F. C. BLANCHARD.

COMBINATION DRILL AND VALVE GRINDER.

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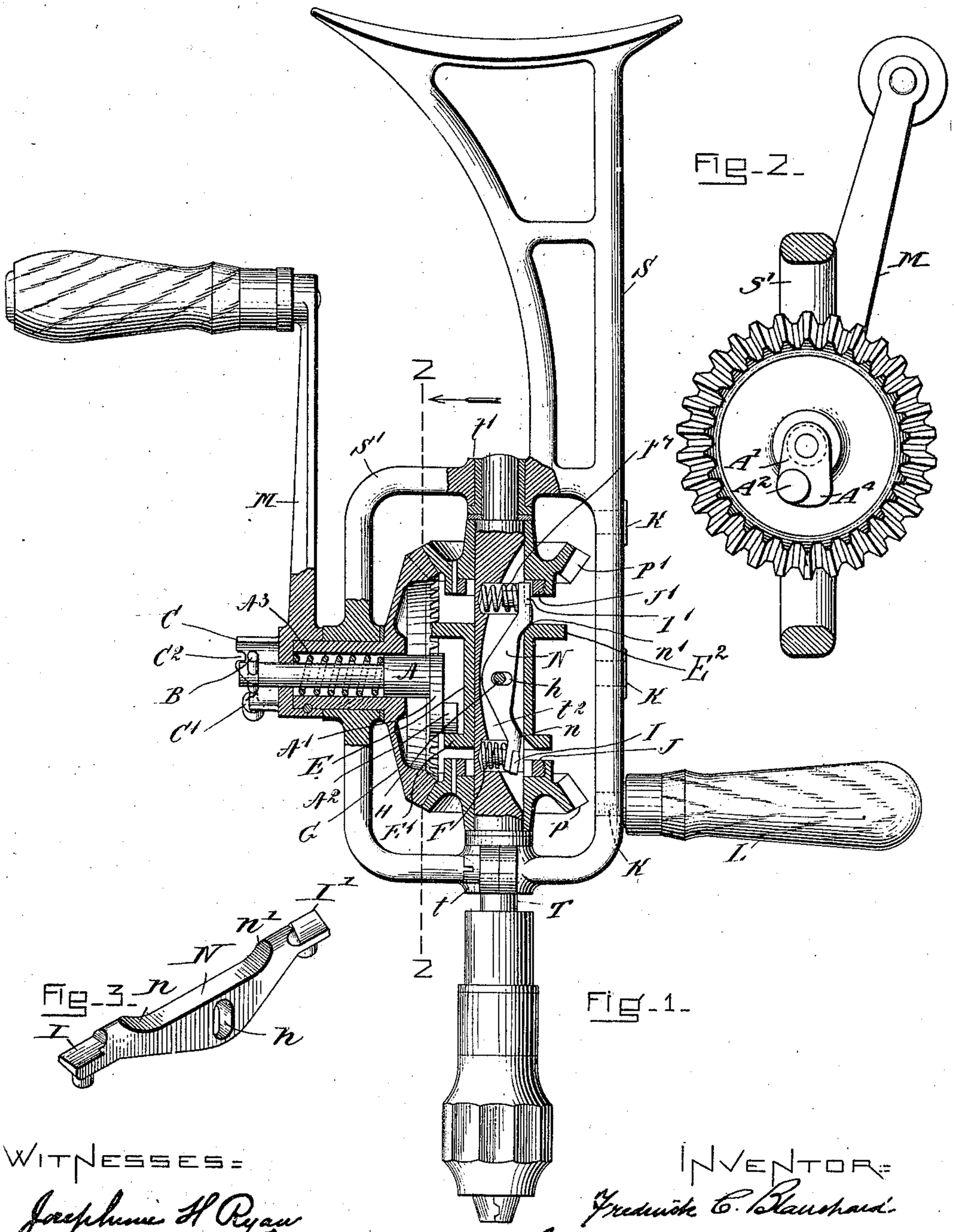

Fig. 1.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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COMBINATION DRILL AND VALVE-GRINDER.

963,986. Specification of Letters Patent. **Patented July 12, 1910.**

Application filed January 20, 1910. Serial No. 539,020.

