(No Model.)

C. A. LIEB.

ELASTIC GEAR.

No. 520,791. Patented June 5, 1894.

Fig. 1.

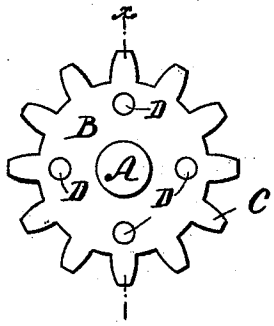


Fig. 2.

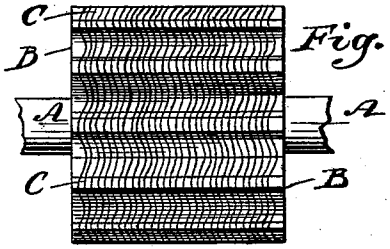


Fig. 3.

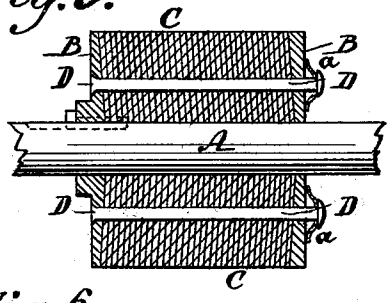


Fig. 4.

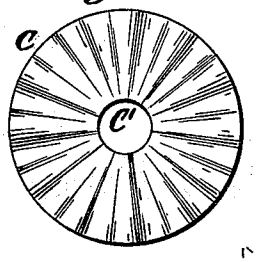


Fig. 5.

Fig. 6.

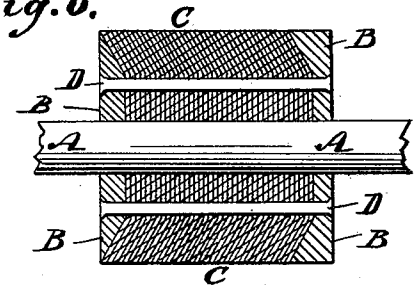
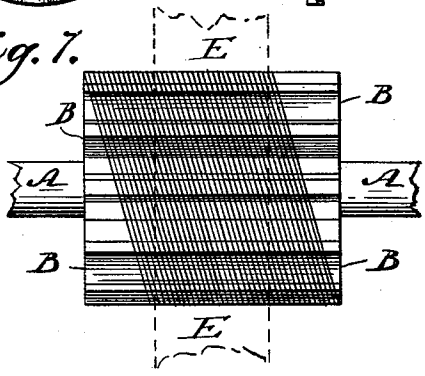


Fig. 7.



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CHARLES A. LIEB, OF NEW YORK, N. Y.

ELASTIC GEAR.

SPECIFICATION forming part of Letters Patent No. 520,791, dated June 5, 1894.

Application filed November 3, 1890. Serial No. 370,156. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Elastic Gear, of which the following is a specification.

My invention relates to improvements in gears, and it consists in constructing the gear of a plurality of thin sheets, disks or plates of metal in which the cogs are cut so that when in use the several plates or sheets of thin metal will yield to the first impulse of the stroke of the opposing gear and yet being suitably fastened together will remain in place and transmit the motion or power to or from the other gear. Also that should the alignment of the teeth or cogs of the gears which intermesh not be coincident from any cause as for instance the wearing of journals then the cogs or teeth of my elastic gear will adjust themselves to the lines of the cogs of the rigid gear.

In the drawings the same reference letters indicate the same parts in all the figures.

Figure 1 illustrates an end elevation of one form of my gear. Fig. 2 illustrates a side elevation of the gear shown in Fig. 1. Fig. 3 illustrates a longitudinal section of the gear shown in Fig. 1 on the line *x*, *x*, thereof, also showing one method of keying the gear to its shaft. Fig. 4 illustrates a face or plan view of one of the corrugated disks used in Figs. 1, 2 and 3. Fig. 5 illustrates an edge view of the disk shown in Fig. 4. Fig. 6 illustrates a sectional view of an alternative construction in which the disks are dish shaped and nested together to make the gear. Fig. 7 illustrates a construction in which the several disks are flat and are arranged at an angle to the shaft on which the gear is supported.

