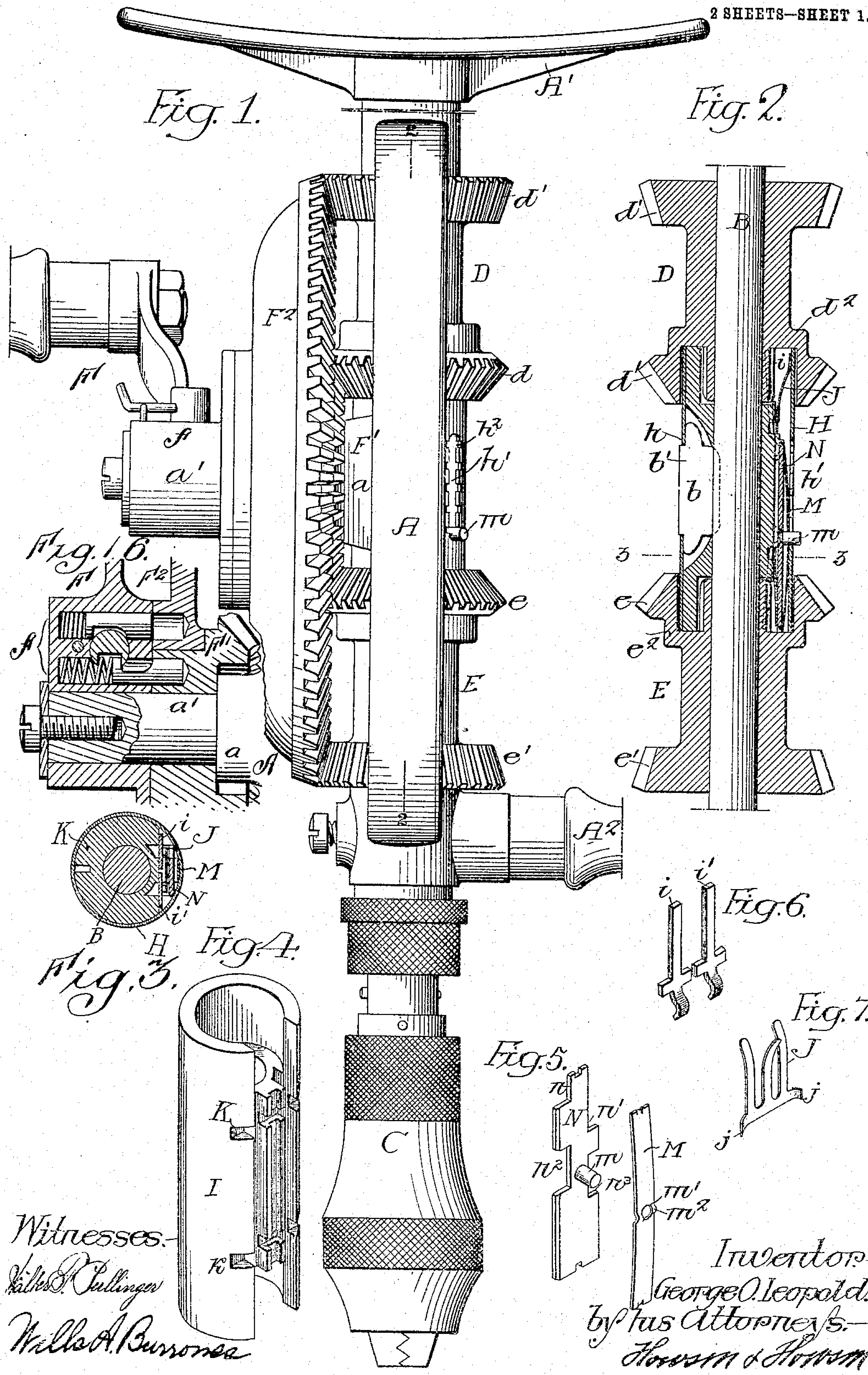
G. O. LEOPOLD.
GEARING.
APPLICATION FILED JUNE 29, 1908.

939,042. **Patented Nov. 2, 1909.**

2 SHEETS—SHEET 1.



Witnesses.
Walter P. Pullinger
Willis A. Burrowes

Inventor
George O. Leopold.
by his Attorneys.
Howson & Howson

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS. WASHINGTON, D. C.