To all whom it may concern:

Be it known that I, FREDERICK C. BLANCHARD, a citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented new and useful Improvements in Combination Drills and Valve-Grinders, of which the following is a specification.

My invention relates to the construction of tools or machines in the class of which breast drills are a typical example and consists of improvements whereby a tool or machine of this character is made capable of performing several functions or modifications of function selectively by means of simple adjusting devices.

In particular, my invention consists in improvements in tools of this class by which the same tool or machine may perform alternately the functions of the ordinary breast drill, reversible ratchet drill, or valve grinder; that is to say, by means of certain adjustments presently to be described continuous rotation of the driving gear may cause a continuous rotation of the tool-moving shaft or holding member; or, if desired, an oscillatory or reversing rotation of the tool holding member; or by an oscillatory or back-and-forth movement of the driving gear, may operate as a ratchet drill in either direction.

Furthermore, the specific mechanism with which I illustrate my invention comprises improvements which insure compactness, strength, durability, and ease of operation and adjustment.

In the drawings hereto annexed which illustrate an example of my invention,—Figure 1 is an elevation, partly in section, of a combination breast drill and valve grinder; Fig. 2 is a cross sectional view taken along the line 2—2 of Fig. 1; and Fig. 3 is a detail which shows the pawl beam which forms a part of the tool or machine shown in Fig. 1.

The stock or frame of the tool, marked S, consists in part of a rectangular framework S′ which embraces the principal mechanically operated parts of the tool or machine. This rectangular framework is stiff and amply able to sustain all the stresses which may be brought to bear upon it in course of operation. A shaft T is mounted in the bearings t, t' at either end of the rectangular framework S′ and is thus provided with ample support. Between the bearings t, t' and also mounted in the framework S′ is the driving gear G shown as the bevel gear which is secured to and driven by the crank M.

Loosely mounted upon the shaft T and meshing with the driving gear G are the two bevel pinions P, P′. These pinions are provided with circular internal ratchets J, J′. The ratchet teeth of the ratchet J are opposed in operative direction to those of the ratchet J′. In order to provide controllable engagement between the ratchets J or J′ and the shaft T, I have arranged two pawls I, I′; preferably these are constructed as parts of a single piece or member, namely, the pawl beam N which is loosely mounted and housed in the shaft T which is milled out at t^2 to accommodate the pawl beam and its adjuncts. The pawl beam N is perforated at h and in this perforation the pin H, secured to the shaft T, fits loosely so as to permit a movement of the beam N sidewise of the shaft while holding the said beam against movement lengthwise of the shaft. The oppositely facing pawls I, I′ are formed in the ends of the beam N and springs F, F′ seated in sockets in the interior of the shaft T support the pawl beam N and urge it outward. The beam N is provided with shoulders at n, n' which coöperate with the pawl actuator E. This pawl actuator consists of a sleeve mounted to slide upon the shaft T and is provided with flanges E′, E^2 of which one is of greater width than the other, E^2 in the instance shown being the wider flange. When the pawl actuator sleeve E is slid toward the operating end of the shaft T as shown in Fig. 1, it engages the shoulder n and presses the pawl I into the housing or recess t^2, disengaging the pawl I from the ratchet J. This movement of the actuator sleeve E also permits the pawl I′ to move outward in response to the effort of the spring F′ and into engagement with the ratchet J′. With the parts in this relationship, movement of the driving gear G will be communicated to the shaft T through the pinion P′, ratchet J′ and pawl I′. If, now, actuator E be moved in the reverse direction sliding along the shaft T it will first engage with the shoulder n' and press the pawl I′

out of engagement with the ratchet J′ and will do this before the opposite end of the actuator leaves the shoulder *n* so that for an instant both pawls I, I′ are released from engagement with their respective ratchets. Further movement of the actuator E will then allow the pawl I to engage with the ratchet J. It is thus obvious that in the operation of the pawl actuator E it is not possible to have both pawls I and I′ in engagement with their respective ratchets at the same instant; their engagement is strictly alternative and never simultaneous. The pawl beam N, as it were, floats in its housing and partakes of movement in part bodily sidewise with relation to the shaft T, and in part rocking movement on the loose pivot H.