Referring first to Figs. 1, 2, 3, 4 and 5, A is the shaft. B B are two plates one at each end of the gear. C C C are a series of disks of thin resilient metal preferably sheet steel, they are each perforated centrally with an opening C′ see Fig. 4, which fits the shaft and are corrugated radially as shown best in Figs. 4 and 5. The set of disks are nested together so that the corrugations fit into each other and they are then clamped together by bolts, rivets or screws D D D D between the end plates B B, the inner surfaces whereof are corrugated to conform to the corrugations of the disks. The cogs best seen in Figs. 1 and 2 are then cut in them as usual preferably extending also through the plates B B. The plates may, however, in some instances be of less diameter than the disks and then the cogs may not be cut in them, and if the disks be strong or thick enough, the heavy end plates may be omitted. The gear is made somewhat wider than the gear with which it is to engage so that the end plates if used will not come in contact therewith.

In Fig. 6, I show a form in which the disks are dish shaped. They are provided with the central opening for the shaft and are confined between end plates substantially the same as those shown in Figs. 1, 2, 3, 4, and 5. Of course the end plates as shown conform to the shape of the surface of the disk with which they respectively came in contact.

In Fig. 7, I show a construction in which the end plates B B are cut at an angle on their inner surface and arranged reversely so that the disks which in this case are perfectly flat are caused to assume an angle relative to the shaft upon which the gear is set. If necessary the shaft hole in the disks in this construction may be slightly elliptical to allow of the angling position of the plates on the shaft. The disks and end plates are all confined together by bolts, rivets, screws or the like as in the other instances and cogs are cut in the periphery of the gear after being put together or before while the disks are still separate if preferred. I deem it more desirable to cut the cogs after the gear block, so to speak has been assembled. A key way may be cut on the interior of the shaft hole of such form as desired or other means may be employed to fasten the gear on the shaft. It will of course be understood that the end plates B B should not be clamped so firmly upon the disks as to prevent their movement under pressures because this would render the gear practically rigid and the benefits of my invention would not be secured and in fact some times I put a dished, cup or spider spring under the heads of the bolts to press against the side plates B as shown at Fig. 3 whereby I secure considerable yielding in the gear. The peripheral area of contact of each of these

gears with the gear into which it meshes should be on lines which fall within the most inwardly extending parts of the end plates, this I indicate by the lines E E on Fig. 7 which represent the width of the face of the other gear.

It will be seen that in each form of my invention the cogs are made of a plurality of separate sheets or plates of relatively thin metal which are adapted to spring under the strain of contact with the other gear and to slightly move upon each other during their flexure. And it will also be seen that in the form shown in Figs. 1 to and including Fig. 7, the flexure of the plates or sheets is possible because they are presented to the opposing gear in positions other than edgewise thereto. It will also be observed that in all forms of my invention the teeth of the flexible gear will move around the shaft somewhat relative to the fixed point thereof determined by the key or fastening should the alignment of the teeth of the rigid gear for any reason not coincide with them. In the constructions shown in all the figures excepting 8 and 9 this takes place by the slipping of the several disks slightly upon each other the bolts or screws D assuming a position slightly tangential to the true axis of the gear.

By my invention I reduce wear, reduce noise, reduce repair account, secure greater safety and more reliability in operation than by any other form known to me.

I do not limit myself to the details of construction shown and described because those skilled in the art will perceive that alterations may be made therein and still the essentials of my invention be present.

I claim—

1. A gear wheel composed of a series of plates or disks having curved or undulating contact faces.

2. A gear composed essentially of a series of disks of metal, having corrugated faces fastened together, and having cogs or teeth in their peripheries, substantially as set forth.

3. A gear composed essentially of a plurality of separate plates or disks centrally perforated to fit the shaft and keyed thereto at one part only, the several disks being loosely clamped or fastened together whereby one end of the gear may have a slight movement upon the shaft while the other end remains rigid therewith.

4. A gear composed essentially of a plurality of separate plates or disks of metal held together by spring pressure, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 1st day of November, A. D. 1890.

CHARLES A. LIEB.

Witnesses:
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WILLIAM ALSUR.