

No. 858,164.

PATENTED JUNE 25, 1907.

H. E. & E. G. EBERHARDT.
FRAMING FOR GEAR CUTTERS.

APPLICATION FILED JAN. 8, 1907.

3 SHEETS—SHEET 1.

Fig. 2.

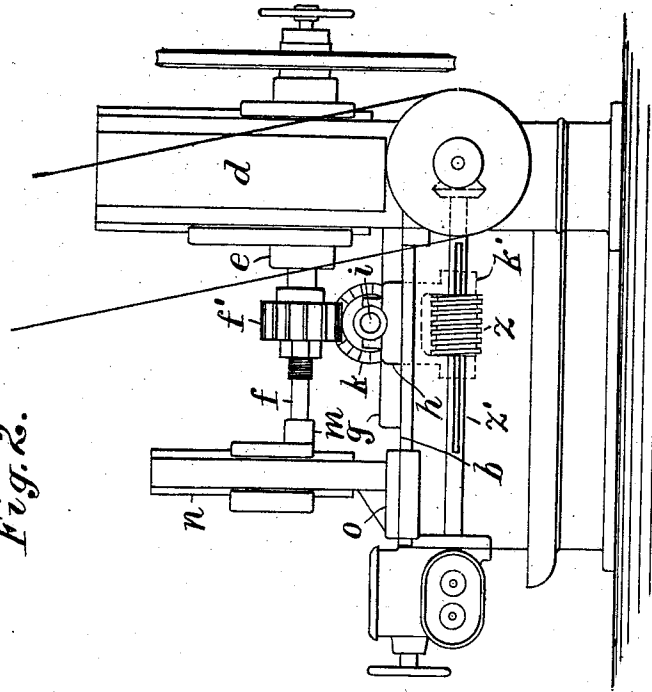
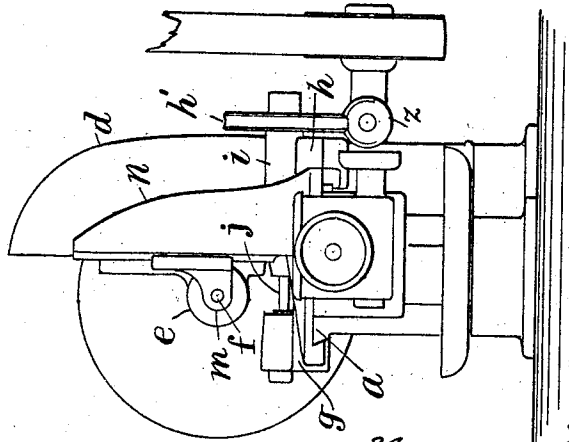


Fig. 1.



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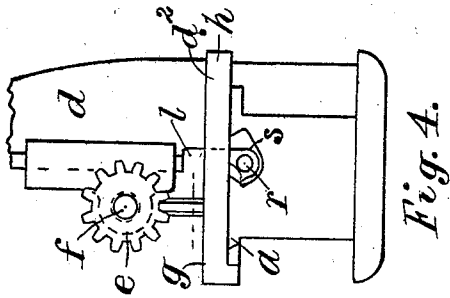


Fig. 4.

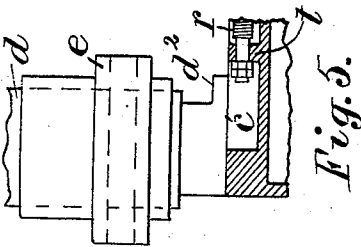


Fig. 5.

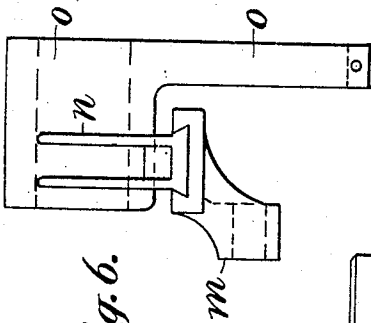


Fig. 6.

