W. BRINTON.

SECTIONAL GEAR.

APPLICATION FILED MAR. 21, 1919.

1,308,160. Patented July 1, 1919.

Fig. 1.

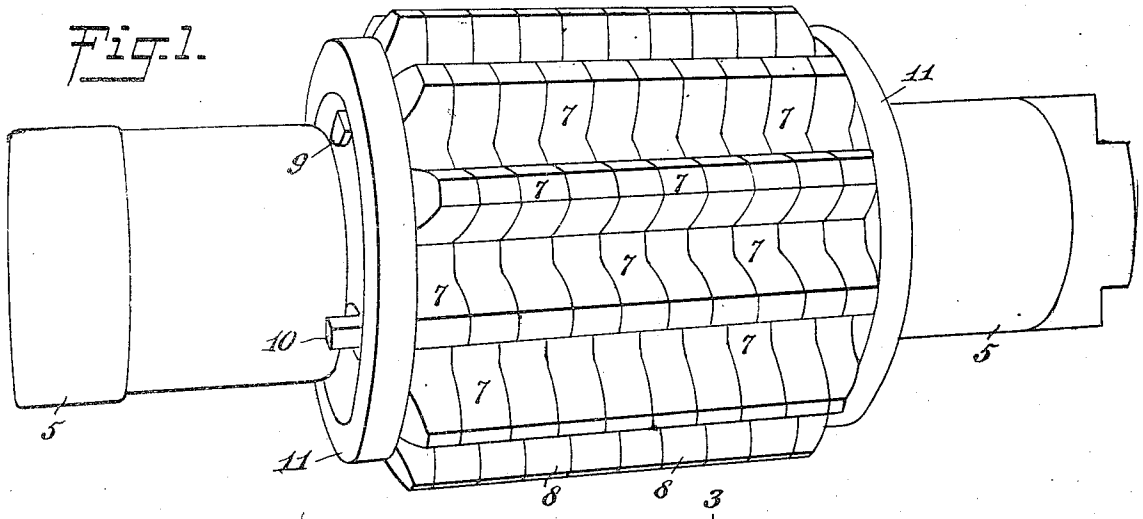


Fig. 2.

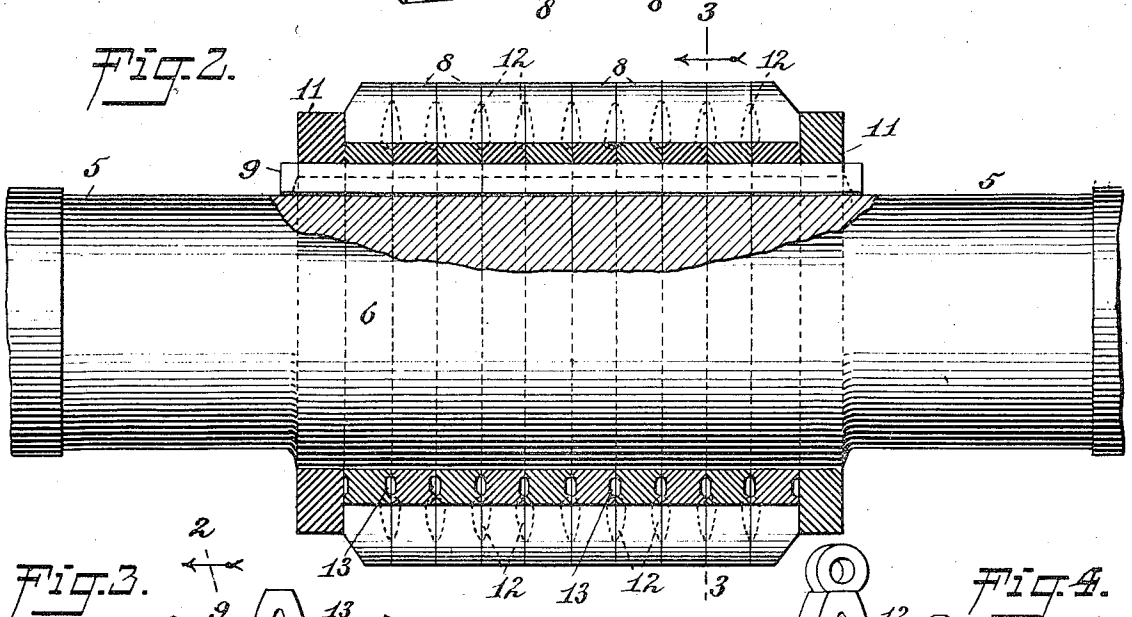


Fig. 3.

