Jan. 19, 1960 A. KINDLER 2,921,475

RAMMING MACHINE

Filed June 28, 1954 4 Sheets-Sheet 1

FIG. 1

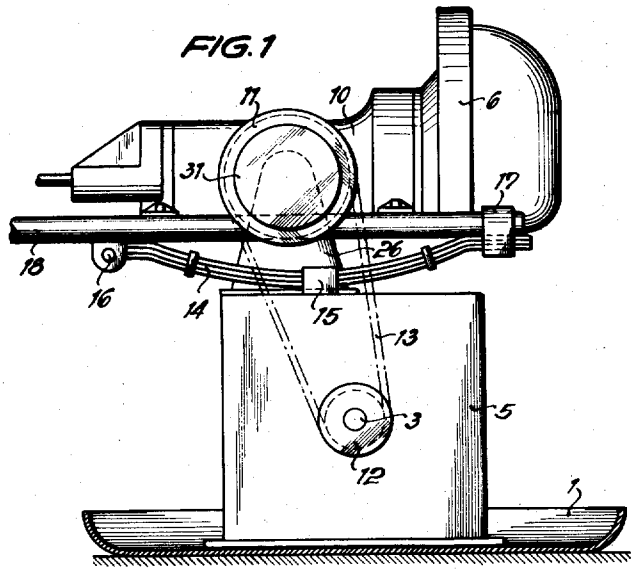
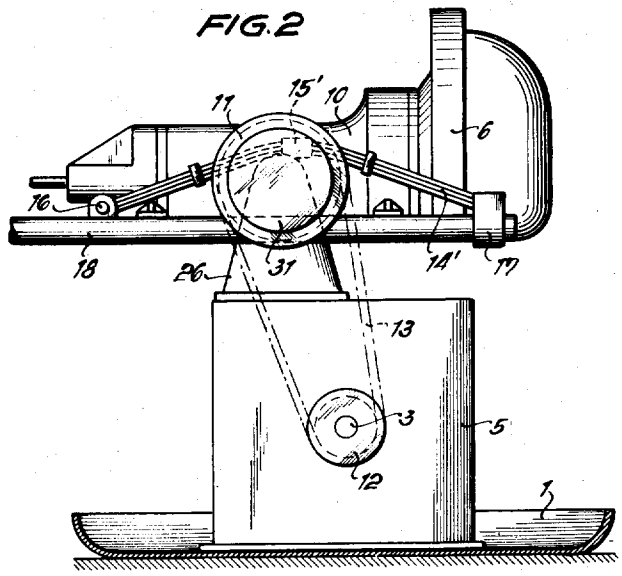



FIG. 2




INVENTOR

Jan. 19, 1960 A. KINDLER 2,921,475

RAMMING MACHINE

Filed June 28, 1954 4 Sheets-Sheet 2

FIG. 3

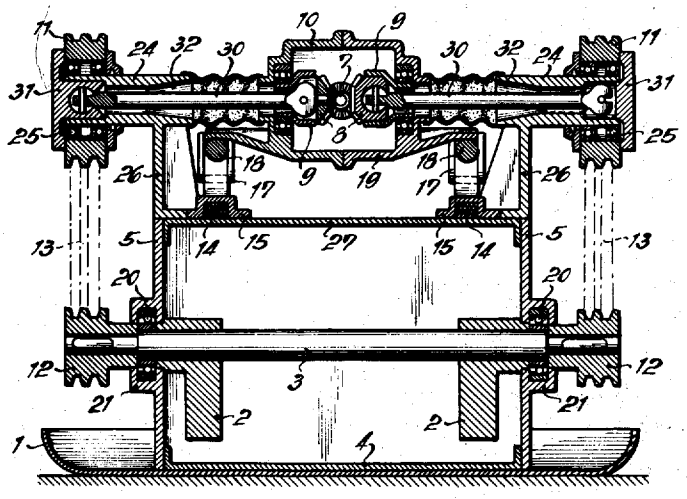
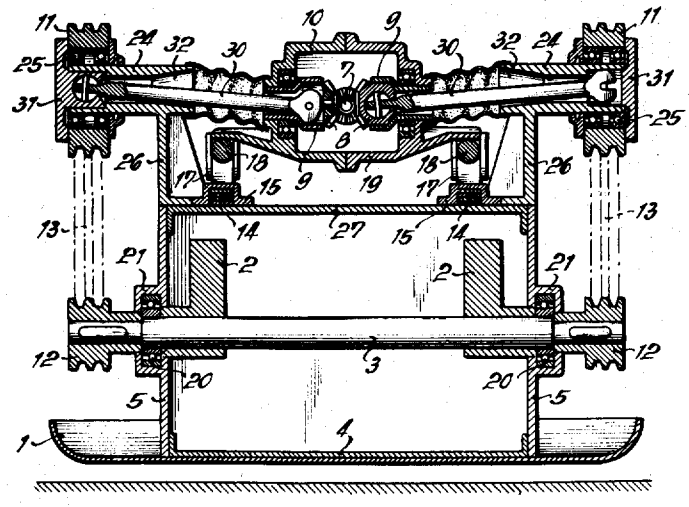


