No. 854,480. PATENTED MAY 21, 1907.

L. A. FRAYER & W. J. MILLER.

SHIFTING DEVICE FOR GEARING.

APPLICATION FILED APR. 5, 1906.

2 SHEETS—SHEET 1.

Fig. 4

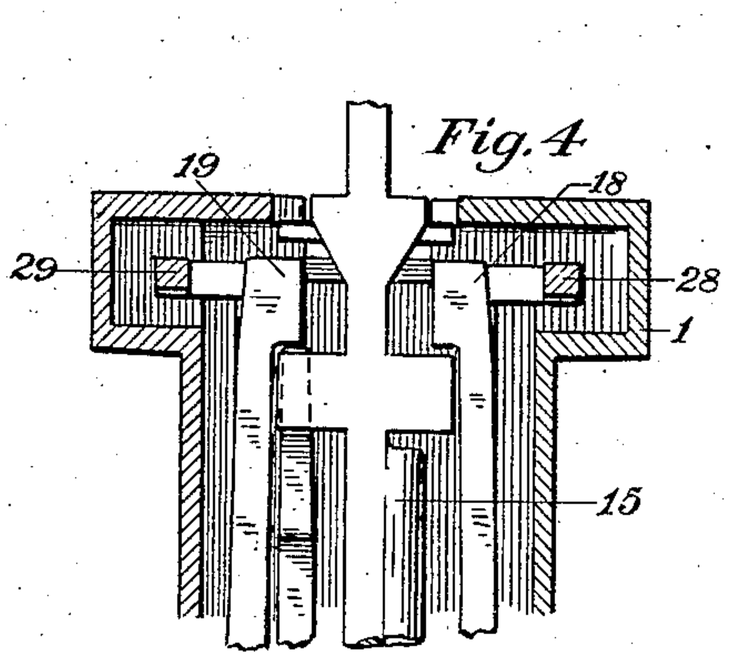


Fig. 1

Fig. 2