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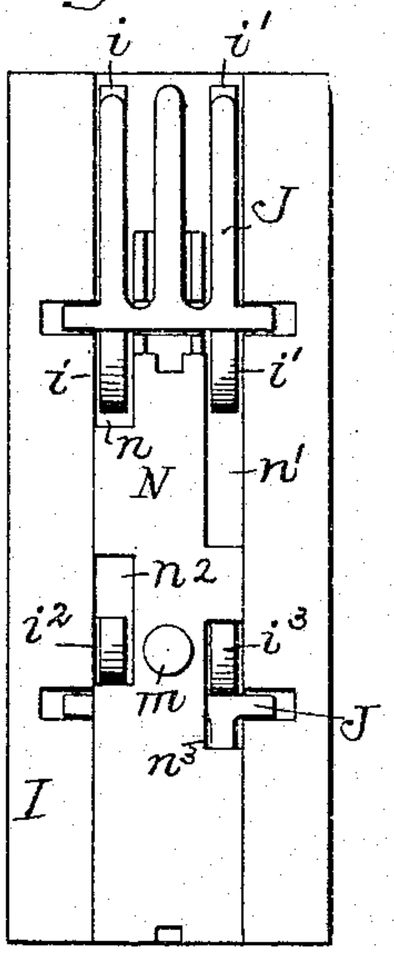
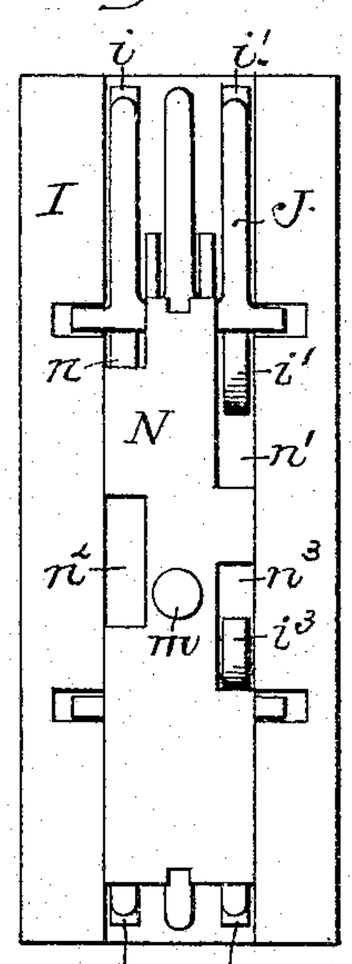
2 SHEETS—SHEET 2.

Fig. 8.



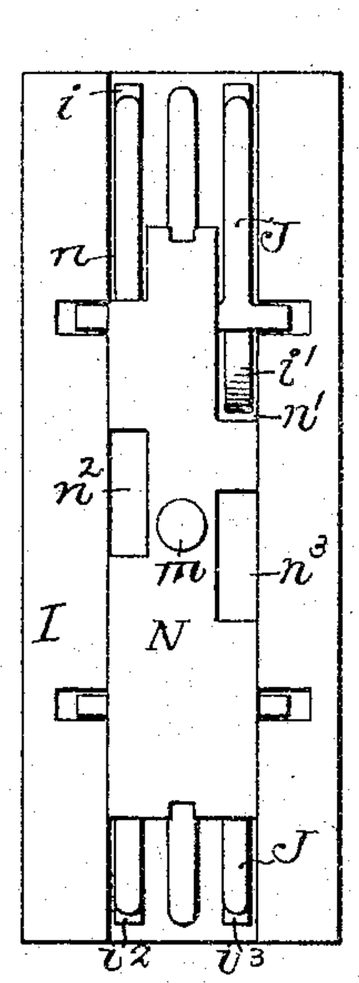
Lock

Fig. 9.



Continuous

Fig. 10.



Right Hand Ratchet

Fig. 11.

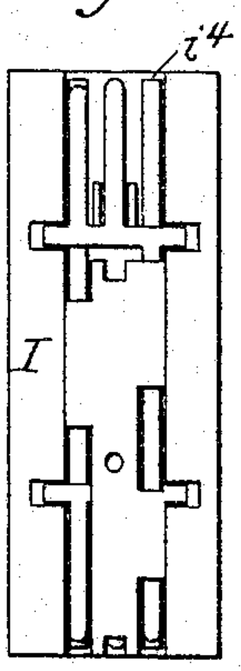


Fig. 12.