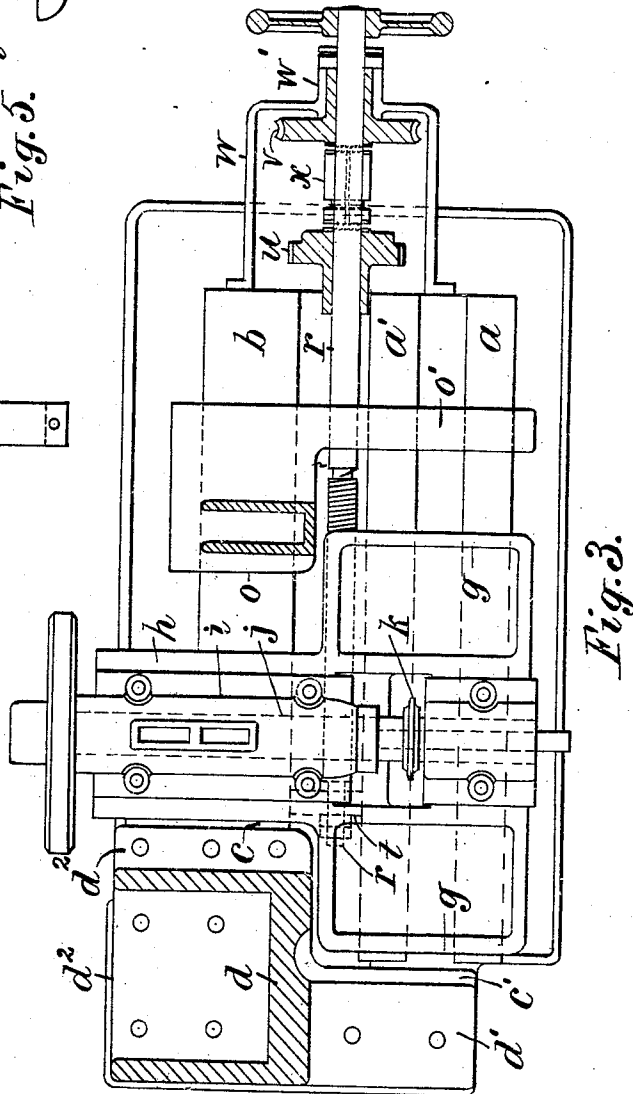


Fig. 3.

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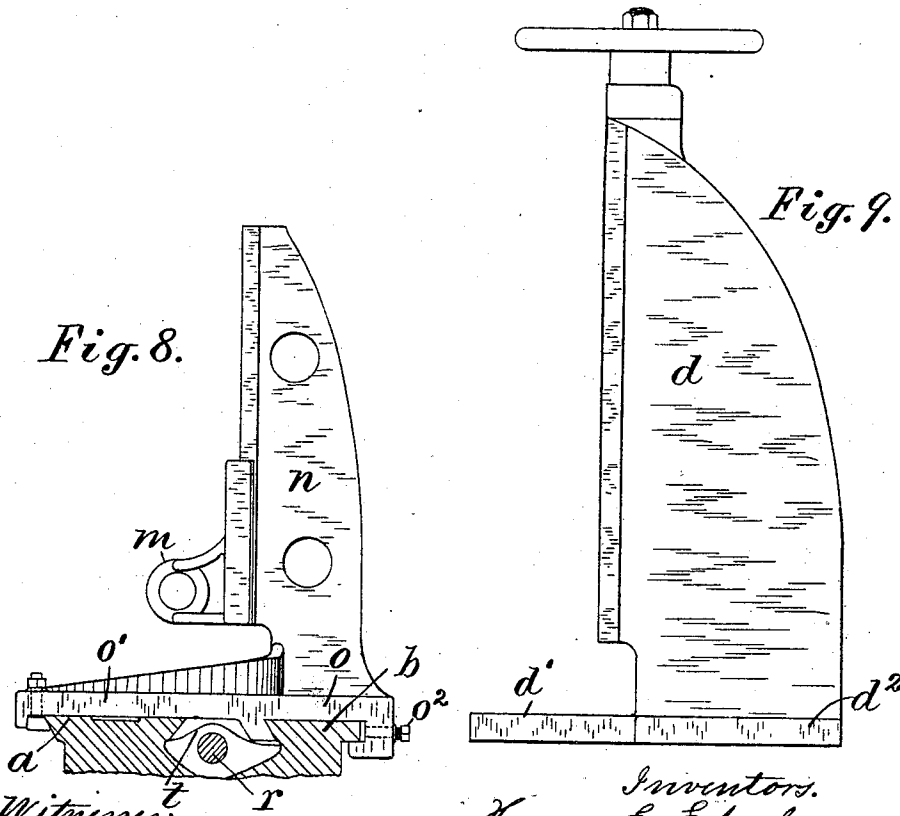
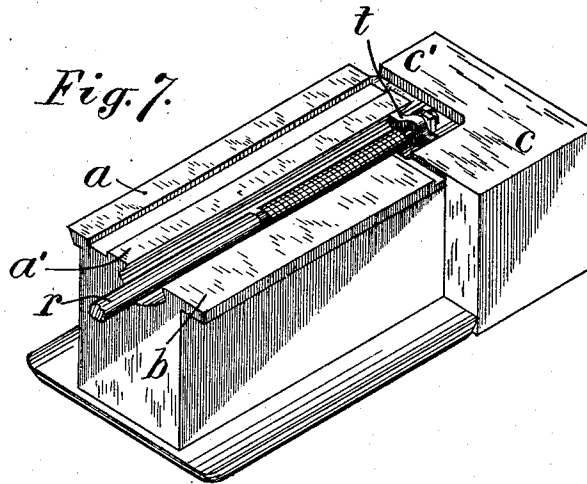
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