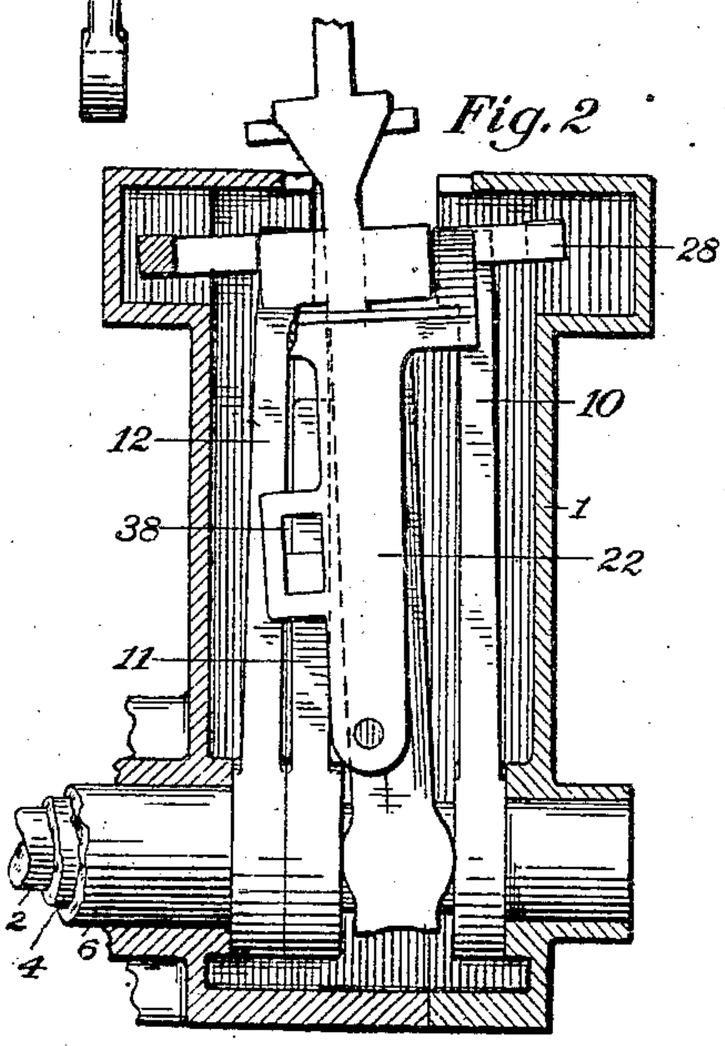
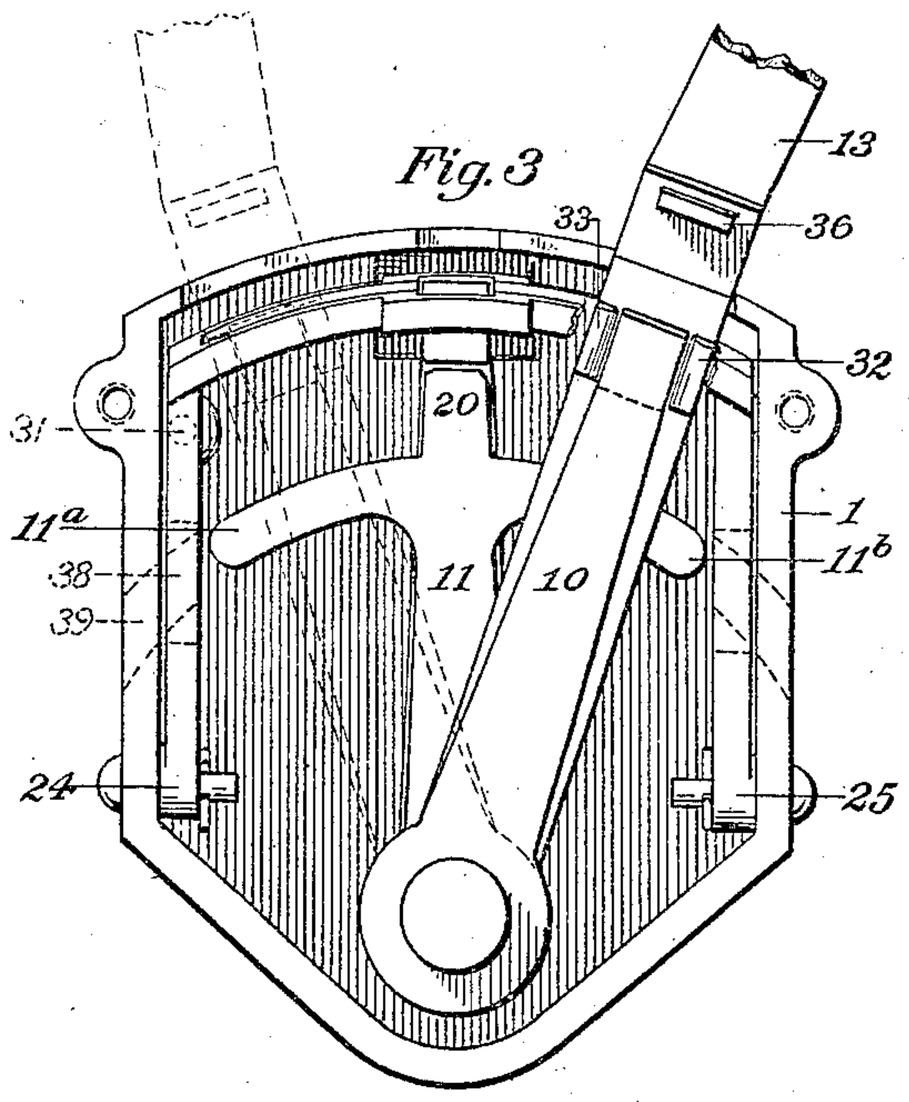


Fig. 3



WITNESSES:

Thos. E. French

R. Rogers.

INVENTORS.

Leo A. Frayer

W. J. Miller

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2 SHEETS—SHEET 2.

