P. E. CLARK.

MACHINE DRIVING MEANS.

APPLICATION FILED JUNE 11, 1910.

969,601.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

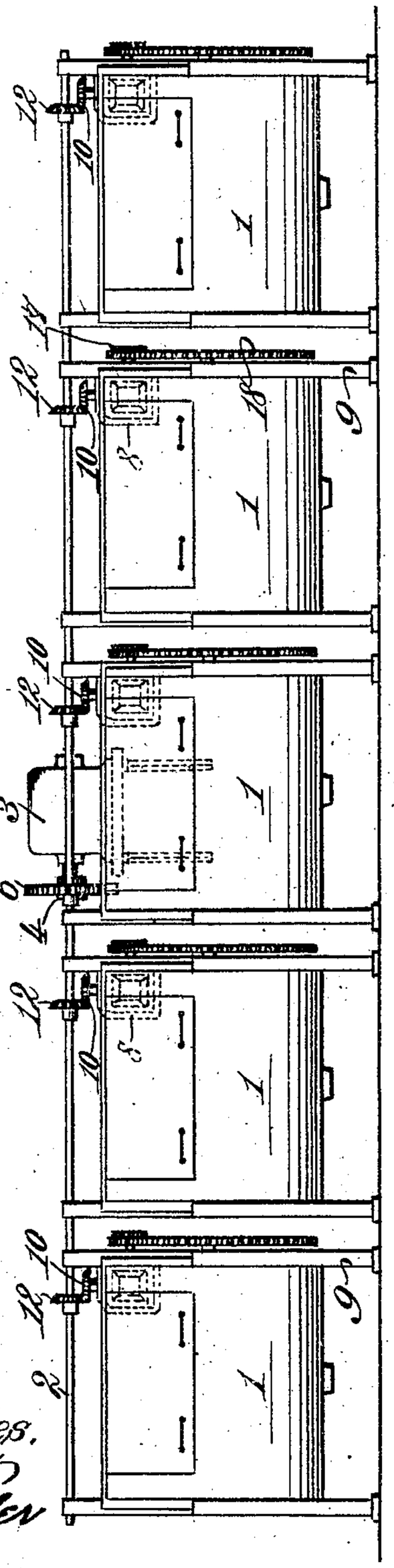
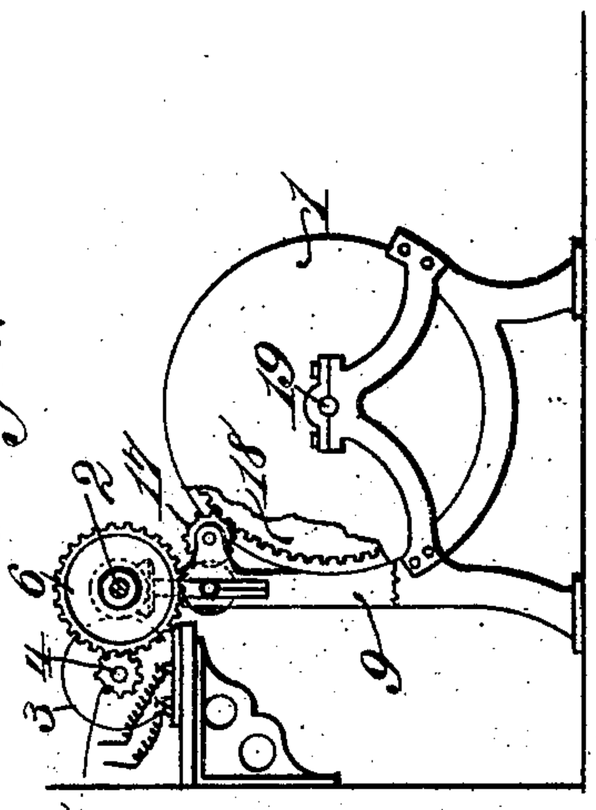


