be disengaged when said chain is drawn tight upon the driven sprocket encountering undue resistance.

4. In a driving mechanism of the class described, the combination with spaced sprockets, of a slack chain mounted on said sprockets, and an intermediate sprocket arranged between said sprockets, adapted to be engaged by said chain under normal conditions, and to be disengaged upon encountering undue resistance.

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

ISRAEL W. MARSHALL.

Witnesses:

WARREN E. WILLIS,  
CHAS. E. POTTS.