FIG. 4

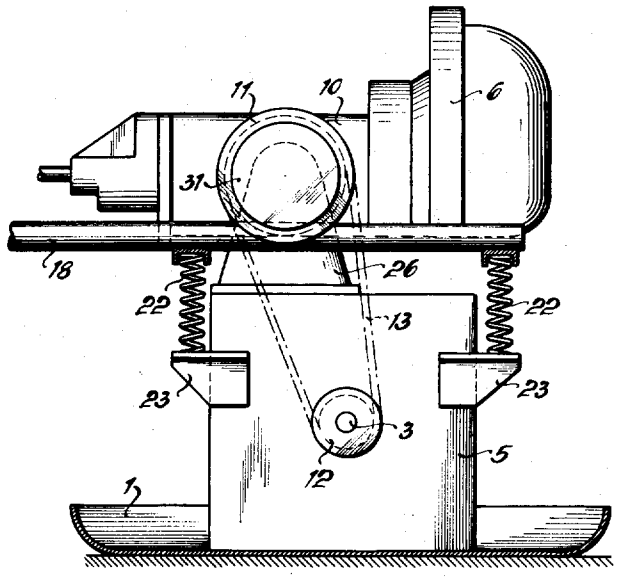


Jan. 19, 1960 A. KINDLER 2,921,475

RAMMING MACHINE

Filed June 28, 1954 4 Sheets-Sheet 3

FIG. 5



Jan. 19, 1960 A. KINDLER 2,921,475

RAMMING MACHINE

Filed June 28, 1954 4 Sheets-Sheet 4

FIG. 6

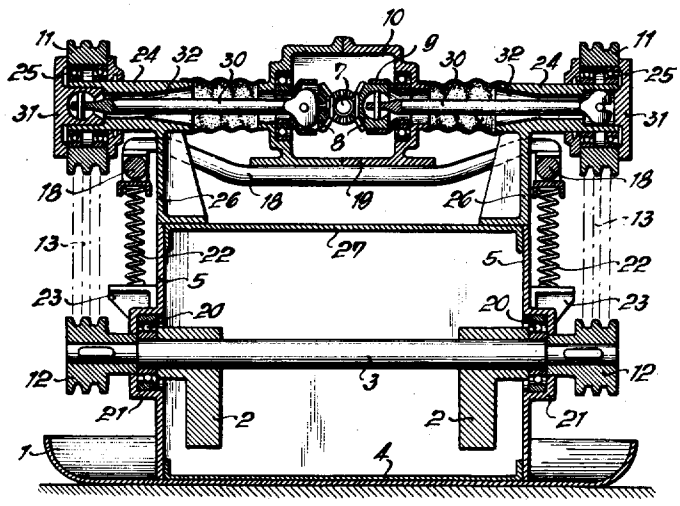
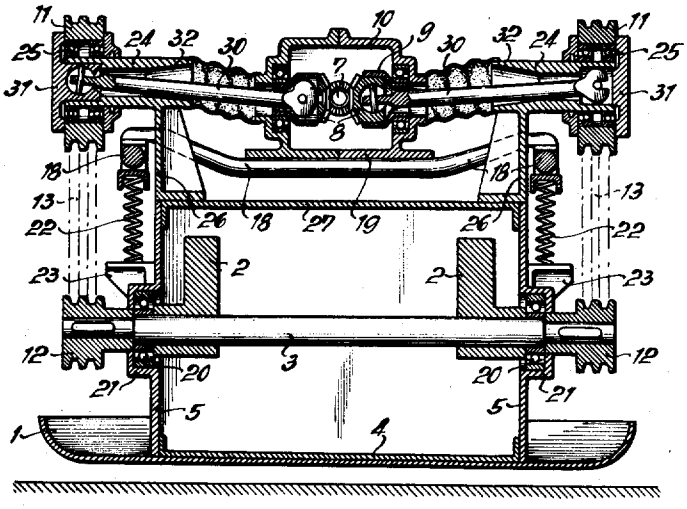