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

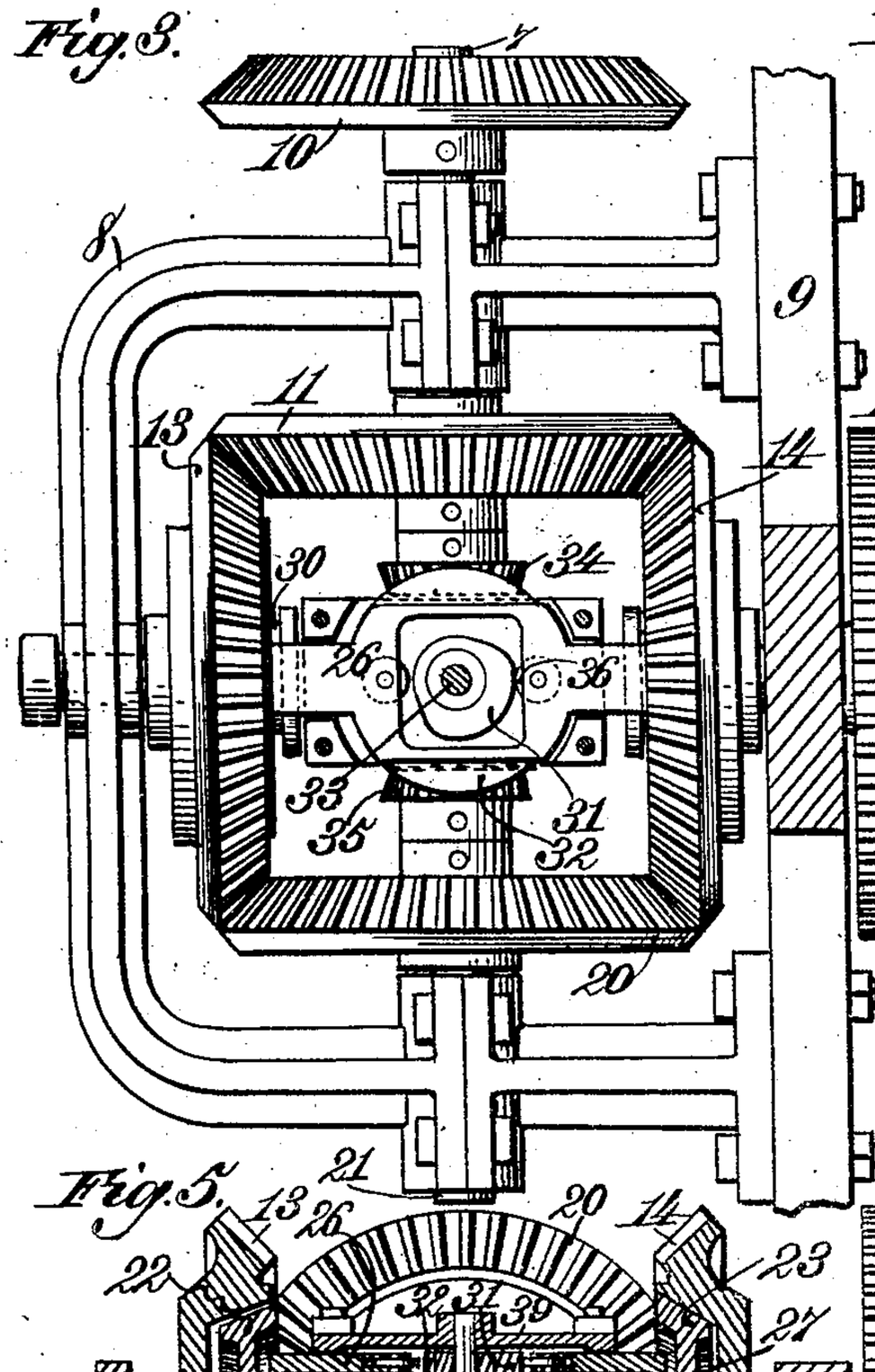


Fig. 4.