HENRY E. EBERHARDT AND ELMER G. EBERHARDT, OF NEWARK, NEW JERSEY, ASSIGNORS TO EBERHARDT BROTHERS MACHINE COMPANY, OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FRAMING FOR GEAR-CUTTERS.

No. 858,164.

Specification of Letters Patent.

Patented June 25, 1907.

Application filed January 8, 1907. Serial No. 351,306.

To all whom it may concern:

Be it known that we, HENRY E. EBERHARDT and ELMER G. EBERHARDT, citizens of the United States, both residing at 113 Orchard street, Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Framing for Gear-Cutters, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that class of gear-cutters in which a vertical column is provided with an adjustable bearing *e* having a mandrel for the gear-blank, and a carriage supporting the gear-cutter and its arbor is moved beneath such blank to cut the teeth upon them in succession.

The object of the invention is to provide a gear-cutter frame in which the column may be placed upon one corner, and guideways for the carriage may be extended in front of the column so that a tee-shaped carriage, having the bearing for the cutter-arbor upon its central arm, may be moved as close to the column as possible, and thus avoid undue projection of the mandrel beyond the support of the column where the blanks are subjected to the cutting strain.

Besides carriage-ways with which the carriage is movably engaged, the top of the bed is provided with an adjacent guideway upon which the central arm of the carriage is supported and upon which is mounted an adjustable mandrel-guide. The column is provided with an auxiliary offset foot at the end of the carriage crossbar, the offset of such foot corresponding with the offset of the crossbar from the central arm of the carriage, and the mandrel guide is furnished with a foot similarly offset; by which construction the various supports are brought into as close working relation as possible, and the length of the bed for a certain extent of bearing surface in each of the elements, is materially reduced. This object is attained by the construction hereinafter described, which operates in an uncommonly rigid manner free from vibration and chattering, and thus finishing the cut gear-teeth more smoothly and accurately than if any vibration occurred.

In the drawing, Figure 1 is an end view of

the gear-cutter provided with the improvement; Fig. 2 is a rear view of the same; Fig. 3 is a plan of the bed with the carriage thereon and the feet of the column and mandrel-guide. Fig. 4 shows the end of the bed and the relation of the carriage to the mandrel supporting post; Fig. 5 shows the front side of the post and mandrel bearing with a section of the bed adjacent to its foot; Fig. 6 is a plan of the mandrel-guide complete; Fig. 7 is a perspective view of the bed alone; Fig. 8 is an end elevation of the mandrel bearing, and Fig. 9 an end elevation of the post.

