

W. S. HOVEY & C. B. STEBBINS.

GEARING.

APPLICATION FILED MAR. 1, 1909.

1,047,943.

Patented Dec. 24, 1912.

7 SHEETS—SHEET 1.

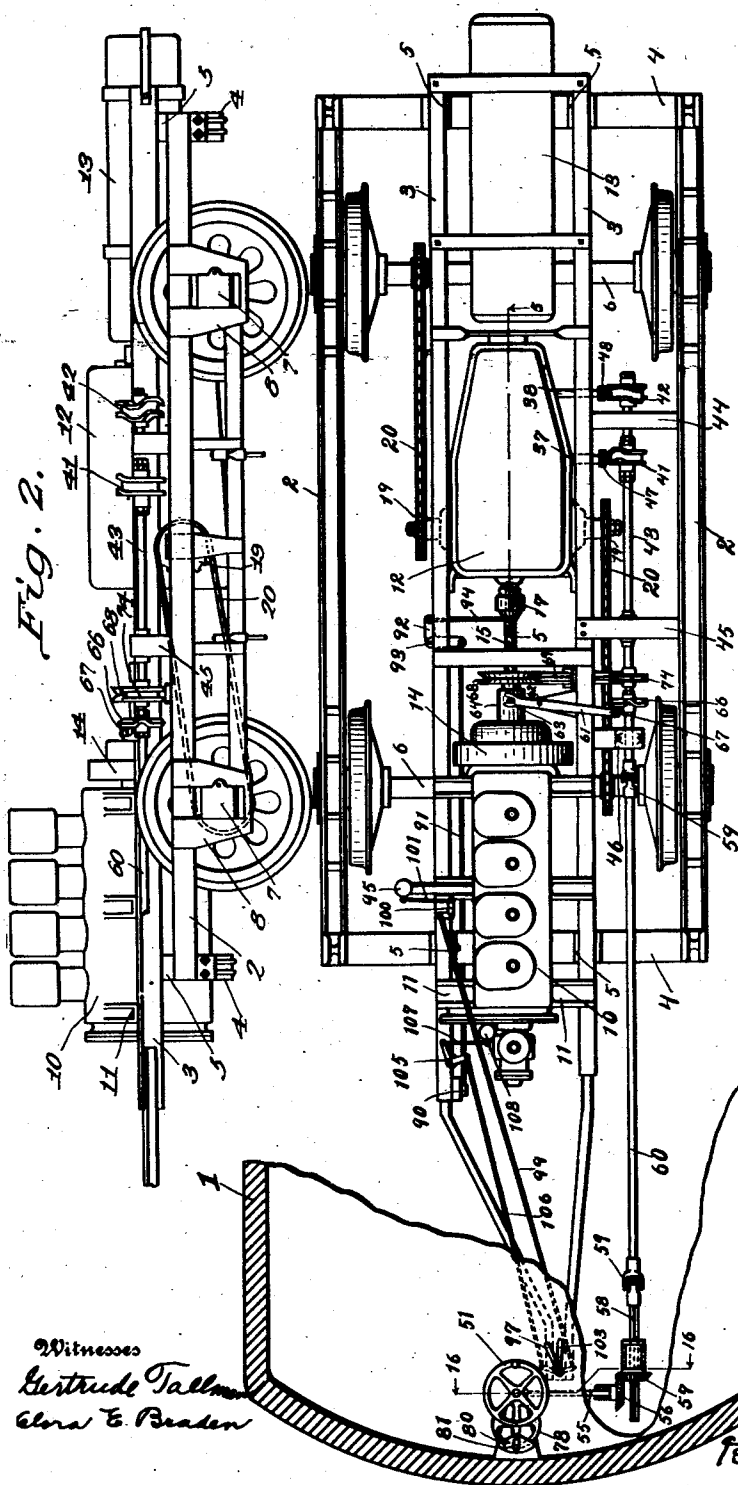


Fig. 2.

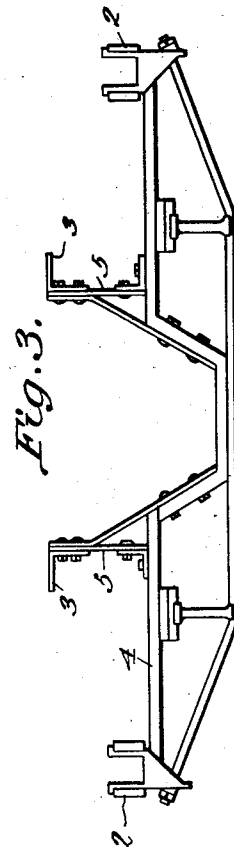


Fig. 3.

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Fig. 1.