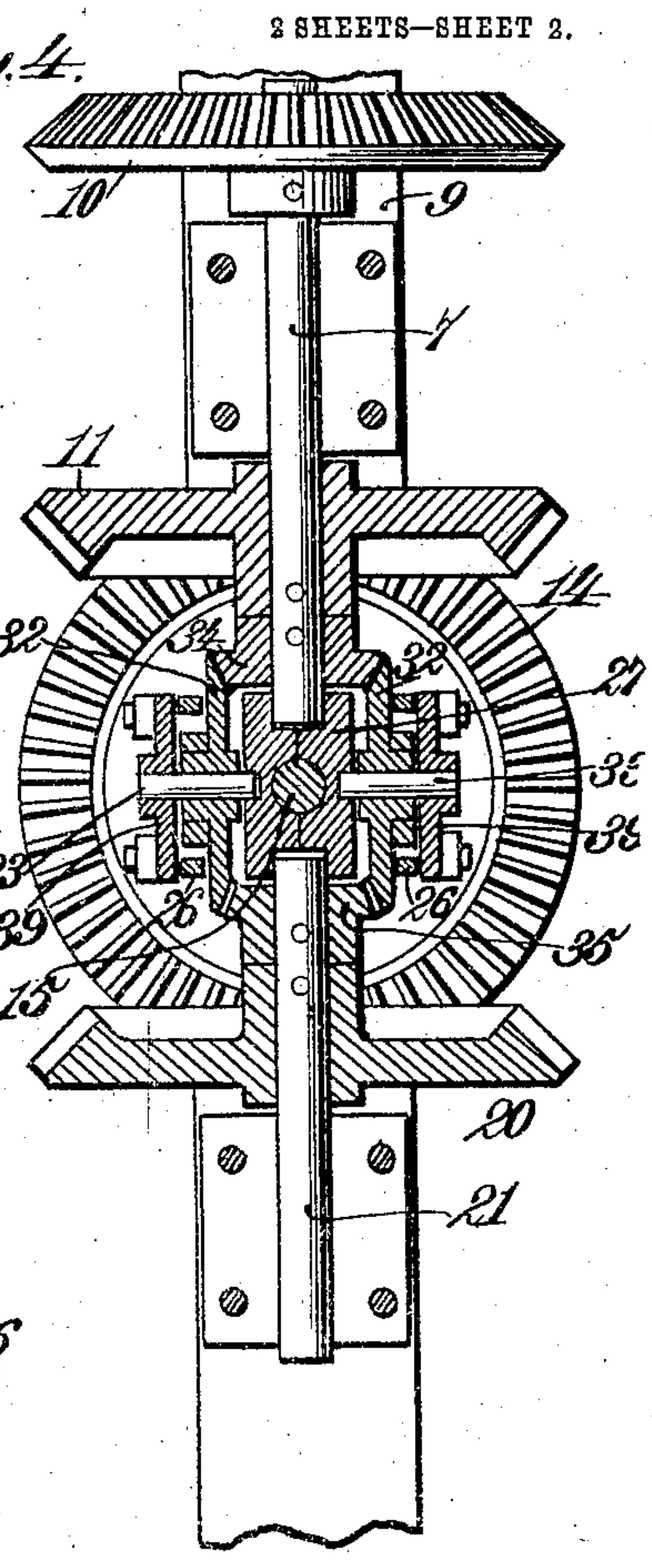


Fig. 5.