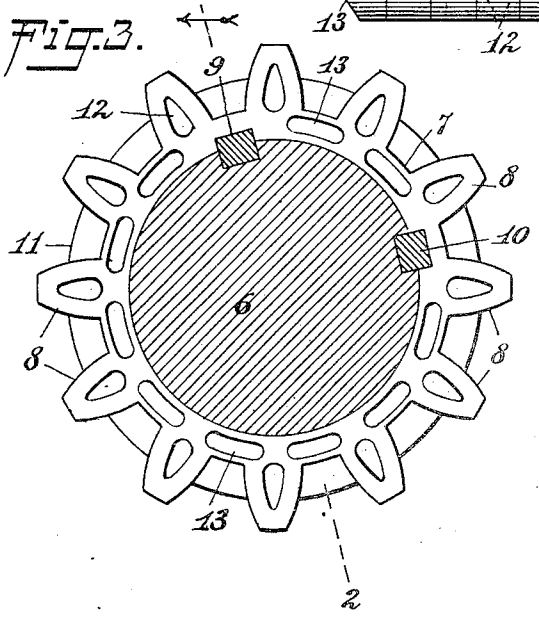
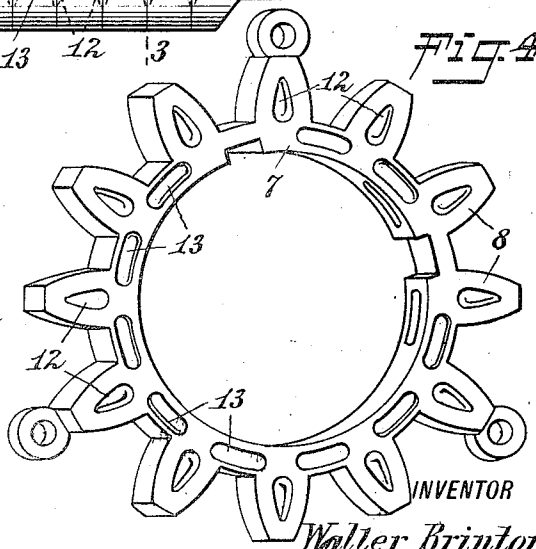


Fig. 4.



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UNITED STATES PATENT OFFICE.

WALTER BRINTON, OF WILMINGTON, DELAWARE, ASSIGNOR TO AMERICAN MANGANESE STEEL COMPANY, OF AUGUSTA, MAINE, A CORPORATION OF MAINE.

SECTIONAL GEAR.

1,308,160. Specification of Letters Patent. Patented July 1, 1919.

Application filed March 21, 1919. Serial No. 284,167.

To all whom it may concern:

Be it known that I, WALTER BRINTON, a citizen of the United States, and a resident of Wilmington, in the county of New Castle and State of Delaware, have made and invented certain new and useful Improvements in Sectional Gears, of which the following is a specification.

My invention relates to sectional gears designed especially for use in heavy and severe service such, for example, as is met with in rolling mill work wherein the roll trains are driven by gears made in accordance with my invention; and particularly to gears wherein the teeth are formed upon a sleeve of tough wear-resisting material such, for example, as cast manganese steel; and which sleeve is then placed upon and secured to a hub, center or shaft suitable for the use to which the complete gear is to be put, and secured thereto. This method of construction provides in effect a single unitary structure, while at the same time enabling the teeth and sleeve to be made of one material, and the shaft or hub of another, should it be deemed desirable to do so.

More particularly, my invention relates to the manufacture of large-size gear or mill pinions measuring up to four to five feet in diameter and formed of cast manganese steel, which material, it has been found in practice, will most successfully withstand the wear and shocks to which pinions are necessarily exposed.

Heretofore it has been found that mill pinions of large size which are formed of cast manganese steel have portions thereof which are brittle, and further, that the strains and stresses set up during the shrinkage of the metal cannot be entirely eliminated, due to the excessive size of the castings.

Manganese steel in the cast state is composed principally of austenite and free cementite, the austenite being the desired solution of iron and manganese, and the cementite occurring as an impurity or undesirable ingredient made up of the carbids of iron and undissolved manganese. The occurrence of cementite in a casting renders the same brittle and unsound and must be eliminated by heat treatment in order for the casting to embody the required strength and toughness.

The failure of large-size mill pinions which have been formed of cast manganese steel, in the past, has been largely due to the presence of cementite, the casting being of such size that it is impossible to quench the same during its heat treatment with sufficient rapidity to prevent the formation of cementite.

It is an object of my invention, therefore, to provide a gear of such construction that it may be formed of cast manganese steel, the design being such that each and every part of the gear may be rapidly quenched during the heat treatment and the formation of cementite avoided.

With this and other objects in view, I have provided a gear or mill pinion which is formed of a hub upon which are assembled annular sections composed of cast manganese steel and the teeth of each section being provided with inwardly projecting cavities, so that the teeth in particular may be entirely free of the injurious cementite.