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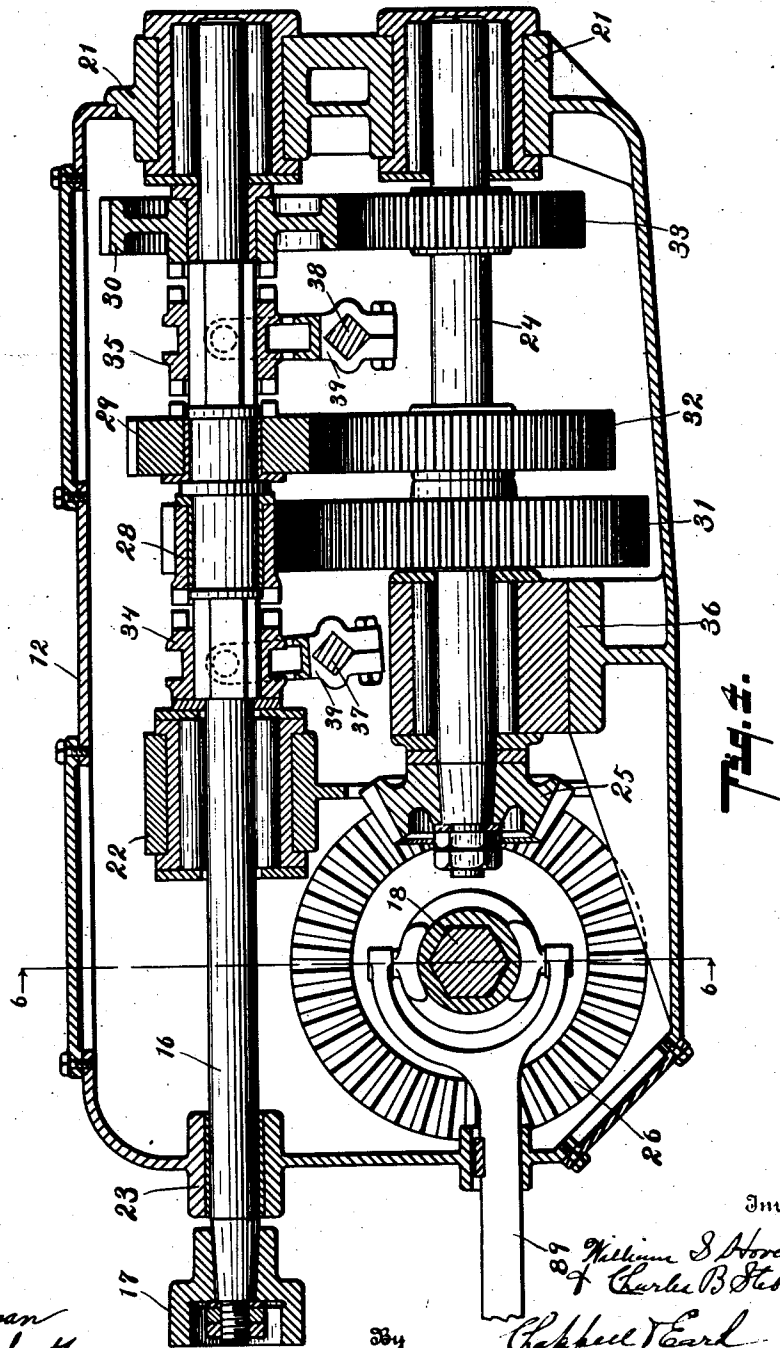
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7 SHEETS—SHEET 2.

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7 SHEETS-SHEET 3.

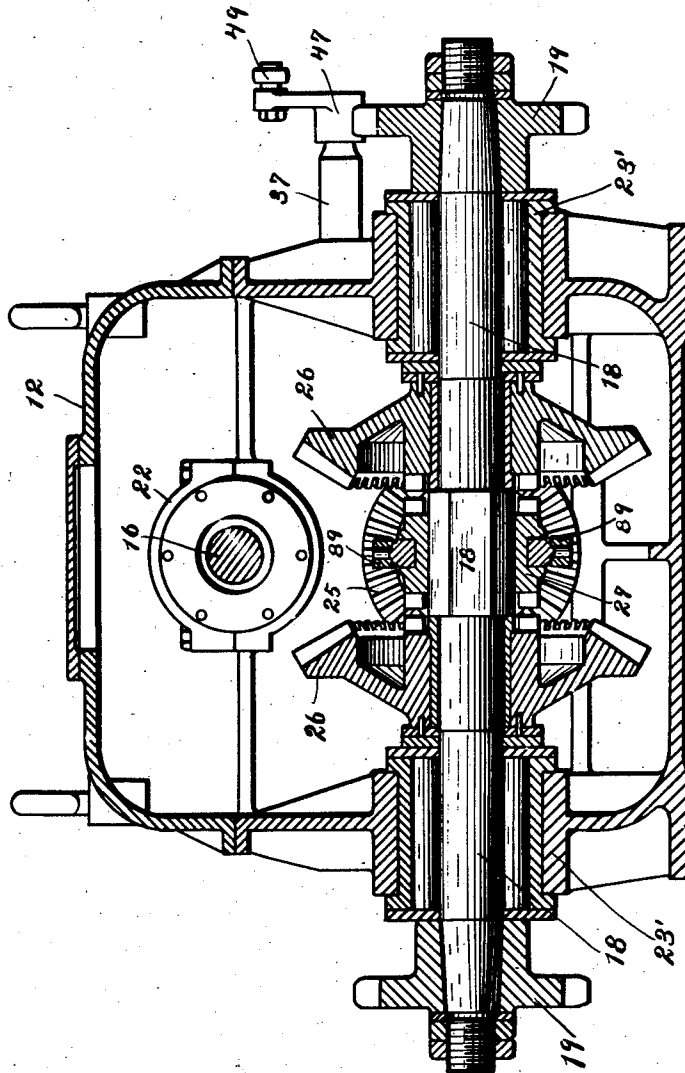


Fig. 5.