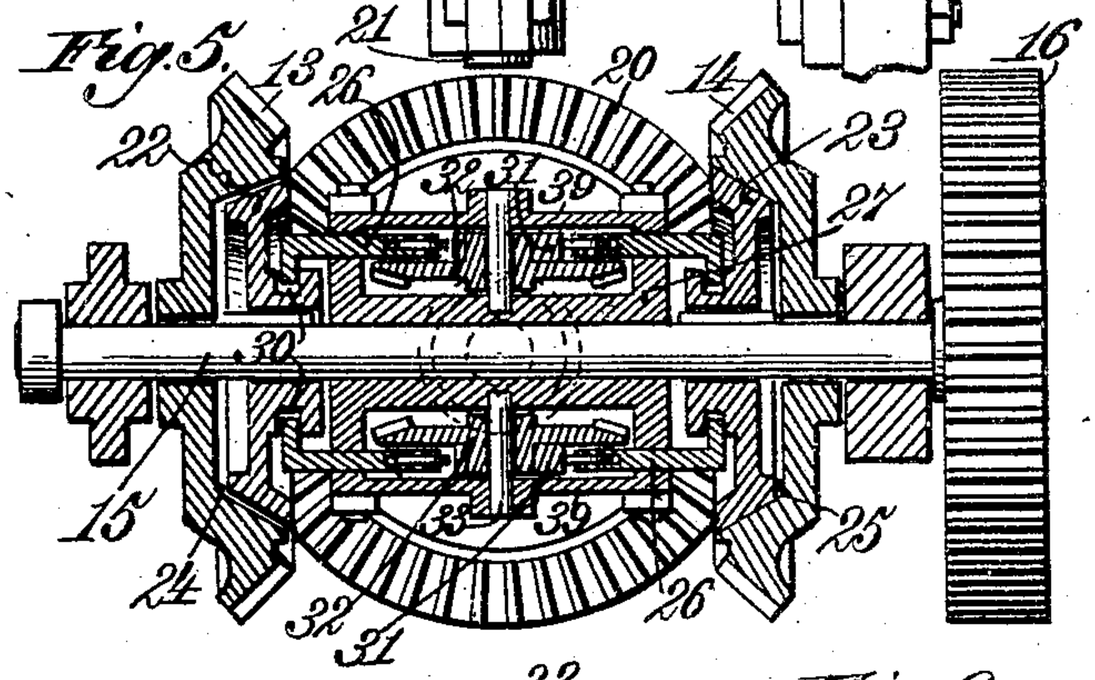
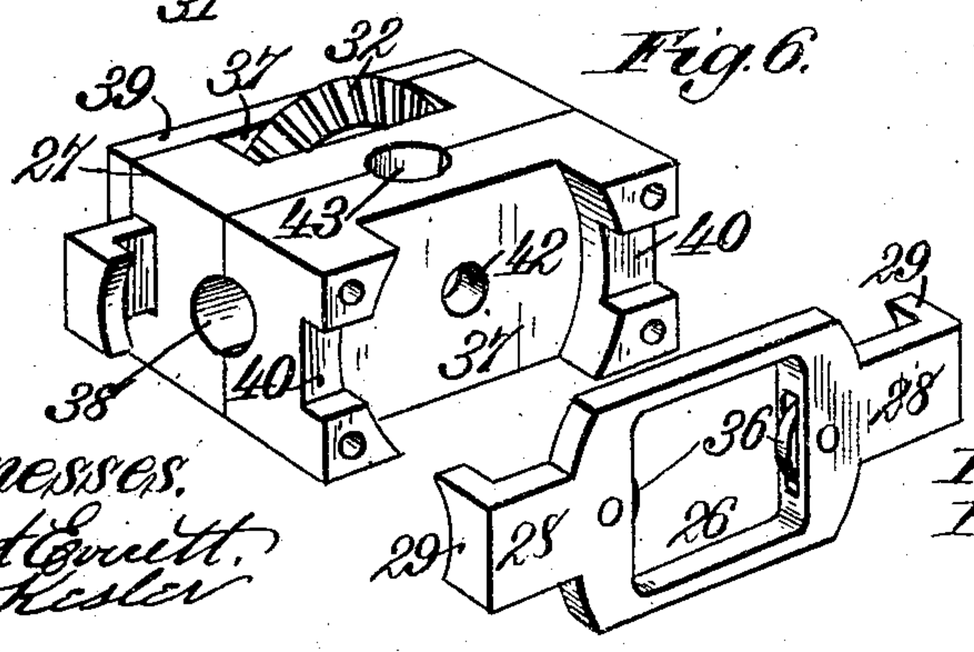
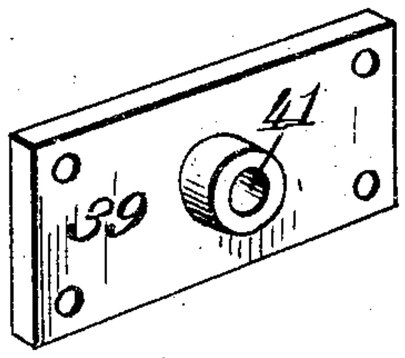


Fig. 6.