The bed is of longitudinal box-form with double carriage-ways *a*, *a'*, extended along one side of the top, and a supporting guide *b* of less length extended along the opposite side, with the seat *c* for the column *d* at the end of such guideway and at the side of the double carriage-ways. A seat *c'* extends across the end of the carriage-ways and a column is shown with a foot *d'* fitted to the seat *c* and with an auxiliary foot *d''* projected from its front side to fit upon the extension seat *c'*. The column carries the mandrel-bearing *e* with mandrel *f* projected over the carriage-ways parallel with the same. The carriage is of tee-shape with crossbar *g* and central arm *h*, which latter carries the bearing *i* for the cutter-arbor *j*, which rotates the cutter *k* over the carriage-ways directly beneath the mandrel *f*, and gear blank *f'*. One end of the crossbar *g* upon the carriage can be moved along the front side of the column nearly half way across the same, and a notch *l* is formed at the bottom of the post above the foot *d'* to clear the crossbar *g* in such movement. As it is desired to rotate the cutter over the carriage-ways so as to receive their full support, it is also essential to support the mandrel over the carriage-ways and the notched base of the post brings the main face of the post closer to the line of the mandrel and thus gives it a more rigid support.

A feed-screw *r* is shown fitted to a nut *s* upon the carriage, the screw being arranged between the inner carriage-way *a'* and the adjacent guideway *b*, and the strain of propelling the carriage toward the post is resisted by a bearing *t* for the screw located, as shown in Fig. 7, close to the base of the post, so that the feeding strain is a tensional strain which causes the screw to propel the carriage

without any chatter or vibration. The screw is shown with a spur-wheel *u* and a worm-wheel *v* upon its outer end inside of a feed-box *w*, and a clutch-block *x* splined upon the shank of the screw and adapted to engage coupling teeth upon either the spur-wheel or the worm-wheel. This is a common arrangement in connection with gearing to reverse the screw at diverse speeds, and control it automatically by the carriage movements, but such gearing is not shown as it is already well-known and forms no part of the present invention.

A mandrel-guide *m* is shown having a standard *n* with foot *o* engaged movably with the guideway *b*, and such foot has a narrow extension *o'* projected from its outer end across the carriage-way, the inner edge of the foot being thus offset in correspondence with the offset of the crossbar *g* upon the carriage. The mandrel-guide itself, as shown in Fig. 6, is projected beyond the inner side of the post toward the column *d*, so as to support the mandrel as closely as possible to the column, and thus prevent it from springing when cutting heavy gear-teeth.

The carriage-ways are formed with dovetail edges, as shown in Figs. 7 and 8, and the crossbar *g* of the carriage is provided with gibs to snugly embrace such edges so as to be held firmly thereby, in its cutting movement; but the central arm *h* of the carriage simply rests upon the top of the guideway *b*, the arm forming a support for the extreme rear end of the cutter-arbor, where the gear *h'* is provided for driving the arbor. The guideway *b* is also dovetailed upon one edge to form a close fit, and gibs upon the foot *o* embrace both the edges of the guideway so that it can be adjusted thereon and locked when secured by screws *o''*, shown in Fig. 8, which tighten one of the gibs.

Fig. 7 clearly shows the relation of the different guides, with the double carriage-way extended along one side of the guideway *b* but extending partly beyond the seat *c*, while the guideway *b* is terminated at such seat, for the reason that the guideway only supports the arm *h* of the carriage from the end of which the crossbar *g* is offset.

It will be observed in Fig. 3 that the bearing of the carriage crossbar upon the carriage-ways *a*, *a'*, is of very much greater length than width, which it is well known (in such machinery) holds the carriage more securely in a given path than where the bearing is relatively shorter. As the arm *h* supports only the bearing *i* for the cutter-spindle, it is made of much less width and requires much less support, as it does not act as a guide to the carriage.

In this class of machine, the cutter-spindle is driven from the rear end by the gear *h'* which is represented in Fig. 2 suitably located to mesh with a worm *z* shown in Fig. 1,

which is splined upon a shaft *z'* at the rear side of the bed. As the carriage moves on the bed, the worm is slid upon the shaft by lugs *k'* shown in dotted lines in Fig. 2, thus holding the worm constantly in mesh with the gear *h'*. It is well known that the strain of driving the cutter-spindle causes a great deal of friction upon the spline and shaft and thus creates a considerable resistance to the longitudinal movement of the worm upon the shaft. The resistance of the cutter *k* is near the opposite end of the carriage, and to apply the force to feed the carriage most advantageously, the screw *r* is located between the two points of resistance, and not beneath the cutter *k*, nor at the front edge of the bed. It is found in practice when cutting heavy gearing that this location of the screw combined with the location of the screw-bearing *t* near the base of the column *d*, enables the screw to feed the carriage with great steadiness and avoids chattering and similar vibrations of the carriage and cutter. The bearing *t* receives all the pull or tension of the screw during the feeding movement, while the bearing *w'* in the feed-box *w*, at the opposite end of the screw supports the resistance when moving the carriage in the opposite direction.