FIG. 7



United States Patent Office 2,921,475 Patented Jan. 19, 1960



2,921,475

# RAMMING MACHINE

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Application June 28, 1954, Serial No. 439,854

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2 Claims. (Cl. 74—61)

The invention relates to a vibrator device intended more particularly for the consolidation of earth and having a vibrator plate supporting the oscillation generator and operating on the mass to be consolidated.

In connection with such appliances, it is already known to arrange the driving motor above the base plate and to support it by springs or other resilient means in such manner on the vibrator plate or the oscillation generator that it does not participate in the oscillation, or at the most only to a small extent. During the operation of such appliances, the vibrator plate consequently constantly carries out relative movements with respect to the driving motor. In order to facilitate these relative movements, such appliances have hitherto been provided on one or both sides, according to their construction, with belt or chain drives connecting the motor shaft and the shaft of the oscillation generator and the variations in the axial spacing of the belt pulleys or chain wheels which occur with the oscillations have been compensated for by tension pulleys or the like, or belt gearings constructed in two parts in the manner of shear arms and having a central belt pulley have been used as the connection. On account of the constant rapid change in the belt or chain tension, such belt or chain gearings are subject to very heavy wear.

The invention therefore follows a different path for facilitating the relative movement between the vibrator part and the driving part of such appliances and consists in that the intermediate gearing transmitting the driving force of the motor to the oscillation generator is constructed as a gearing in which the gearing parts are at a fixed distance from one another and are not capable of rocking relatively to one another, and is connected by a cardan shaft to one of these two parts of the appliance for the purpose of facilitating the relative movement between the oscillation generator and the driving motor.

The result obtained in this manner is that with vibrator appliances of the said type, instead of using belt or chain gears as the intermediate gearing, it is possible to employ any other gears which are suitable for the mutual transmission of the revolutions of two shafts arranged at a fixed spacing one above the other. Therefore, it would be possible, for example, also to use crank gears or tooth wheel gears without the wear on such gears exceeding the normal amount. However, this is also the case when using belt or chain gears, since the belt pulleys or chain wheels are now constantly at the same distance from one another during running and consequently the belt or chain tension is no longer constantly changing during the vibrational movements.

A preferred embodiment of the invention is obtained, with a vibrator appliance of the said type in which the intermediate gear or gears are constructed as belt or chain gears, if the belt pulleys or chain wheels associated with the driving motor and the oscillation generator are mounted in bearing parts on the vibrator plate or the oscillation generator at a fixed distance from one another and the



cardan shaft or shafts are arranged between the driving motor and the belt pulley or pulleys, or chain wheel or wheels associated therewith.

In an appliance which is provided in known manner with a drive means on both sides for the oscillation generator, the driving motor is expediently arranged with its shaft transversely of the shaft of the oscillation generator, and combined with a change-speed gear, differential and secondary shaft to form a driving assembly, as known per se in the construction of vehicles.

Various constructional forms of a vibrator appliance according to the invention are shown in the drawings.