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UNITED STATES PATENT OFFICE.

PRENTICE E. CLARK, OF ELKINS, WEST VIRGINIA.

MACHINE-DRIVING MEANS.

969,601. Specification of Letters Patent. Patented Sept. 6, 1910.

Application filed June 11, 1910. Serial No. 566,403.

To all whom it may concern:

Be it known that I, PRENTICE E. CLARK, a citizen of the United States, residing at Elkins, in the county of Randolph and State of West Virginia, have invented new and useful Improvements in Machine-Driving Means, of which the following is a specification.

The present invention has reference to improvements in machine-driving means, and more especially in the construction and arrangement of parts shown and described in my prior Patent, No. 840,199, granted January 1, 1907. The patented construction comprehends, essentially, a driving shaft which is separately connected with a gang of machines arranged in tandem, and which has a further connection with the shaft of a motor or other prime mover; the latter connection, wherein that invention primarily resides, is such as to effect a predetermined number of revolutions of the drive shaft first in one direction and then in the other, thereby imparting the desired alternating rotary movement to the operating elements of the machines. This construction, however, necessitates a simultaneous reversal of all of said elements, in consequence whereof the drive shaft is subjected at each reversal to the full force of the shock and stress incidental to such reversal, even though the same be comparatively gradual, and as a result the wear and tear upon the parts reaches a high degree, and the effective life of the apparatus is proportionately decreased.

In order to overcome the afore-mentioned defects, I propose to utilize a driving system wherein each machine has an individual gear connection with the drive shaft, which latter is given a continuous rotary movement, the cam elements of the several gear connections being so timed as to entail a successive reversal of the operating elements of the machines, in contradistinction to the simultaneous reversal of the coresponding elements in the patented construction. By this means, the shock is distributed evenly throughout the drive shaft, and is transmitted thereto in the form of a series of successive shocks of comparatively small force, which can be readily resisted. Again, where the drive shaft itself is reversed as in the earlier construction, the number of machines which can be effectively connected thereto is necessarily limited, since the entire load is borne at one time by said shaft, whereas such number may be readily increased when the load is divided, as in the present instance, and is evenly distributed.

A structural embodiment of the invention is illustrated in the accompanying drawings, in which:

Figure 1 is a front elevation of a gang of machines with said invention applied thereto. Fig. 2 is an end elevation of Fig. 1, a part of one of the machines being broken away. Fig. 3 is an enlarged side elevation of the improved transmission gear, the cover of the clutch box being omitted. Figs. 4 and 5 are, respectively, vertical and horizontal sections of Fig. 3. Fig. 6 is a perspective view of one of the clutch boxes, showing one of the clutch-operating members and the adjacent cover separated from the box.

In said drawings, as in those of my prior patent, above identified, the invention is illustrated as applied to a gang of washing machines, although such application, while peculiarly advantageous, is not obligatory. These machines are arranged in tandem, and are generally designated by the numeral 1. They are driven, as hereinafter described, from the main shaft 2, which is driven, in turn, from the motor 3, the shaft 4 of the motor having fixed thereto a gear 5 in mesh with a larger gear 6 on shaft 2. The arrangement is such, therefore, that a continuous rotary movement is imparted to said shaft.