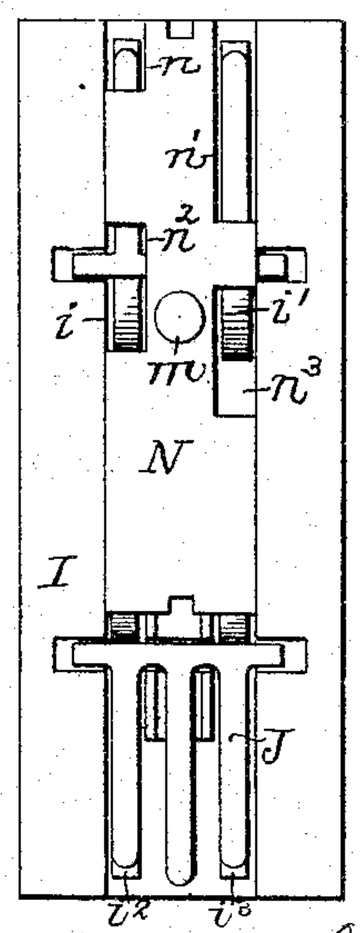
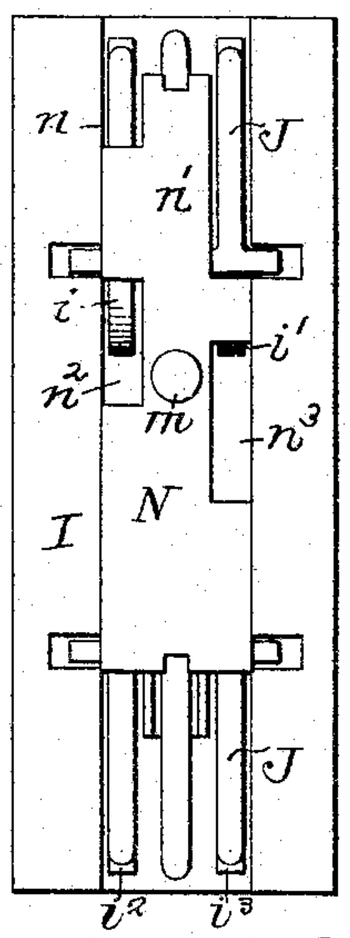


Fig. 13.



Left Hand Ratchet

Fig. 14.

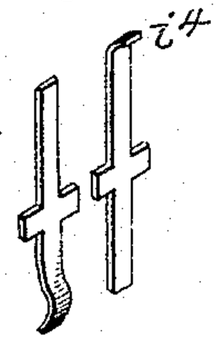


Fig. 15.

Ordinary

Witnesses

Walter J. Cullinger

Will A. Burrows

Inventor:-

George O. Leopold.

by his Attorneys.-

Howson & Howson

UNITED STATES PATENT OFFICE.

GEORGE O. LEOPOLD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO NORTH BROS. MFG. CO., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

GEARING.

939,042. Specification of Letters Patent. Patented Nov. 2, 1909.

Application filed June 29, 1908. Serial No. 440,849.

To all whom it may concern:

Be it known that I, GEORGE O. LEOPOLD, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented Improvements in Gearing, of which the following is a specification.

My invention relates to certain improvements in gearing especially adapted for use in connection with breast drills.

The object of my invention is to provide means for locking the elements so that it will not be necessary to hold the gearing with one hand while the chuck is being opened or closed by the other hand. This object I attain in the following manner, reference being had to the accompanying drawings, in which:—

Figure 1, is a side view of sufficient of a breast drill to illustrate my invention; Fig. 2, is a sectional view on the line 2—2, Fig. 1; the frame being omitted; Fig. 3, is a transverse sectional view on the line 3—3, Fig. 2; Fig. 4, is a detached perspective view of the pawl carrier; Fig. 5, is a detached perspective view of the shifting plate and its spring; Fig. 6, is a detached perspective view of a pair of pawls; Fig. 7, is a perspective view of one of the springs; Figs. 8 to 12, both inclusive, are views showing the different positions of the shifting plate which releases or holds out of engagement certain of the pawls; Fig. 13, is a view of a modification; and Figs. 14 and 15, are views of the pawls and springs used in the modification shown in Fig. 13. Fig. 16, is a sectional view of a detail of Fig. 1.