From the above description it will be seen that minute attention has been given in this invention to the disposition of all the parts so as to resist all the strain upon them in the most efficient manner, and for this reason every element of the invention contributes something to the total results.

Having thus set forth the nature of the invention what is claimed herein is:

1. A gear-cutter bed having the top formed with double carriage-ways *a*, *a'*, extended along one side and the supporting guideway *b* of less length extended along the opposite side, with the seat *c* for the column *d* at the end of such guideway and at the side of the double carriage-ways, the bed being thus adapted for use with a tee-shaped carriage.

2. A gear-cutter bed having the top formed with double carriage-ways *a*, *a'*, extended along one side and the supporting guideway *b* of less length extended along the opposite side, with the seat *c* for the column *d* at the end of such guideway and at the side of the double carriage-ways, and having an extension-seat *c'* across the end of the carriage-ways, the bed being thus adapted for use with a tee-shaped carriage.

3. In a gear-cutter, a frame having the top of the bed formed with double carriage-ways *a*, *a'*, extended along one side and the supporting guideway *b* of less length extended along the opposite side, the seat *c* for the column *d* at the end of such guideway and at the side of the double carriage-ways, the column *d* fitted to the seat *c* and having the bearing *e* with mandrel *f* for the gear-blanks

supported above the carriage-ways and the tee-shaped carriage having its cross bar *g* engaged movably with the carriage-ways and its arm *h* extended across the guideway *b* with the arbor-bearing *i* mounted on the arm *h* with the arbor *j* therein carrying the cutter *k* below the gear-blank mandrel.

4. In a gear-cutter, a frame having the top of the bed formed with double carriage-ways *a*, *a'*, extended along one side and the supporting guideway *b* of less length extended along the opposite side, the seat *c* for the column *d* at the end of such guideway and at the side of the double carriage-ways, and having an extension-seat *c'* across the end of the carriage-ways, the column *d* having foot *d*² fitted to the seat *c* and auxiliary foot *d'* fitted to the seat *c'*, and having the bearing *e* with mandrel *f* for the gear-blanks supported above the carriage-ways, and the tee-shaped carriage having its crossbar *g* engaged movably with the carriage-ways and its arm *h* extended across the guideway *b* with the arbor-bearing *i* mounted on the arm *h* with the arbor *j* therein carrying the cutter *k* below the gear-blank mandrel, the column *d* having the notch *l* at the bottom above the foot *d'*, to clear the crossbar *g* of the carriage.

5. In a gear-cutter, a frame having the top of the bed formed with double carriage-ways *a*, *a'*, extended along one side and the supporting guideway *b* of less length extended along the opposite side, the seat *c* for the column *d* at the end of such guideway and at the side of the double carriage-ways with the column *d* upon such seat carrying the bearing *e* with mandrel *f* for the gear-

blanks over the carriage-ways, the tee-shaped carriage having its crossbar *g* engaged movably with the carriage-ways and its arm *h* extended across the guideway *b* and provided with the bearing and arbor carrying the cutter *k* over the carriage-ways beneath the mandrel, and the mandrel-guide *m* having standard *n* and foot *o* engaged movably with the guide *b*.

6. In a gear-cutter, a frame having the top of the bed formed with double carriage-ways *a*, *a'*, extended along one side and the supporting guideway *b* of less length extended along the opposite side, the seat *c* for the column *d* at the end of such guideway and at the side of the double carriage-ways, with the column *d* upon such seat carrying the bearing *e* with mandrel *f* for the gear-blanks over the carriage-ways, the tee-shaped carriage having its crossbar *g* engaged movably with the carriage-ways and its arm *h* extended across the guideway *b* and provided with the bearing and arbor carrying the cutter *k* over the carriage-ways beneath the mandrel, and the mandrel-guide *m* having standard *n* and foot *o* engaged movably with the guide *b*, such foot having a narrow extension *o'* projected from its outer edge over the carriage-way, and the mandrel-guide being projected beyond its inner edge toward the column *d*.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

HENRY E. EBERHARDT.

ELMER G. EBERHARDT.

Witnesses:

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THOMAS S. CRANE.