A further object of my invention is to provide for the more convenient manufacture of sectional gearing made up of annular gears as aforesaid, such end being attained by providing the sections with perforated lugs or ears through which bolts may extend, and whereby all the sections necessary to form a finished gear may be secured together preparatory to grinding the interiors of the sections and the keyways for securing them to the hub or shaft whereby they are carried at one and the same grinding operation, thereby securing uniformity of size in the holes in the several individual gear sections through which the shaft referred to extends and materially reducing the cost of manufacture of the finished gear made up of the sections as aforesaid.

With the above and other objects in view, my invention consists in the improved sectional gear illustrated in the accompanying drawing and hereinafter described and particularly claimed, and in such variations

and modifications thereof as will be obvious to those skilled in the art to which my invention relates.

In the drawing accompanying and forming a part of this specification and wherein the preferred embodiment of my invention is illustrated:

Figure 1 is a perspective view showing a gear made in accordance with my invention; Fig. 2 is a view showing a section upon a longitudinal central plane of the gear sections, the end rings of the gear, and the shaft or hub in part; the position of the plane being indicated by the line 2, 2, Fig. 3; Fig. 3 is a view showing a section upon a transverse plane indicated by the line 3, 3, Fig. 2; and

Fig. 4 is a perspective view showing a section from which the gear as a whole is formed by itself, and with the ears or lugs whereby several sections may be secured together to thereby secure uniformity in grinding the opening for the shaft or hub to which they are to be secured.

Referring now to the drawing, the reference numeral 5 designates a hub or shaft the central portion 6 of which is shown as slightly enlarged, and to which enlarged portion a plurality of separate annular toothed gear sections designated each by the reference numeral 7 are secured so as to rotate with the shaft but not independent thereof; the side faces of each two successive gear sections being in contact one with another, and the teeth 8 of all the sections being in alinement, as best shown in Fig. 1 of the drawing. In the embodiment of my invention illustrated the several sections of the assembled gear are secured in proper position relative to one another by two keys 9, 10 lying within key ways provided in the enlarged central portion 6 of the shaft and in the several gear sections, although the manner of holding the gear sections in proper position is of secondary importance herein, as this present invention in no way relates to the structure of securing means for preventing the rotation of the gear sections upon the shaft whereby they are supported. End rings such as are designated by the reference numeral 11 are preferably placed one at each end of the gear made up of the several separate sections as herein explained to thereby secure a more desirable gear and to provide shroudings at the ends thereof, although the use of such end rings may be dispensed with without affecting the distinguishing features enumerated in the concluding claims, and wherein my invention consists, should it be deemed desirable to do so.

The gear sections 7 are made of cast manganese steel, this material being extremely strong and tough and having wear-resisting qualities especially adapting it for use in the manufacture of gears for rolling mills, where excessive strains and fluctuating loads are of frequent occurrence.

The sections 7 are provided with recesses or cavities 12 extending inwardly from the side walls thereof, which cavities approximate the form or shape of the contour of the walls of the teeth 8. Grooves 13 are also provided which project inwardly from the side face of the sections 7, and the walls thereof follow the contour of the side walls of the ring-like construction from which the teeth project. The thus forming of the gear with a separate hub and mounting thereon a plurality of cast manganese steel sections, the design of which section being such that the occurrence of cementite therein is entirely eliminated, provides a gear which is especially able to withstand high and excessive strains and hard service. In order that the various sections 7 may be properly alined and the teeth ground without disturbing the alinement, I have provided the gear sections with projecting ears or lugs, as illustrated in Fig. 4, through which bolts may extend. After the teeth have been properly ground, the lugs are removed.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. A gear composed of a plurality of transversely arranged sections formed of cast manganese steel, each section including a continuous ring-like body having teeth projecting therefrom, said teeth provided with recesses extending inwardly from the side walls thereof.

2. A gear section formed of cast manganese steel with a ring-like body having teeth projecting therefrom, said teeth provided with recesses extending inwardly from the side walls thereof, the ring-like portion of the section being also provided with recesses extending inwardly from the side walls thereof.

3. A gear section formed with a ring-like body having teeth projecting therefrom, the said teeth provided with recesses extending inwardly from the side walls thereof, the walls of said recesses extending substantially parallel to the adjacent walls of the teeth, the ring-like portion of the section being also provided with recesses approximating the form of the adjacent walls of the particular portion of the section in which the said recesses are located.

4. An annular gear section having a series of circumferentially arranged teeth; and a plurality of perforated lugs or ears carried by said section whereby a plurality of sections may be secured together for grinding.

5. An annular gear section having a series of circumferentially arranged teeth; and a plurality of perforated lugs or ears carried by said teeth whereby a plurality of sections may be secured together for grinding.

Signed at New Castle, in the county of New Castle and State of Delaware, this 19th day of March, A. D. 1919.

WALTER BRINTON.

Witnesses:
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G. T. COMLY.