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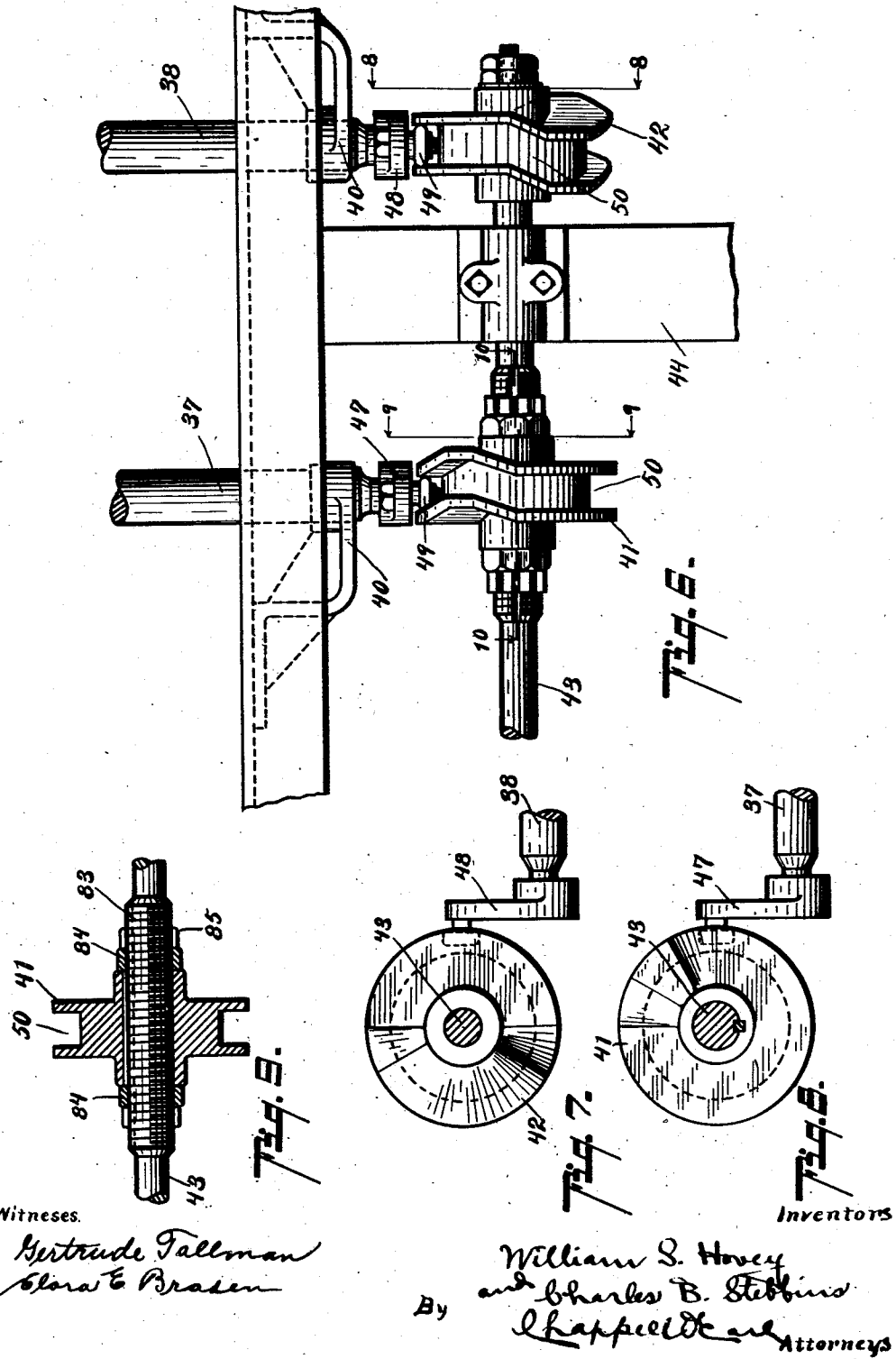
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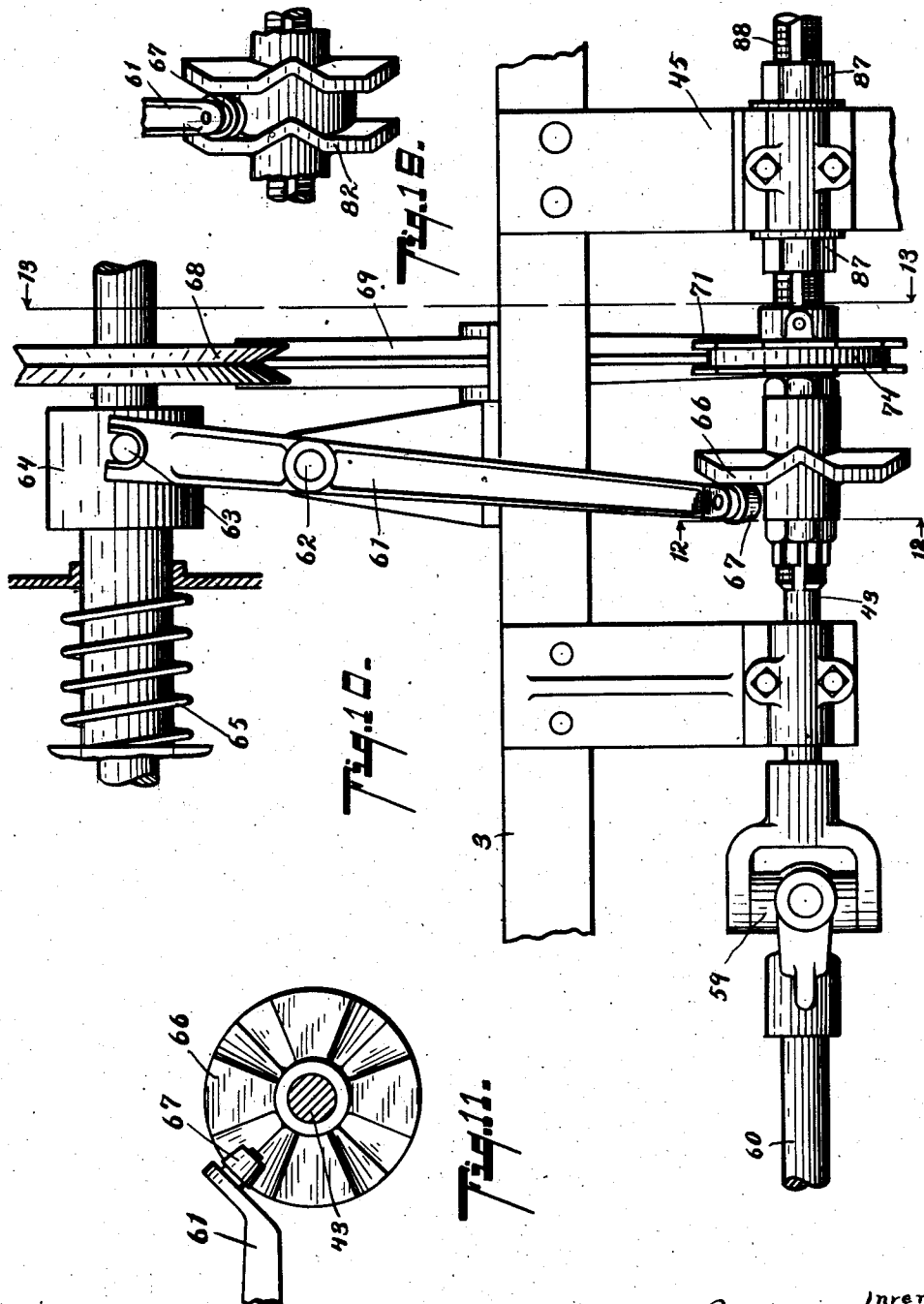
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7 SHEETS—SHEET 6.