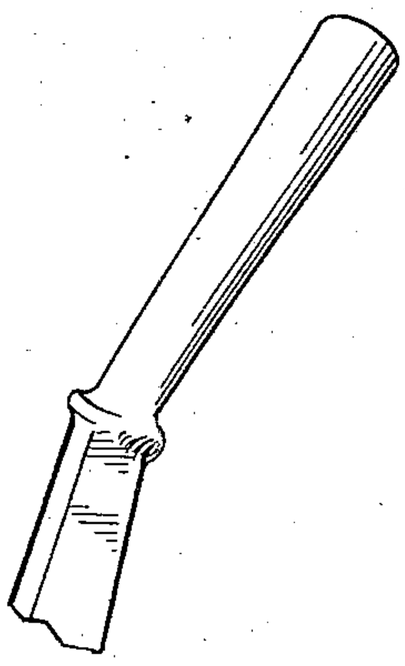

Fig. 6

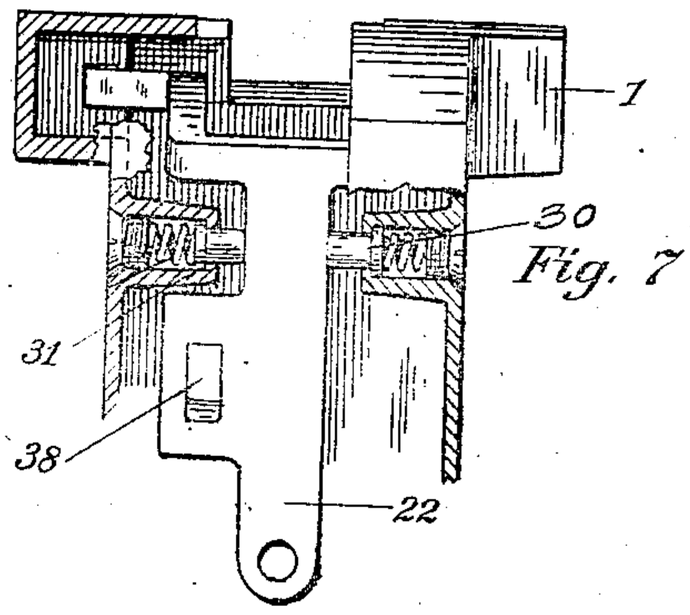

Fig. 7

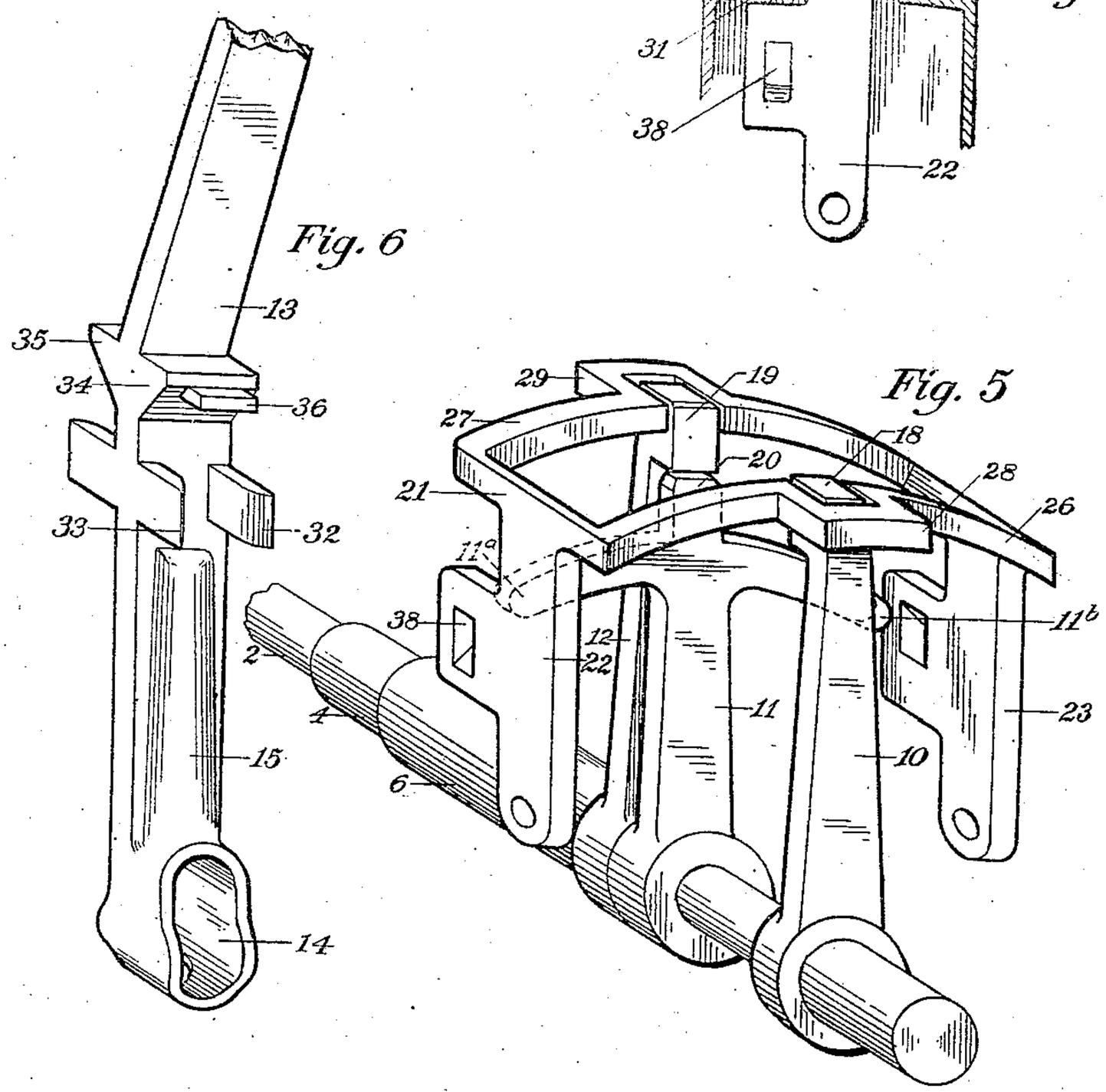

Fig. 5

WITNESSES:

Thos. E. Frenck.

R. Rogers.

INVENTORS.

Lee A. Frayer

Wm. J. Miller

UNITED STATES PATENT OFFICE.

LEE A. FRAYER AND WILLIAM J. MILLER, OF COLUMBUS, OHIO, ASSIGNORS TO THE OSCAR LEAR AUTOMOBILE COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

SHIFTING DEVICE FOR GEARING.

No. 854,480. Specification of Letters Patent. Patented May 21, 1907.

Application filed April 5, 1906. Serial No. 309,968.

To all whom it may concern:

Be it known that we, LEE A. FRAYER and WILLIAM J. MILLER, citizens of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Shifting Devices for Gearing, of which the following is a specification.

Our invention relates to improvements in shifting devices for gearing, especially for automobiles, and comprises a nested arrangement of shafts, each connected with the gearing, and each carrying near its inner end a shifting lever rigidly secured thereon, whereby the shaft is rotated.

It comprises further the location of the levers in proximity to each other and to a main controlling or operating lever, the latter being adapted to pick up the short levers and oscillate the same.

It comprises further the use of an oscillating frame or shuttle inclosing the group of levers, and adapted to lock all levers except the one being operated by the main lever.

It comprises further the use of a main controlling or operating lever constructed to be loosely mounted on one of the nested shafts to oscillate thereon transversely or longitudinally, and to be moved thereon radially against spring tension; and provided with lugs and recesses to adapt it to pick up the shifting levers, and to operate the same within the shuttle.