When it is desired to impart to the shaft T an oscillating movement the following mechanism is put in action: The hub of the gear G is bored out to receive the sliding crank shaft A which is pressed inwardly by a spring A^3 and carries at its inner end the crank A′. A pin B passes through the exposed end of the crank shaft A and engages at the will of the operator with either of the notches C′, C^2 which are formed in the semicircular flange C, which is preferably an integral part of the crank M. The operative portions of the crank A′ move between the flanges E′, E^2, on the pawl actuating sleeve E. These operative portions are best shown in Fig. 2. One of the operative portions A^2 is formed as a boss projecting inwardly from the crank A′ and the other A^4 is a portion of the crank A′ itself. The projection of the boss A^2 is such that the operative portions A^2, A^4 are offset from each other so that as shown in Fig. 1 the boss A^2 may act upon the smaller flange E′ while the operative portion A^4 acts upon the larger flange E^2. With the pin B in the notch C′ the crank shaft A is in its operative position and continuous rotation of the crank M causes the operative portions of the crank A^2, A^4 to engage alternately with the flanges E′, E^3, sliding the pawl actuating sleeve E alternately back and forth. As above described this reciprocation of the sleeve E causes the pawls I and I′ to engage alternately with the ratchets J and J′, and consequently alternately drives the shaft T through the pinions P, P′. Consequently any tool secured in the chuck T′ will be given an oscillating movement.

In order to adapt this tool or machine as perfectly as possible to the work of valve grinding, the operative portions of the crank A′ are set at an angle one to the other so that in the ordinary right handed rotation of the gear G, the operative portion A^4 leads the operative portion A^2 and consequently the pinion P will be in engagement with the shaft T during the larger portion of any one rotation of the gear G and thus not only will an oscillating movement be given to the shaft T but also a step-by-step progressive movement. When the tool or machine is used for grinding valves or valve seats, this combined oscillating and step-by-step progressive movement insures the best results.

If it be desired to use the tool as a ratchet drill the parts are left in the same positions and relation as shown in Fig. 1 and an oscillating movement is given to the driving crank M, care being taken not to allow this oscillating movement to proceed far enough in either direction to throw the sleeve E and thus reverse the driving relations in the train of mechanism.

If it be desired to use the tool or machine as an ordinary breast drill, the crank shaft A is moved outward and turned so that the pin B is lodged in the notch C^2. This movement removes the boss E^2 beyond the limits of the smaller flange E′ but still within the limits of the larger flange E^2. Continuous rotative movement of the driving crank M insures engagement between pawl I and ratchet J and places the tool or machine in condition for ordinary work as a breast drill.

The steadying handle L may be secured in any one of several tapped holes K as best suits the operator.

What I claim and desire to secure by Letters Patent is:

1. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, respectively provided with ratchets mutually opposed in operative direction, a beam, mounted to rock relatively to the shaft, and provided with two oppositely directed pawls, appropriate respectively to the ratchets, and a pawl actuator movably mounted on the shaft, to determine the alternative engagement of the pawls with the operative ratchets.

2. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, respectively provided with ratchets mutually opposed in operative direction, a beam mounted to rock relatively to the shaft, and provided with two oppositely directed pawls, appropriate respectively to the ratchets, and a pawl actuator movably mounted on the shaft, to determine the alternative engagement of the pawls with their operative ratchets, and a pawl actuator controller carried by the driving gear.

3. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets, mutually opposed in operative direction, two pawls appropriate respectively to the ratchets, and alternately engageable therewith,

the said pawls movably mounted and housed in the shaft, a pawl actuator movably mounted on the shaft to determine the alternative engagement of the pawls with their respective ratchets, and a pawl actuator controller carried by the driving gear.

4. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housed in the shaft and mounted to rock in its housing, springs supporting the beam, two oppositely directed pawls, appropriate respectively to the ratchets, carried by the beam, and a pawl actuating sleeve slidably mounted on the shaft over the beam-housing, to determine the alternative engagement of the pawls with their respective ratchets.

5. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housed in the shaft and mounted to rock in its housing, springs supporting the beam, two oppositely directed pawls, appropriate respectively to the ratchets, carried by the beam, a pawl actuating sleeve slidably mounted on the shaft over the beam-housing, to determine the alternative engagement of the pawls with their respective ratchets, and a controller carried by the driving gear, to slide said sleeve reciprocally.

6. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam mounted to rock relatively to the shaft, and provided with two oppositely directed pawls, appropriate respectively to the ratchets, a pawl actuator movably mounted on the shaft, to determine the alternative engagement of the pawls with their respective ratchets, and a disengageable pawl actuator controller carried by the driving gear.

7. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets, mutually opposed in operative direction, two pawls appropriate respectively to the ratchets, and alternately engagable therewith, the said pawls movably mounted and housed on the shaft, a pawl actuator movably mounted on the shaft to determine the alternative engagement of the pawls with their respective ratchets, and a disengageable pawl actuator controller carried by the driving gear.

8. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housed in the shaft and mounted to rock in its housing, springs supporting the beam, two oppositely directed pawls, appropriate respectively to the ratchets, carried by the beam, a pawl actuating sleeve slidably mounted on the shaft over the beam-housing, to determine the alternative engagement of the pawls with their respective ratchets, and a disengageable controller carried by the driving gear to slide said sleeve reciprocally.

9. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housing in the shaft and mounted to rock in its housing, springs supporting the beam, oppositely directed pawls, appropriate respectively to the ratchets, carried at the ends of the beam, and a pawl actuating sleeve slidably mounted on the shaft engaging with the beam at either end alternately to depress an end of the beam into the housing, and release the other end of the beam to allow engagement of pawl and ratchet.

10. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housed in the shaft and mounted to rock in its housing, springs supporting the beam, oppositely directed pawls, appropriate respectively to the ratchets, carried at the ends of the beam, a pawl actuating sleeve slidably mounted on the shaft engaging with the beam at either end alternately, to depress an end of the beam into the housing, and release the other end of the beam to allow engagement of pawl and ratchet, and means carried by the driving gear to slide said sleeve reciprocally.

11. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housed in the shaft and mounted to rock in its housing, springs supporting the beam, oppositely directed pawls, appropriate respectively to the ratchets, carried at the ends of the beam, a pawl actuating sleeve slidably mounted on the shaft engaging with the beam at either end alternately to depress an end of the beam into the housing, and release the other end of the beam to allow engagement of the pawl and ratchet, and dis engagable means carried by the driving gear to slide said sleeve reciprocably.

12. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets movably opposed in operative direction, two pawls appropriate respectively to the ratchets and

alternately engageable therewith, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve, slidably mounted on the shaft to determine the alternative engagement of the parts with their respective ratchets.

13. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, two pawls appropriate respectively to the ratchets and alternately engageable therewith, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve, slidably mounted on the shaft, to determine the alternative engagement of the parts with their respective ratchets, and a controller carried by the driving gear to slide said sleeve reciprocally.

14. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, two pawls appropriate respectively to the ratchets and alternately engageable therewith, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve, slidably mounted on the shaft and provided with a flange at either end, a crank carried by the driving gear revolving between and alternately engaging the sleeve flanges to slide the sleeve reciprocally.

15. The combination, in a suitable frame, of a revolubly mounted shaft, provided respectively with ratchets mutually opposed in operative direction, two pawls appropriate respectively to the ratchet and alternately engageable therewith, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve slidably mounted on the shaft and provided with a flange at either end, a crank carried by the driving gear revolving between and alternately engaging the sleeve flanges to slide the sleeve reciprocally, said crank having two engaging members, one for each flange, one of said members set in advance of the other, to slide the sleeve reciprocally and unequally in point of time.

16. The combination, in a suitable frame, of a revolubly mounted shaft, a driving bevel gear, two bevel pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a loosely mounted beam housed in the shaft, two oppositely directed pawls appropriate respectively to the ratchets, each at one end of the beam, springs supporting the beam and pressing it toward the ratchets, a pawl actuating sleeve slidably mounted on the shaft over the beam housing, to determine the alternate engagement of the pawls with their respective ratchets, a crank shaft concentric with and slidable in the driving bevel gear, a crank on the shaft, said crank having two engaging members, one set in advance of the other, flanges on the pawl actuating sleeve in path of the engaging members on the crank, and means to retract the crank shaft and crank out of normal engagement position relatively to the sleeve flanges.

17. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam mounted in the shaft between the pinions and mounted to rock in its housing, springs supporting the beam, oppositely directed pawls, appropriate respectively to the ratchets, carried at the ends of the beam, and a pawl actuating sleeve slidably mounted on the shaft engaging with the beam at either end alternately to depress an end of the beam into the housing and release the other end of the beam to allow engagement of the pawl and ratchet.

18. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housed in the shaft between the pinions and mounted to rock in its housing, springs supporting the beam, oppositely directed pawls, appropriate respectively to the ratchets, carried at the ends of the beam, and a pawl actuating sleeve slidably mounted on the shaft engaging with the beam at either end alternately, to depress an end of the beam into the housing, and release the other end of the beam to allow engagement of the pawl and ratchet, and means carried by the driving gear to slide said sleeve reciprocally.

19. The combination in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a beam housed in the shaft between the pinions and mounted to rock in its housing, springs supporting the beam, oppositely directed pawls, appropriate respectively to the ratchets, carried at the ends of the beam, a pawl actuating sleeve slidably mounted on the shaft engaging with the beam at either end alternately, to depress an end of the beam to allow engagment of pawl and ratchet, and disengageable means carried by the driving gear to slide said sleeve reciprocally.

20. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, two pawls appropriate respectively to the ratchets and alternately engageable there-

with, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve, slidably mounted on the shaft between the pinions to determine the alternative engagement of the parts with their respective ratchets.

21. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, two pawls appropriate respectively to the ratchets and alternately engageable therewith, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve, slidably mounted on the shaft between the pinions to determine the alternative engagement of the parts with their respective ratchets, and a controller carried by the driving gear to slide said sleeve reciprocally.

22. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, two pawls appropriate respectively to the ratchets and alternately engageable therewith, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve, slidably mounted on the shaft between the pinions and provided with a flange at either end, a crank carried by the driving gear revolving between and alternately engaging the sleeve flanges to slide the sleeve reciprocally.

23. The combination, in a suitable frame, of a revolubly mounted shaft, a driving gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, two pawls appropriate respectively to the ratchets and alternately engageable therewith, the said pawls movably mounted and housed in the shaft, a pawl actuating sleeve slidably mounted on the shaft between the pinions and provided with a flange at either end, a crank carried by the driving gear revolving between and alternately engaging the sleeve flanges to slide the sleeve reciprocally, said crank having two engaging members, one for each flange, one of said engaging members set in advance of the other, to slide the sleeve reciprocally and unequally in point of time.

24. The combination, in a suitable frame, of a revolubly mounted shaft, a driving bevel gear, two pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a loosely mounted beam, housed in the shaft between the pinions, two oppositely directed pawls appropriate respectively to the ratchets, each at one end of the beam, springs supporting the beam and pressing it toward the ratchets, and a pawl actuating sleeve slidably mounted on the shaft over the beam housing, to determine the alternate engagement of the pawls with their respective ratchets, a crank-shaft concentric with and slidable in the driving bevel gear, a crank on the shaft, flanges on the pawl actuating sleeve in the path of the crank, and means to retract the crank shaft and crank out of normal engagement position relatively to the sleeve flanges.

25. The combination, in a suitable frame, of a revolubly mounted shaft, a driving bevel gear, two bevel pinions loosely mounted on the shaft, provided respectively with ratchets mutually opposed in operative direction, a loosely mounted beam housed in the shaft between the pinions, two oppositely directed pawls appropriate respectively to the ratchets, each at one end of the beam, springs supporting the beam and pressing it toward the ratchets, a pawl actuating sleeve slidably mounted on the shaft over the beam housing, to determine the alternate engagement of the pawls with their respective ratchets, a crank shaft concentric with and slidable in the driving bevel gear, a crank on the shaft, said crank having two engaging members, one set in advance of the other, flanges on the pawl actuating sleeve in the path of the engaging members on the crank, and means to retract the crank shaft and crank out of normal engagement position relative to the sleeve flanges.

Signed by me at Bridgeport, Connecticut this 15th, day of January 1910.

FREDERICK C. BLANCHARD.

Witnesses:

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