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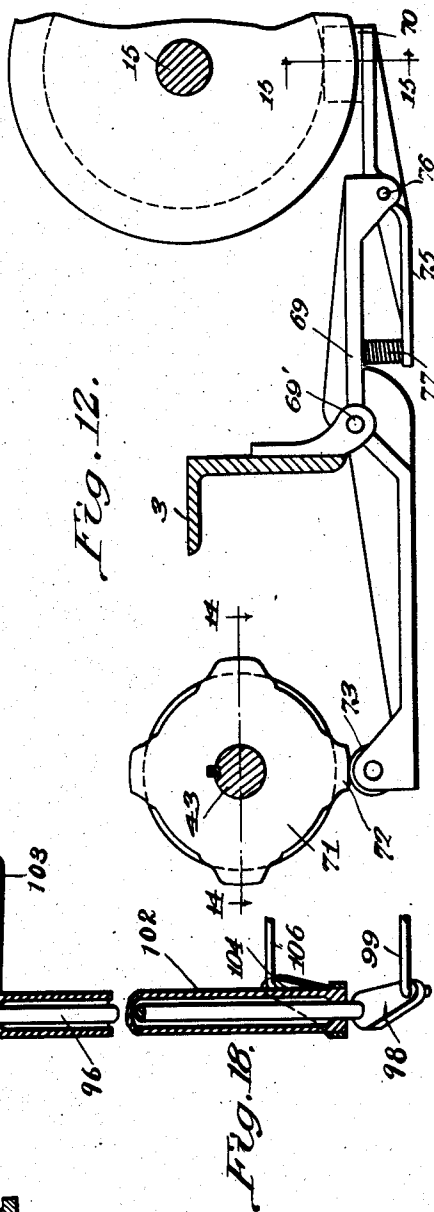
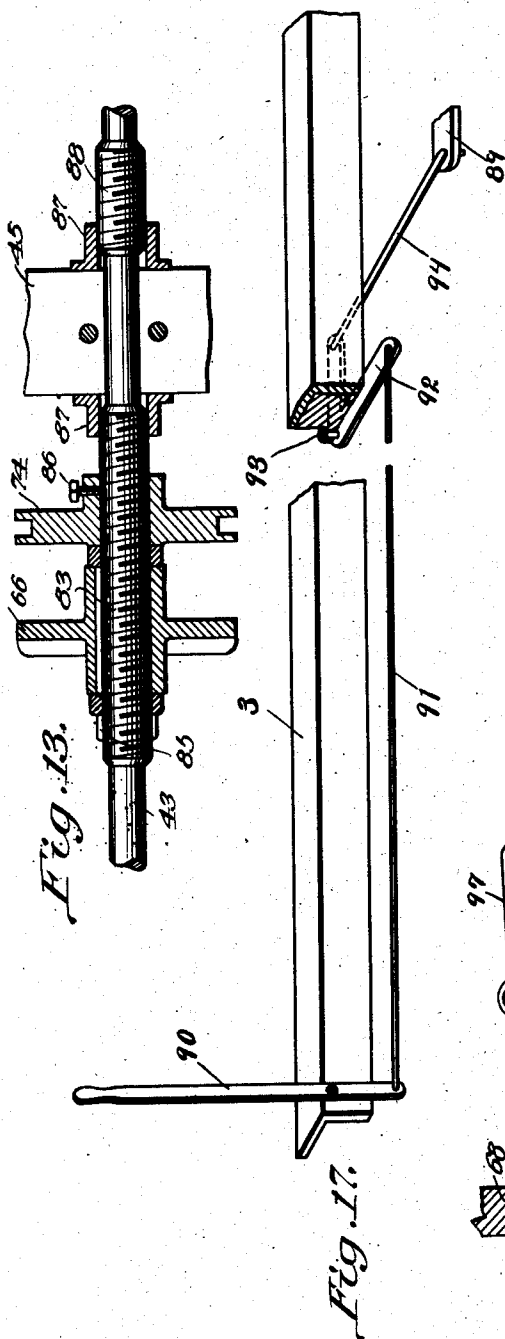
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7 SHEETS—SHEET 6.