It comprises further the parts and arrangements thereof hereinafter specifically set forth.

In the accompanying drawings Figure I is a vertical longitudinal section showing the levers in normal position; Fig. II shows the position of the parts when the main lever has picked up one of the shifting levers to operate the same; Fig. III shows the position of the parts when the main lever has carried a shifting lever to the limit of its movement in one direction. Fig. IV shows the position of the parts when the main lever has been forced downwardly to pick up the fingered lever; Fig. V is a perspective of the shuttle and levers in normal position; Fig. VI represents the main lever in elevation; Fig. VII shows the spring actuated stops for returning the oscillating shuttle to normal position.

In the drawings, in which the same reference numerals indicate like parts throughout, 1 is a casing inclosing the shifting levers and shuttle, and the inner ends of the nested shafts upon which the levers are mounted, and also the lower end of the main operating lever; 2 is the central shaft carrying near its outer end the arm 3, which is connected by a rod not shown to the transmission gearing to shift the same; 4 is a tubular shaft or sleeve mounted concentrically upon shaft 2 and carrying near its outer end the arm 5 which is connected by a rod not shown to the transmission gearing to shift the same; 6 is a tubular shaft or sleeve mounted concentrically upon shaft 4, and carrying near its outer end an arm 7 which is connected by a rod not shown to the transmission gearing to shift the same. Shaft 2 is journaled in an enlargement 8 in the outer portion of the casing, and is surrounded by the tubular shaft 4; the outer shaft or sleeve 6 is journaled in a tubular extension 9 of the inner or vehicle side of the casing.