My invention is an improvement on the ratchet mechanism for which application for patent was filed by me on the 15th day of February 1908, under Serial Number 416,025, but in this case there was no provision for locking the parts when it was desired to open or close the chuck.

A is the frame of the breast drill in which is mounted a spindle B carrying at its lower end a chuck C for holding the drill or other tool. At the upper end of the frame A is a breast piece A′ of the ordinary type and projecting at one side of the frame is a handle A^2 which is grasped by the hand when the handled crank F is turned.

On a yoke *a* of the frame A is a spindle *a′* on which is mounted the handled crank F. Loose on this spindle is a bevel wheel F′ and mounted on the hub of this bevel wheel is a second bevel wheel F^2, either one of these bevel wheels can be thrown into engagement with the handled crank F by the locking mechanism *f*. I lay no claim to this locking mechanism as it is covered in an application for patent filed by me on the 22nd day of January 1908, under Serial Number 412,149.

Mounted on the spindle B are two hubs D and E, each having beveled gears *d*, *d′* and *e*, *e′* respectively. The teeth of the beveled gears *d* and *e* mesh with the teeth of the beveled gear wheel F′, while the teeth of the beveled wheels *e′* and *d′* mesh with the teeth of the beveled wheel F^2. The hubs D and E are both loose on the shaft. When the teeth of the hub D are in mesh with either of the wheels F′, F^2 the hub is turned in one direction and when the teeth of the hub E are in mesh the head E is turned in the reverse direction and the speed of the hub is regulated by locking the handled crank to either one of the gear wheels F′, F^2.

Mounted on the spindle is a carrier I secured to the spindle by a key *b;* the key being held in position by the shell H which is slotted at *h* to receive a projection *b′* on the rear of the key *b*, the ends of the key passing under the shell. The carrier I is slotted as shown in Fig. 4 and grooved for the reception of the pivoted pawls *i*, *i′*, i^2, i^3; the pivots of these pawls resting in notches *k* in the carrier and the pawls are pressed down by springs J, Fig. 7. The arms *j* of these springs are adapted to the notches *k* and are slightly turned up at the ends, as shown in Fig. 7, so that the rear ends of the springs will be retained firmly in position.

The sliding plate N is notched at *n*, *n′*, n^2 and n^3, leaving solid portions which, when the plate is shifted, hold certain of the pawls out of position. Each of the pawls has a heel which is held down by the plate N when said plate is moved to certain positions and these pawls are released when the notches in the plate are directly above the heels. The springs *j* force the pawls into engagement with the ratchet teeth d^2 and e^2 respectively on the hubs D and E.

On the sliding plate N is a pin *m* which projects through an opening *m′* in a flat spring M adapted to travel with the plate and press the plate against its seat. This pin *m* extends through a slot *h′* in the shell

H and the plate can be moved longitudinally by pressing against the pin m in one direction or the other. On the spring M on each side of the opening m' are projections m^2 which register with the notches h^2 in the side walls of the slot h'. There are five notches in the present instance indicating the five positions in which the pawls can be set.

Referring now to the diagrams, Figs. 8 to 12, Fig. 8 shows the plate in its lowest position with the pin m opposite the lowest notch. In this position the heels of the four pawls are exposed in the notches, thus they are free so that their springs J will force them in contact with the ratchet wheels on both hubs D and E, locking each hub from movement in either direction. Consequently the spindle is firmly locked to the frame and the chuck can be opened or closed for the insertion or removal of a drill bit or other tool without having to hold the gearing from turning by grasping it with the other hand, which is the common method now in use. This is the essential feature of this invention.

In Fig. 9, the plate is raised one notch so as to hold out of engagement the pawls i and i^2, leaving the pawls i' and i^3 free to engage their respective ratchet wheels. While in this position the crank handle can be reciprocated and the spindle will have a continuous forward movement.

In Fig. 10, the plate is moved to the third position, holding the pawls i, i^2 and i^3 out of engagement and leaving the pawl i' free to engage its ratchet wheel. When the plate is in this position on the reciprocation of the crank handle the spindle is given a right hand forward movement and remains stationary during the return of the crank handle.