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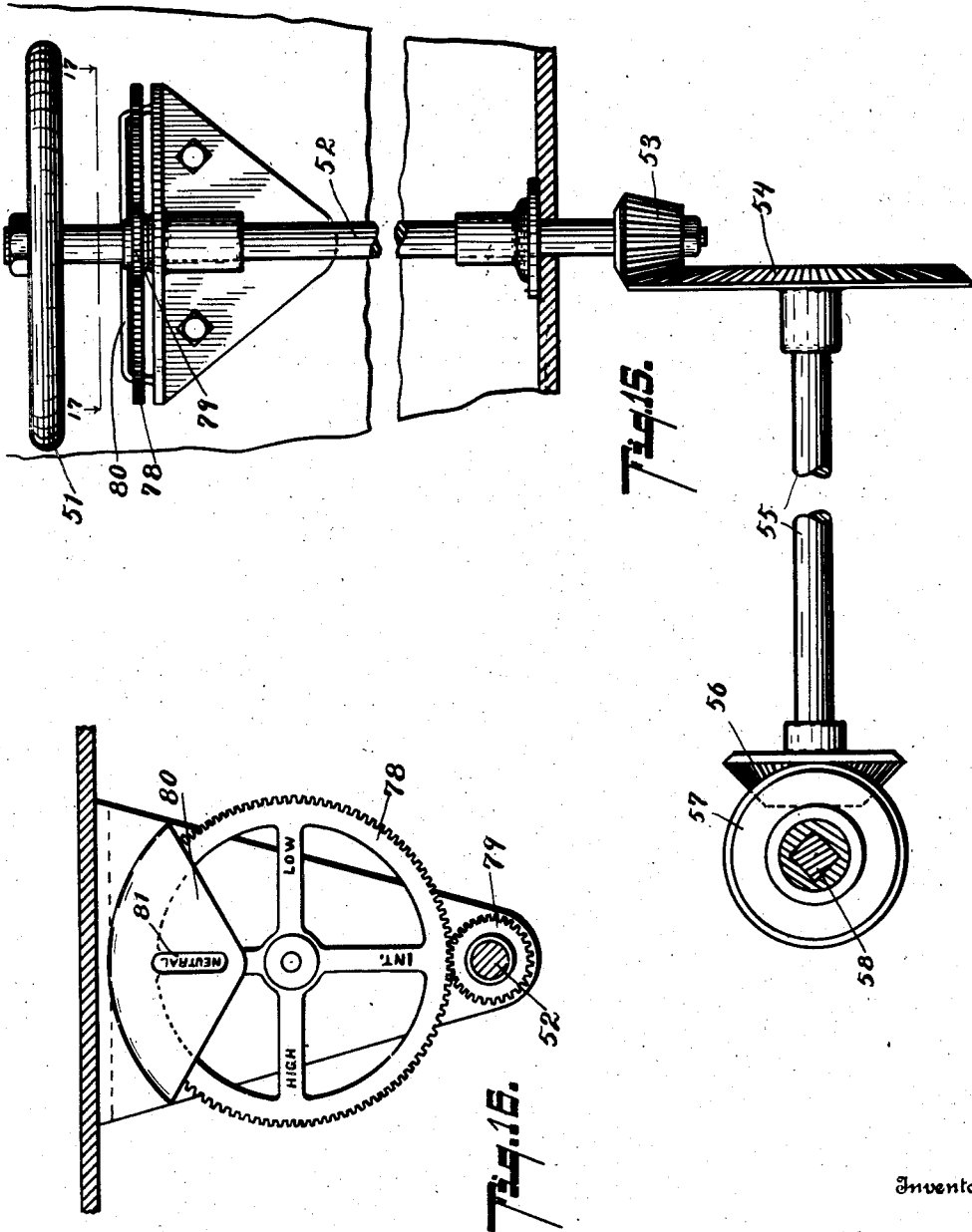
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7 SHEETS-SHEET 7.

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Witnesses

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GEARING.

1,047,943.

Specification of Letters Patent.

Patented Dec. 24, 1912.

Application filed March 1, 1909. Serial No. 480,811.

To all whom it may concern:

Be it known that we, WILLIAM S. HOVEY and CHARLES B. STEBBINS, citizens of the United States, residing at the city of Three Rivers, St. Joseph county, State of Michigan, have invented certain new and useful Improvements in Gearing, of which the following is a specification.

This invention relates to improvements in motor cars.

The main objects of this invention are, first, to provide an improved motor car adapted for use as a railway car, having explosion engines as driving power. Second, to provide in a motor car, an improved control mechanism. Third, to provide in a motor car, an improved control mechanism by which the driving mechanism may be adjusted to different speeds with a minimum shock to the car and to the driving mechanism. Fourth, to provide in a motor car, an improved running gear frame. Fifth, to provide in a motor car, an improved driving connection.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of our invention is clearly illustrated in the accompanying drawing, forming a part of this specification, in which;

Figure 1 is a plan view of the running gear, a detail of the forward end of the body of the car being illustrated in connection therewith to show the relation of the parts. Fig. 2 is a side elevation of the running gear. Fig. 3 is an end view of the running gear frame. Fig. 4 is an enlarged detail longitudinal section through the transmission, taken on a line corresponding to line 5—5 of Fig. 1. Fig. 5 is a vertical, transverse section taken on a line corresponding to line 6—6 of Fig. 4. Fig. 6 is an enlarged detail plan of the transmission clutch actuating cams. Fig. 7 is a detail, vertical section taken on a line corresponding to line 8—8 of Fig. 6. Fig. 8 is a detail vertical section taken on a line corresponding to line 9—9 of Fig. 6. Fig. 9 is a detail longitudinal section taken on a line corresponding to line 10—10 of Fig. 6. Fig. 10 is an enlarged

detail plan view of the master or driving clutch shifting means. Fig. 11 is a detail section of the master clutch actuating cam taken on a line corresponding to line 12—12 of Fig. 10. Fig. 12 is a detail vertical section of the transmission brake and its actuating cam, taken on a line corresponding to line 13—13 of Fig. 10. Fig. 13 is a detail longitudinal section taken on a line corresponding to line 14—14 of Fig. 12. Fig. 14 is a detail section of the brake wheel and brake shoe taken on a line corresponding to line 15—15 of Fig. 12. Fig. 15 is an enlarged detail vertical section taken on a line corresponding to line 16—16 of Fig. 1, showing details of the operating means. Fig. 16 is a horizontal section taken on a line corresponding to line 17—17 of Fig. 15. Fig. 17 is a detail perspective of the reverse operating means. Fig. 18 is a detail perspective of the throttle and timer control ports. Fig. 19 is a modified form of the master or driving clutch operating means.