Mounted radially upon shaft 2 to actuate the same is a lever 10 which normally has a vertical direction; mounted radially upon shaft 4 to actuate the same is a lever 11, which is provided near its upper end with the curved fingers 11^a and 11^b and may be described as the "fingered" lever; mounted radially upon the tubular shaft or sleeve 6 is a lever 12 adapted to actuate said shaft. The main lever 13 is loosely mounted upon the shaft 2 preferably between the shorter levers 10 and 11, and is arranged to permit oscillation in a plane cutting the shaft longitudinally. It is noted that the shifting levers are adapted to oscillate only in a plane at a right angle to the length of the shafts. The opening through the main lever whereby it is positioned upon the shaft is slotted as shown at 14 to permit the lever to be moved radially thereon; this lever is enlarged as shown at 15 and is hollowed to receive a coiled spring 16 and plunger 17 contacting with the shaft 2, which operate to return the lever to its normal upper position after the operator has depressed the same to actuate the fingered lever, and maintain it in this position until the operator again depresses it. The spring is of sufficient strength to maintain the main lever in this upper position when it is being used to actuate the levers 10

and 12. Levers 10 and 12 are provided at their upper ends with heads 18 and 19, and lever 11 has its upper end extended above the fingers as shown at 20, these parts of the levers respectively being adapted to be engaged by the main lever.

Inclosed within the casing 1 is a frame or shuttle 21 mounted upon legs 22 and 23, pivotally secured to the casing at 24 and 25. The shuttle or frame is preferably quadrilateral and its sides 26 and 27 form an arc described about the central shaft by a radius equal to the length of the lever 10, or 12, and the sides are spaced apart sufficiently to receive the main lever and the levers 10 and 12 between them; being pivotally mounted, the shuttle is free to oscillate in the direction of the length of the shafts. Its sides are recessed at 28 and 29, and when all the parts are in normal vertical position the heads of the levers 10 and 12 enter these recesses respectively and all the parts are thereby locked against movement so long as this position is maintained. To maintain the shuttle normally in this vertical position spring actuated plugs are provided at 30 and 31, which are adapted to be pressed inwardly when the parts are manipulated as hereinafter described.

The main lever 13 has projections 32, 33, on one face, and corresponding projections on its opposite face, the jaw thus formed on each face being of sufficient width to receive the head as at 18, of the lever 10, or 19 of the lever 12, and thereby carry said lever with the main lever when the latter is oscillated at a right angle to the length of the shaft. When it is desired to pick up lever 10, the main lever 13 is swung laterally, the projections 32 and 33 carrying the oscillating shuttle in front of them until they have closed around the head 18, which is then clear of the shuttle. The shuttle having been drawn laterally by the movement of the main lever, the recess 29 has been occupied by the head 19 of the lever 12, which is thereby prevented from movement. In this position, which is shown as to lever 12 in Fig. II, main lever 13 and lever 10 are free to be moved, and the movement may take place as indicated in Fig. III. When the lever 10 is carried forward, one set of gears in the transmission box is thrown into mesh through the movement of the arm 3 and its connecting rod (not shown) caused by the rotation of shaft 2, and a certain speed is induced in the vehicle; when the main lever is thrown backward and carried beyond center, the gears are released and another set is enmeshed, whereby a different rate of speed is induced. It is necessary that the operator exert a slight lateral pressure continuously in manipulating the main lever as just described. Upon returning the shifting lever to vertical position, the spring pressed plug, as shown at 30 will operate to carry the shuttle and main lever back to normal position. A similar series of movements of the main lever will result in the actuation of lever 12 to produce two degrees of speed in a similar manner through the rotation of tubular shaft 6 and arm 7, thereby actuating a rod (not shown) to shift the transmission gearing. If for any reason shaft 4 should tend to rotate during the movement of shaft 2 or 6, the lever 11 will tend to be carried toward one side or the other, but its movement will be stopped by a finger striking against a leg of the shuttle and the rotation of the shaft in this position of the parts is rendered impossible. Above the jaws heretofore described on the lever 13 are enlargements 34 and 35 on its opposite faces, and each enlargement carries a lateral lug 36, 37, for a purpose now to be described.