As originally stated, there is provided an individual reversing gear connection between each machine and the drive shaft. In the present construction, each of these connections comprises a vertical shaft 7 mounted in an open U-shaped frame 8 secured to the machine frame 9, said shaft being provided at opposite ends with a pair of gears 10 and 11, the former of which meshes with and is driven by a gear 12 fast on the drive shaft, there being a separate gear on the drive shaft for each machine, as will be understood. Gear 11 meshes, in turn, with a pair of gears 13 and 14 which it drives in opposite directions, these gears being loosely mounted on a horizontal shaft 15 likewise journaled in frame 8. Shaft 15 has secured thereto a gear 16 which drives, with or without the aid of an intermediate gear 17 as may be desired, the usual large gear 18 on the machine shaft 19, the proportions of the several gears being such that the agitator arms, or other operating elements, (not

shown,) secured to the machine shaft are driven at a slow rate of speed. The gears 13 and 14 also mesh with a balance gear 20 fixed to a vertical shaft 21 journaled in frame 8 directly beneath shaft 7.

With the two loose gears 13 and 14 there is associated a clutch device by means whereof the requisite alternating rotary movement is imparted to the transmission shaft 15 and thence to the machine shaft. This device preferably comprises a pair of clutch members 22 and 23 splined on shaft 15 and designed for coaction, respectively, with said gears 13 and 14 which are formed with recesses 24 and 25 wherein the clutch members are designed to seat. The said clutch members are operated by a pair of shifter carriages or shifters 26 mounted opposite each other in a two-part clutch-box 27. (See Fig. 6.) These shifters are in the form of yokes, the stems 28 of which are provided with in-turned ends 29 engaging in recesses 30 in the hubs of the clutch members; they are actuated by means of cams 31 fast upon the hubs of a pair of gears 32 inclosed within the clutch box and mounted upon horizontal shafts 33 carried in said box. Gears 32 mesh with a pair of gears 34 and 35 secured to the inner ends of shafts 7 and 21, and the cams 31 which are rigid with the first-mentioned gears work in the yoke portions of the shifters and against pairs of rollers 36 seated in recesses in opposite sides of said yokes. By virtue of this arrangement, it will be observed, with reference to any particular machine, that when the drive shaft 2 is running, its motion will be imparted to shaft 7 of the corresponding reversing mechanism, whereupon the gear 11 on said shaft 7 will rotate the two loose gears 13 and 14 in opposite directions on shaft 15, the rotation of the latter gears effecting that of gear 20 and its shaft 21. Gears 34 and 35 fixed to shafts 7 and 21 mesh with and drive the two gears 32 that carry the cams 31, and said cams will, in consequence, be rotated and will impart an endwise reciprocatory movement to the clutch shifters 26 which, on being actuated, will move first one and then the other of said clutch members into engagement with the companion clutch faces of the corresponding loose gears. As a result, the shaft 15 will be rotated first in one direction and then in the other, which movement will be transmitted to the machine shaft 19 through the gears 16, 17 and 18. Considering the apparatus as a whole, it will be apparent therefore that the main drive shaft is given a continuous rotary movement which is transformed into alternating rotary movement and transmitted to each of the several machines individually. It will also be understood that the periods of reversal of the gearings with relation to each other directly control the force of the shock or shocks to which the main drive shaft is subjected; that is to say, if all of the machines reverse simultaneously, a single shock of full force will be imparted to the shaft, whereas if two machines reverse at one time, and three at another, two separate shocks will be imparted to said shaft, each of which is of less than full force, and one of which is of less force than the other. The relation of these periods to each other is obviously dependent wholly upon the timing of the cams 31 and the latter are so timed, according to this invention, as to effect a reversal of the machines in succession, so that the shaft will be subjected to a maximum number of shocks, each of a minimum force, which can be readily resisted, since such arrangement entails an even distribution of stress throughout the shaft. For the same reason, it will be obvious that a greater number of machines can be effectively connected to the drive shaft, if reversed individually and in succession, than if reversed simultaneously, for in the latter instance the shaft is subjected to the load of all the machines at once, and in the former instance the loads are exerted in succession upon said shaft.