In the drawings, similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the sectional lines.

Referring to the drawing, the car body 1 is illustrated herein merely to show the general application of the features of this invention. The running gear frame preferably consists of the outer longitudinal sills 2 and the inner longitudinal sills 3, the sills 3 being primarily a support for the engine, transmission, and the like. Details of this frame construction are illustrated in Figs. 1, 2 and 3.

The outer longitudinal sills 2 are connected by cross-pieces 4 at each end, and the inner longitudinal sills 3 are supported on these cross sills by blocks or uprights 5 so that the sills 3 are supported in an elevated position relative to the sills 2. These sills and their connections are shown largely in conventional form and in practice, connections for the parts other than those illustrated are provided to make a rigid strong frame, but as such details form no part of this invention, they are not illustrated herein.

The axles 6 are provided with suitable bearings 7, which are arranged in bearing pedestals 8 of the common or any desired type, so that the running gear frame is yieldably supported on the axles, the bear-

ing pedestals embodying the springs, as is customary in car truck construction. The engine 10 illustrated is of the four-cylinder type, and is shown in conventional form only. This engine is arranged at the forward ends of the sills 3, being arranged between them and provided with rests 11 resting on the top of the sills. At the rear of the engine, and also arranged between and supported by the longitudinal sills, is a transmission, while at the rear of the transmission and also arranged between and supported by the longitudinal sills 3 is a fuel storage reservoir 13.

The engine or crankshaft, not here illustrated, is arranged longitudinally of the running gear frame and is connected by the driving or master clutch 14 to the driving shaft 15. The details of the master clutch 14 are not here illustrated, as they form no part of this invention. The section 16 of the driving shaft is arranged within the transmission casing 12, the coupling 17 for the driving shaft sections being outside of the transmission gear casing. The driven shaft 18 is arranged transversely of the driving shaft and transversely through the transmission casing 12 below the sills 3, and is provided with a sprocket wheel 19 at each end which sprocket wheels are connected by the sprocket chains 20 to the axles 6, the axles being provided with suitable sprocket wheels for the chains. Thus a driving connection is secured to both axles. The driving shaft is provided with a bearing 21 in the rear end of the casing 12, and with a bearing pedestal 22 within the casing. The driving shaft is also supported by a bearing 23 at the front end of the casing 12. The driven shaft is supported by bearing 23' in the side walls of the transmission gear casing. Arranged within the casing and parallel with the driving shaft is a transmission shaft 24, having a beveled gear 25 at one end, which is arranged to mesh with the beveled gears 26 on the driven shaft 18. The gears 26 are revolubly mounted on the driven shaft 18 and are adapted to be connected thereto through the clutch 27, which is of the double jawed collar type so that either of the gears may be secured to transmit the power, thus reversing the driven shaft.

The shaft 24 is connected to the driving shaft through the gears 28, 29 and 30 on the driving shaft, and the gears 31, 32 and 33 on the transmission shaft 24, which are arranged to mesh respectively with the gears 28, 29 and 30. The gears 28, 29 and 30 are all revolubly mounted on the driving shaft, and are adapted to be connected thereto through the clutches 34 and 35, the clutch 34 being arranged to engage the gear 28 while the clutch 35 is adapted to engage either the gears 29 or 30. When the

clutch 34 is in engagement, the drive is through the gears 28 and 31, and a low speed secured. When the clutch 35 is in engagement with the gear 29, an intermediate speed is secured, while a high speed is secured when the clutch 35 is in engagement with the gear 30.

The transmission shaft 24 is supported by the bearing 21 in the rear wall of the casing 12 while its forward end is provided with a bearing supported by a pedestal 36 within the casing. The clutches 34 and 35 are controlled by rock shafts 37 and 38 respectively, the rock shafts projecting transversely from the casing and being provided at their inner ends with forks 39 which engage the clutches. The outer ends of the rock shafts are supported by bearing hangers 40 carried by one of the sills 3. These rock shafts are actuated through the cams 41 and 42, which are mounted on the cam shaft 43 which is arranged longitudinally of the running gear frame. This cam shaft is supported in suitable bearings on the cross-pieces 44 and 45 and on the arm 46, the cross-pieces being between the pair of longitudinal sills 2 and 3 and the arm or bracket 46 projecting outwardly from one of the longitudinal sills 3. These cams 41 and 42 are arranged to act upon the arms 47 and 48 on the rock shafts 37 and 38 respectively, the arms being provided with cam engaging rollers 49 which engage and travel in the cam grooves 50 of the cams, so that the rock shafts are positively actuated in both directions. The cams 41 and 42 are so located relative to each other that the clutches 34 and 35 are successively engaged and disengaged, or both may be thrown out of engagement as the cam shaft is revolved. This cam shaft is actuated from the hand wheel 51, which is arranged at the end of the car, as is indicated in Fig. 1.

The hand wheel 51 is mounted on the central shaft or post 52 on the lower end of which is a beveled gear 53 arranged to mesh with a gear 54 on the shaft 55, the shaft 55 being arranged horizontally under the floor of the car and transversely thereof. On the shaft 55 is a gear 56 arranged to mesh with the gear 57 on the shaft section 58 of the driving connections for cam shaft 43 to the control post. This section 58 is connected to the gear 57 by a slip joint connection, and is connected by a universal joint 59 to the shaft section 60, and the shaft section 60 is connected by a universal joint to the cam shaft 43 to compensate for the movement of the car body on its springs. Thus through this hand wheel 51 the cam shaft is actuated to throw the transmission clutches into and out of engagement, as stated.