To manipulate the lever 11, main lever 13, being in normal position, is thrust downwardly until the jaws have passed below the heads on the levers 10 and 12; the jaws on one face will now engage the upper end of the lever 11, and when a slight movement is made of the main lever, the lugs 36 and 37, pass between the top of the casing and the upper side of the shuttle, and the lever 13 is thereby maintained in its depressed position, the spring 16 pressing the lugs in contact with the under face of the top of the casing. As the lever is moved in one direction, the finger passes through an opening 38 in a leg of the shuttle and a corresponding opening 39 in the casing 1; similar openings are provided on the opposite side to accommodate a movement of the lever 11 in the opposite direction. While the manipulation of lever 11 is being accomplished, levers 10 and 12 are maintained against movement by the shuttle, as appears in Fig. IV. When the lever 13 is returned to the vertical position and the pressure removed, the spring operates to throw it upwardly into the normal position, the radial movement of said lever being rendered possible by the slotted opening therein shown at 14.

To summarize the foregoing description of our invention:—We provide a central shaft and a plurality of tubular shafts or sleeves mounted concentrically thereon, and each shaft is operatively connected with the gearing to shift the same to develop the degree of speed desired; mounted at the inner end of each shaft is a shifting lever for rotating its shaft. Mounted on the central shaft between its shifting lever and the lever mounted at the inner end of the inner tubular shaft or sleeve, is the main operating or controlling lever, which is constructed to oscillate transversely of the shaft and longitudinally also, and is slotted to permit a radial movement thereof. The longitudinal oscillating movement of the main lever is designed to bring the same into engagement with the inner or

outer lever mounted upon the inner or outer shaft, whereupon the transverse oscillation of the main lever causes the appropriate shaft to be rotated. The inward radial movement of the main lever causes the same to engage the fingered lever which is adapted to set up a rotation in its shaft by the transverse oscillation of the main lever. When one lever is actuated by the main lever, the remaining levers are held in an inoperative position by the shuttle, which is pivotally supported to swing laterally to engage the remaining levers and maintain the same against movement when the inner or outer lever is being actuated by the main lever; the shuttle is provided with side recesses adapted to hold the inner and outer levers against movement when the middle or fingered lever is being actuated by the main lever. Spring actuated means are provided for maintaining the main lever in its elevated position, and lugs are provided therein to contact with the under face of the top side of the casing to maintain said lever in depressed operating position. Spring pressed means are provided for returning the shuttle to its normal position after it has been oscillated laterally. The faces of the main lever are provided with jaws to engage the upper ends of the shaft rotating levers.

The advantages apparent from the foregoing study of our shifting device are:—compact arrangement of parts, the employment of a main lever which is thrown into operative engagement with the shaft actuating levers by an oscillatory or a radial movement, and the location thereof on the central shaft always remains unchanged, thus assuring ease, quickness, and accuracy of operation. The shuttle provides a locking means for the unoperated levers, and, being mounted pivotally, is adapted to the conditions created by the manipulation of the main lever. Only one hand lever is required to be manipulated by the operator, its position on its shaft is not changed, and its use in connection with the shifting levers produces two positions of the gearing with each shifting lever, rendering six combinations of gearing possible with the arrangement shown in the drawings herein.

The arrangement and construction of parts herein shown is deemed preferable, but other arrangements and constructions are possible and may readily be suggested or demonstrated; we do not, therefore, limit ourselves to what is specifically shown or described herein but claim all variations which are within the spirit of our invention.

What we claim as new and desire to secure by Letters Patent is:—

1. Shifting devices for gearing, comprising nested shafts connected with said gearing, shifting levers mounted on said shafts to rotate the same, a controlling lever mounted on one of the shafts and constructed to oscillate longitudinally thereon to engage some of said shifting levers and to oscillate transversely thereon to actuate any of said levers to compel a rotation of the shaft desired.