In Fig. 11, the sliding plate is moved to its fourth position, the pawls i', i^2, i^3 being held out of engagement and the pawl i being free to engage its ratchet wheel so that on the forward reciprocation of the crank handle the spindle will have a left hand movement and will remain stationary while the crank handle is returning.

In Fig. 12, the plate is moved to its highest position, releasing the pawls i, i' and holding out of engagement the pawls i^2, i^3, thus locking the hub D and leaving the hub E entirely free so that the spindle will move with the crank handle the same as an ordinary breast drill.

Thus it will be seen that by my improved construction I am enabled to provide ratchet mechanism having all the movements necessary and yet the mechanism can be so adjusted as to firmly lock the spindle to the frame when it is desired to manipulate the chuck to insert a drill bit, or to remove one from the chuck. In chucks of this type the drill bit is often held very firmly so that it is almost impossible to prevent the gearing from turning when held by hand, but by locking the parts, as mentioned, the chuck can be readily turned to release the bit without the liability of the hand being caught in the gearing.

In Figs. 13, 14 and 15, I have shown a modification in which one of the pawls has a projection i^4 at the forward end instead of a projecting heel; the pawl being forced down into engagement by the plate pressing upon the end of the pawl having the projection. The spring, as shown in Fig. 15, has a portion acting upon the heel of said pawl.

I claim:—

1. The combination in gearing, of a spindle, a carrier secured to the spindle, pawls mounted on the carrier, two sets of ratchet wheels loose on the spindle, means for driving both sets of wheels, and means for holding certain pawls out of engagement, the said last mentioned means being adapted to be shifted to a position to free all the pawls so as to lock both ratchet wheels to the spindle, thus preventing movement of the spindle and the driving mechanism.

2. The combination in gearing, of a frame, a spindle mounted in the frame, a carrier secured to the spindle, two hubs loose on the spindle, each hub having a ratchet wheel and two beveled gear wheels, four pawls pivotally mounted on the carrier, two of said pawls arranged to engage the ratchet wheel on one hub, the other two pawls arranged to engage the ratchet wheel on the other hub, adjustable means for controlling the pawls, said means being so arranged that when in one position the four pawls will be free to engage their ratchet wheels and lock the spindle and the gears from turning, with two beveled gears meshing with the gears on the hubs, and a handled crank for actuating one or the other of the said beveled gears.

3. The combination in gearing of a spindle, a carrier secured to the spindle, four pawls, two ratchet wheels at each end of the carrier, two pawls engaging one ratchet wheel and the other two pawls engaging the other ratchet wheel, a sliding notched plate, the notches in the plate being so arranged that when the plate is moved in one position all the pawls are free to engage the ratchet wheels so as to lock the spindle and the driving mechanism.

4. The combination in gearing, of a spindle, a carrier secured to the spindle, two ratchet wheels loose on the spindle, four pawls pivoted to the carrier, each pawl having a heel, a sliding plate notched at each side, said plate being adapted to be shifted longitudinally so as to raise certain pawls and allow others to be free, the notches in the plate being so formed that when the plate is in one position the heels of the pawls

will be locked in line with the notches, and springs for forcing the pawls into engagement with the ratchet wheels so that the spindle and the driving mechanism are locked against movement in either direction.

5. The combination of a spindle, a carrier secured to the spindle, pawls pivoted to the carrier, a ratchet wheel mounted on the spindle adapted to be engaged by the pawls, a sliding plate controlling the movement of the ratchet wheels, said plate having a pin, a shell having a slot therein through which the pin extends, a flat spring mounted between the shell and the plate and perforated for the passage of the pin and having projections on each side of the perforations, the walls of the slot in the shell being notched to receive the projections on the spring so as to retain the plate in the position to which it is adjusted.

6. The combination of a spindle and a keyway therein, a carrier mounted on the spindle and also having a keyway, a slotted shell inclosing the carrier, a key adapted to the keyway in the carrier and extending into the keyway in the spindle, and a projection on the key entering the slot in the shell, thus locking the key in position.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE O. LEOPOLD.

Witnesses:
Jos. H. Klein,
Wm. A. Barr.