With reference to the clutch-box 27, wherein the shifters 26 and the cam-carrying gears 32 are arranged, it may be stated that the outer sides of the two sections or members thereof are formed with seats 37 in which said gears and the yoke portions of said shifters are disposed, and that the inner sides of said members are formed with mating semi-cylindrical depressions 38 which unite in producing the bore through which shaft 15 passes. The two shifters are held against displacement by means of the covers 39 which close seats 37 and also the pairs of seats 40 through which the yoke stems 28 project. The shafts 33, whereon gears 32 are mounted, are supported at their outer ends in bearings 41 formed on said covers, and at their inner ends in alining openings 42 in the box members. In like manner, the inner ends of the two shafts 7 and 21 are journaled in mating depressions 43 formed in the inner faces of the box members at right angles to the afore-mentioned depressions 38.

I claim as my invention:

1. The combination of a plurality of machines, each including a drive shaft; a single continuously rotating main drive shaft for all of said machines; and individual gear connections between the main drive shaft and the shaft of each machine for automatically and periodically reversing the direction of rotation of each machine shaft.

2. The combination of a plurality of machines, each including a drive shaft; a single continuously rotating main drive shaft for

all of said machines; and gear connections between the main drive shaft and all of the machine shafts for periodically reversing the latter shafts in succession.

3. The combination of a plurality of machines, each including a drive shaft; a single continuously rotating main drive shaft for all of said machines; and individual gearing interposed between the main drive shaft and each machine shaft and rotated continuously from the former shaft, each gearing including means for automatically and periodically reversing the direction of rotation of the corresponding machine shaft.

4. The combination of a plurality of machines, each including a drive shaft; a single continuously rotating main drive shaft for all of said machines; and individual gearing interposed between the main drive shaft and each machine shaft and rotated continuously from the former shaft, each gearing including means for automatically and periodically reversing the direction of rotation of the corresponding machine shaft, and a cam for actuating said means, the cams of all of said gearings being timed to effect the reversal of the machine shafts successively.

5. In transmission gearing of the type set forth, the combination of a driven shaft; a pair of oppositely rotatable gears mounted thereon, each gear having a clutch face; a pair of rotatable clutch elements mounted on said shaft for driving the same, each of said elements being arranged for coaction with the clutch face of the adjacent gear; a clutch box; an axially-movable shifter mounted in said box and having its ends engaged with said elements; and means for reciprocating said shifter.

6. In transmission gearing of the type set forth, the combination of a driven shaft; a pair of oppositely rotatable gears mounted thereon, each gear having a clutch face; a pair of rotatable clutch elements mounted on said shaft for driving the same, each of said elements being arranged for coaction with the clutch face of the adjacent gear; a clutch box; an axially-movable shifter mounted in said box and having its ends engaged with said elements; and a cam rotatably mounted in said box and engaged with said shifter, for imparting a reciprocatory movement to the latter.

7. In transmission gearing of the type set forth, the combination of a driven shaft; a pair of oppositely rotatable gears mounted thereon, each gear having a clutch face; a pair of rotatable clutch elements mounted on said shaft for driving the same, each of said elements being arranged for coaction with the clutch face of the adjacent gear and being provided with a recessed portion; a shifter formed with in-turned ends engaged in said recessed portions; and means for reciprocating said shifter.

8. In transmission gearing of the type set forth, the combination of a driven shaft; a pair of oppositely rotatable gears mounted thereon, each gear having a clutch face; a pair of rotatable clutch elements mounted on said shaft for driving the same, each of said elements being arranged for coaction with the clutch face of the adjacent gear; a shifter comprising a yoke-like body portion, and a pair of oppositely extending stems engaged with said elements; and a rotatable cam disposed within said yoke, for imparting a reciprocatory movement to the latter.

9. In transmission gearing of the type set forth, the combination of a driven shaft; a pair of oppositely rotatable gears mounted thereon and having common direct driving means, each gear having a clutch face; a pair of rotatable clutch elements mounted on said shaft for driving the same, each of said elements being arranged for coaction with the clutch face of the adjacent gear; a clutch box; a reciprocatory shifter mounted therein and engaged with said elements; a gear disposed in said box; means for rotating said gear from the driving means; and a rotatable cam rigid on said gear for actuating said shifter.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PRENTICE E. CLARK.

Witnesses:
J. S. LINGAMFELTER,
BERTHA FLORENTINA.