It is desirable that the transmission clutches shall be actuated only when the master clutch 14 is disengaged, and we

therefore provide a means for engaging and disengaging this master clutch through the cam shaft so that the manipulation of the hand wheel 51 actuates the master clutch and the transmission clutches in proper sequence. This, in the structure illustrated, see details of Figs. 10 and 11, is accomplished through the lever 61, which is pivoted at 62 and arranged to engage the pin 63 on the clutch member 64, the clutch of the structure illustrated in Figs. 10 and 11 being actuated or thrown into engagement by means of a spring as 65. The lever 61 is actuated by the cam 66 on the cam shaft, the lever being provided with a roller 67 adapted to travel on the face of the cam. The cam projections of the cam 66 are so arranged relative to the cams 41 and 42 that the master clutch 14 is always disengaged during the movement of the transmission clutch.

It is desirable in the shifting of the transmission clutch that the clutches should not be engaged when the driving shaft 15 is running at a high rate of speed, not only on account of the strain upon the structure, but, further, the clutch jaws do not readily engage when the driving shaft is running at the high rate of speed. We therefore preferably use in this connection a brake for the driving shaft which is automatically thrown into and out of engagement by the actuation of the cam shaft. This brake in the structure illustrated consists of a grooved brake wheel 68, see the details illustrated in Figs. 11, 12 and 14, and a brake lever 69 having a V-shaped shoe 70 thereon adapted to engage the grooved brake wheel. The lever 69 is pivoted at 69', and is acted upon by the cam wheel 71 mounted on the cam shaft. This cam wheel is provided with cam projections 72 which are so arranged relative to the cam projections of the cam wheel 66 that the brake is automatically thrown into engagement upon the disengaging of the transmission clutches. The lever is provided with a roller 73 adapted to travel in the grooves 74 of the cam wheel 71. The lever is preferably provided with a yielding portion 75 which is pivoted at 76 and held yieldingly in position by means of the spring 77. The advantage of this will be readily understood. With this arrangement of the parts, by the manipulation of the hand wheel, which may be continuous in one direction or reversed as desired, the low, intermediate or high speeds are secured, or the mechanism entirely disconnected from the engine.

As an index or guide for the motorman, we preferably provide an index wheel 78, see Fig. 16, which is in the form of a gear arranged to mesh with the gear 79 on the control post or shaft. The index wheel 78 and the gear 79 are of the proportion of 1 to 4 so that one revolution of the hand wheel

secures a quarter revolution of the index wheel. The gears 53 and 54 which connect the control post with the shaft 55, are also in the proportion of 1 to 4, so that on each revolution of the hand wheel, the cam shaft is given one quarter turn, thereby bringing one or the other of the transmission clutches into engagement, or both to the neutral point. It is obvious that the device might be adapted for a structure having less than three speeds, or for one having more than three, it only being essential to keep the clutch actuating cams arranged so that the parts are actuated in proper sequence. To further guide the operator, a shield 80 is provided for the operation of the index wheel, having a window 81 therein through which the indicating word or character appears.

In the modified construction shown in Fig. 19, the master clutch is both engaged and disengaged by the lever 61, the cam wheel 82 being of the same type as the cam wheels 41 and 43. For convenience in assembling, the cam wheels 41 and 66 are adjustably secured upon the cam shaft so that they can be brought into proper relation to their levers or rock shafts, and to each other. This we preferably accomplish by placing upon the cam shafts split sleeves 83, see Figs. 6, 9, 10 and 13, which are clamped in place by the nuts 84, the sleeves being threaded to receive the nuts and the nuts being provided with spring fingers 85, which retain them in their adjusted position, thereby adjustably securing the cam wheels to the shaft. The cams are clamped between the nuts, as clearly appears from Figs. 6 and 9. The cam wheel 74 is secured upon the sleeve 83 for the cam wheel 66 by means of a set screw, as 86. The shaft is also preferably made longitudinally adjustable; that is, it may be adjusted longitudinally to some extent, and this is preferably accomplished by providing the internal threaded members 87 at each side of the bearing support 45, the members 87 being threaded to engage one of the sleeves 83 and the clamping sleeve 88 on the other side of the bearing support. The parts can thus be nicely adjusted so that great accuracy in maintaining the measurements in manufacturing is not essential. The engine reversing is secured through the reversing clutch 27, which is shifted by means of the lever 89 arranged through the front of the gear casing, and forked to engage the clutch 27, as clearly appears from Figs. 4 and 5. By shifting this clutch into engagement with one or the other of the gears 26, it will be obvious that the car will be driven accordingly, the speeds being the same in each direction. The lever 89 is shifted from the hand lever 90, which is connected by the link 91 to the bell crank lever 92, which is pivoted at

93 on one of the longitudinal sills 3, and is, in return, connected to the shifting lever 89 by the link 94, see Figs. 1 and 17. The engine throttle 95 is controlled through the rock shaft or control post 96, which is provided with a hand piece 97 at its upper end and an arm 98 at its lower end, which is connected by the link 99 to one arm of the bell crank lever 100, the other arm of the lever being connected by the link 101 to the throttle; see Figs. 1 and 18. The timer is controlled by the rock shaft or control post 102, through which the control post 96 is preferably arranged, as clearly appears in Fig. 18 the rock shaft 102 being provided with a hand piece 103 at its upper end and an arm 104 at its lower end, which is connected to one arm of the bell crank lever 105 by the link 106, the other arm of the bell crank lever being connected by the link 107 to the timer 108. The timer and the throttle, which is arranged in the carbureter, are indicated in conventional form only as they form no part of this present invention. These throttle and timer control posts are preferably located adjacent to the hand wheel 51 for convenience. By this construction of the running gear frame, it is simple, and, at the same time, strong, rigid and compact, which are features to be desired in structures of this class—that of a four wheel railway truck. The engine is mounted on the truck or running gear, which is supported by the traction wheels, and the car body is mounted upon the running gear frame by springs, so that the vibration of the engine is not communicated thereto, or the movement or swaying of the car body is not materially communicated to the engine. The engine and transmission being mounted upon the sills 3, are held in alinement.