2. Shifting devices for gearing comprising nested shafts connected with said gearing, levers mounted on said shafts to rotate the same, a controlling lever mounted on one of the shafts and free to oscillate both longitudinally and transversely thereon and constructed to engage a selected shifting lever to actuate the same, and means to prevent the movement of the remaining levers.

3. Shifting devices for gearing comprising a central shaft, tubular shafts mounted concentrically thereon, shifting levers mounted on said shafts to rotate the same, a controlling lever mounted on one of said shafts and constructed to admit of longitudinal and transverse oscillation thereon and constructed to be depressed radially thereon, said controlling lever being adapted to engage and to rotate any selected shifting lever, and means adapted to prevent movement of the remaining levers.

4. Shifting devices for gearing comprising a central shaft, tubular shafts concentrically arranged thereon, shifting levers mounted upon said shafts, a controlling lever mounted on one of said shafts and constructed to oscillate longitudinally thereon to engage a shifting lever, and constructed to oscillate transversely thereon to compel said shifting lever to rotate its shaft, and pivotally mounted means inclosing said levers and adapted to prevent movement of the levers not engaged by the controlling lever.

5. In a shifting device for gearing, a plurality of shifting levers, a controlling lever mounted to admit of transverse and longitudinal oscillation throughout its length, rigid jaws formed on the faces of said controlling lever adapted to engage a selected shifting lever, pivotally mounted means inclosing said levers, said means being adapted to be moved laterally by said controlling lever when said jaws are brought into engagement with said shifting lever, whereby said means is positioned to lock the remaining shifting levers against movement thereof.

6. In a shifting device for gearing, a plurality of shifting levers, a pivotally mounted frame inclosing said levers, there being a recess in the side of said frame, a controlling lever mounted to be oscillated longitudinally and transversely throughout its length, rigid jaws formed on the faces thereof, said controlling lever being adapted to be swung laterally to engage said jaws with a shifting lever, whereby said frame is swung laterally, and a second shifting lever is thereby locked in said recess.

7. In a shifting device for gearing a fingered shifting lever, a controlling lever adapt-

ed to be depressed radially against spring pressure, a casing inclosing said levers, means carried by said controlling lever to engage said fingered lever when said controlling lever is depressed, and means carried by said controlling lever to engage against said casing to maintain said controlling lever in operating engagement with said fingered lever.

8. In a shifting device for gearing, a plurality of shifting levers, a fingered shifting lever, a frame surrounding said levers, there being pivoted legs having openings therethrough supporting said frame and recesses in said frame, a controlling lever adapted to operate said shifting levers, said fingered shifting lever being held against movement by contacting with said legs when another shifting lever is operated, the fingers on said fingered lever being adapted to pass through the openings in said legs to permit said lever to be operated.

9. In a shifting device for gearing, shifting levers, a controlling lever mounted to be oscillated longitudinally to engage certain shifting levers and to be depressed radially to engage other shifting levers, and to be oscillated transversely to operate any of said shifting levers, means to permit the selection of any shifting lever desired to be operated by said controlling lever, and means to prevent the operation of all shifting levers except the one so selected.

10. In shifting mechanism for gearing, a shaft, a controlling lever mounted thereon and constructed to be depressed radially thereon, and spring-pressed means carried by said lever and bearing against said shaft and adapted to maintain said lever normally in elevated position.

11. In shifting mechanism for gearing, a plurality of levers, a pivotally mounted frame surrounding said levers, a controlling lever adapted to swing said frame upon its pivot, and spring-actuated means constructed to return said frame to normal position.

12. In shifting devices for gearing, a controlling lever, a fingered shifting lever, a frame member surrounding said levers and mounted to oscillate laterally upon pivoted legs, said legs having openings therethrough, means for oscillating said frame member, the operation of said fingered lever being prevented by the engagement of a finger with one of said legs when the frame member is in oscillated position, and the operation of said fingered lever being permitted by the passing of a finger through one of said openings when the frame member is in normal position.

In testimony whereof we affix our signatures in the presence of two witnesses.

LEE A. FRAYER.
WILLIAM J. MILLER.

Witnesses:
R. E. RIGHTMIRE,
GEO. W. RIGHTMIRE.