By the control described, the speeds may be changed as desired, from the low to the high speed, thus securing a comparative even increase in the speed, and thereby relieving the car of sudden jerks to which it would otherwise be subjected.

We have illustrated and described our improvements in detail in the form preferred by us on account of the structural simplicity and economy thereof, but we are aware that these structural details may be very greatly varied without departing from our invention, and we desire to be understood as claiming the same specifically, as illustrated, as well as broadly.

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

1. A variable speed transmission gearing comprising a plurality of clutches, a plurality of rock shafts for actuating said clutches, a master or driven clutch for said transmission gearing, a cam shaft, cams thereon ar-

anged to actuate said rock shafts, said cams being adapted to act successively on said rock shafts, whereby the said transmission clutches may be successively engaged and disengaged, an actuating lever for said master clutch, a cam on said cam shaft having a plurality of cam projections arranged to act on said lever to disengage said master clutch simultaneously with the shifting of said transmission clutches; a brake wheel for said transmission gearing; a brake lever; and a cam on said cam shaft having a plurality of cam projections arranged to act on said lever to engage said brake when said clutches are disengaged.

2. A variable speed transmission gearing comprising a clutch, a rock shaft for actuating said clutch, a master or driving clutch for said transmission gearing; a cam shaft; a cam thereon arranged to actuate said rock shaft; an actuating lever for said master clutch; a cam on said cam shaft arranged to act on said lever to disengage said master clutch upon the shifting of said transmission gear; a brake lever; and a cam on said cam shaft having a plurality of cam projections arranged to act on said lever to engage said brake wheel when said clutches are disengaged.

3. A variable speed transmission gearing comprising a plurality of clutches; a brake for said transmission gearing; a master or driving clutch for said transmission gearing; means for shifting said clutches and for actuating said brake, comprising a cam shaft having cams thereon arranged so that said transmission clutches may be successively engaged and disengaged and said driving clutch and brake are engaged and disengaged upon the shifting of said transmission clutches; and means for actuating said cam shaft having an indicator operatively associated therewith.

4. A variable speed transmission gearing comprising a plurality of clutches; a brake for said transmission gearing; a master or driving clutch for said transmission gearing; and means for shifting said clutches and for actuating said brake, comprising a cam shaft having cams thereon arranged so that said transmission clutches may be successively engaged and disengaged and said driving clutch and brake are engaged and disengaged upon the shifting of said transmission clutches.

5. A variable speed transmission gearing comprising a plurality of clutches; a brake for said transmission gearing; a master or driving clutch for said transmission gearing; means for shifting said clutches and for actuating said brake, arranged so that said transmission clutches are engaged and disengaged and said driving clutch and brake are engaged and disengaged upon the shifting of said transmission clutches; and

means for actuating said cam shaft having an indicator operatively associated therewith.

6. A variable speed transmission gearing comprising a plurality of clutches; a brake for said transmission gearing; a master or driving clutch for said transmission gearing; and means for shifting said clutches and for actuating said brake, arranged so that said transmission clutches are engaged and disengaged and said driving clutch and brake are engaged and disengaged upon the shifting of said transmission clutches.

7. The combination of a transmission gearing; a clutch therefor; a brake for said transmission gearing; a master clutch for said transmission gearing; means for shifting said clutches and for actuating said brake; comprising a cam shaft having cams thereon arranged so that said transmission clutch is engaged and disengaged and said master clutch and brake are engaged and disengaged upon the shifting of said transmission clutch.

8. The combination of a transmission gearing; a clutch therefor; a brake for said transmission gearing; a master clutch for said transmission gearing; means for shifting said clutches and for actuating said brake, arranged so that said transmission clutch is engaged and disengaged and said master clutch and brake are engaged and disengaged upon the shifting of said transmission clutch.

9. A variable speed transmission gearing comprising a plurality of clutches; a brake for said transmission gearing; and means for shifting said clutches and for actuating said brake comprising a cam shaft having cams thereon arranged so that said transmission clutches may be successively engaged and disengaged and said brake is engaged and disengaged upon the disengaging and engaging of the clutches.

10. A variable speed transmission gearing comprising a plurality of clutches; a brake for said transmission gearing; and means for shifting said clutches and for actuating said brake arranged so that said transmis-

sion clutches are successively engaged and disengaged and said brake is engaged and disengaged upon the disengaging and engaging of the clutches.

11. A transmission gearing comprising a clutch; a brake for said transmission gearing; and means for shifting said clutch and for actuating said brake comprising a cam shaft having cams thereon arranged so that said transmission clutch and brake are alternately engaged and disengaged.

12. The combination of a transmission shaft; a driving clutch therefor; a plurality of gears, revolubly mounted on said shaft; clutch members slidably mounted on said shaft, and adapted to be shifted into engagement with said gears; means for shifting said clutch members, comprising: a cam shaft having actuating cams thereon; a brake wheel on said transmission shaft; a brake lever; a cam on said cam shaft arranged to actuate the brake upon the disengaging of the said transmission clutch members; and a master clutch actuating means comprising a cam arranged to actuate said master clutch actuating means to disengage the same in proper sequence with said transmission clutches.

13. The combination of a transmission shaft; a driving clutch therefor; a plurality of gears, revolubly mounted on said shaft; clutch members slidably mounted on said shaft, and adapted to be shifted into engagement with said gears; means for shifting said clutch members, comprising: a cam shaft having actuating cams thereon; a brake wheel on said transmission shaft; a brake lever; and a cam on said cam shaft arranged to actuate the brake upon the disengaging of the said transmission clutch members.

In witness whereof, we have hereunto set our hands and seals in the presence of two witnesses.

WILLIAM S. HOVEY. [L. S.]

CHARLES B. STEBBINS. [L. S.]

Witnesses:

E. J. GODSHALK,

D. C. MIX.