Figure 1 shows an appliance with drive means on both sides for the oscillation generator and leaf springs for supporting the driving unit, this view being a diagrammatic side elevation with the vibrator plate in section,

Figure 2 is a similar view of an appliance with a modified arrangement of the leaf spring,

Figure 3 is a cross-sectional view of the appliance according to Figure 1, the section lines to the left and right of the centre line indicated by a chain-dotted line being staggered relatively to one another, and

Figure 4 shows the same appliance in a view corresponding to Figure 3 with the vibrator plate lifted,

Figure 5 is a side elevation corresponding to Figure 1 of another appliance which is also provided with a drive means on both sides, but in which the driving unit is supported by means of spiral springs.

Figure 6 is the corresponding section related to Figure 3, and

Figure 7 shows the same appliance in a view corresponding to that of Figure 6, but with the vibrator plate raised.

In all the constructional forms which are illustrated, the appliance consists of the vibrator plate **1**, the oscillation generator provided with the eccentrics **2** and the shaft **3**, the housing **5** which is fixed on the vibrator plate **1** by means of angle plates **4** or the like and which accommodates the oscillation generator and the driving unit **10**. The driving unit **10** is in each case formed by the driving motor **6** which is not shown in the sectional figures and which has the shaft **7**, the differential **8** and the secondary shafts **9**.

The drive of the oscillation generator **2**, **3** takes place at each side by way of a belt gearing comprising the upper belt pulleys **11**, the lower belt pulleys **12** which are fast with the shaft **3** and the V-belts **13** which are indicated in chain-dotted lines. The shaft **3** is mounted in ball-bearings **20** which are arranged inside bearing housings **21** of the machine housing.

In all the constructional forms which are illustrated, the drive unit **10** is resiliently supported on the housing **5** of the oscillation generator **2**, **3** in such manner that it constitutes a mass not participating or only participating to a slight extent in the oscillations of the vibrator plate **1** and the oscillation generator **2**, **3** and the housing **5**, the vibrator plate **1** being statically loaded by said mass in a manner known per se.

In the constructional form according to Figures 1 to 4, this is effected by means of leaf springs **14** which, according to Figures 1, 3 and 4, engage by means of the angle members **15** on the one hand on the housing **5** of the oscillation generator and, on the other hand, by means of the bearing lugs **16** and **17** on the supporting frame **18** for the driving unit **10**. The leaf springs **14** are rigidly connected in the bearing lug **16** to the supporting frame **18**, but are guided for movement in the bearing lugs **17**. The supporting frame **18** is fixed to the base plate **19** of the drive unit **10**.

The constructional form according to Figure 2 dif-

fers from that described above only by the fact that the leaf springs **14'** are curved upwardly.

In the constructional example according to Figures 5 and 7 the supporting frame **18** of the drive unit **10** is supported at four places by means of the spiral springs **22** on brackets **23** of the housing **5**.

In contrast to the known constructions, the upper belt pulleys **11** in all the constructural forms of the vibrator appliance according to the invention which have been illustrated are arranged at a fixed distance from the lower belt pulleys **12**. For this purpose, the upper belt pulleys **11** are rotatably mounted on lateral journals **24** by means of the ball bearings **25**, said journals being rigidly connected to supporting arms **26** or being in one piece with the latter, said arms in turn being rigidly connected to the top wall **27** of the housing **5**. Since the lower belt pulleys **11** are keyed to the shaft **3** of the oscillation generator, which shaft is mounted so as to be immovable vertically in the housing **4**, the spacing of the belt pulleys **11** and **12** and the distance between their shafts is invariable.

The relative movements of the vibrator plate **1** and of the oscillation generator **2**, **3** relatively to the driving unit **10** not participating or only participating to a small degree in the oscillations, which movements are shown in Figures 3 and 4 or 6 and 7, are rendered possible according to the invention by cardan shafts **30** which are guided through the hollow journals **24**, and are connected at one end to the secondary shafts **9** and at the other end to the upper belt pulleys **11** so as to be movable in all directions but not reciprocally rotatable. The connection to the upper belt pulleys **11** is effected by means of bearing elements **31**, which engage in the hole **32** of the hollow journal **24** and are rigidly connected externally of the latter to the belt pulleys **11**.

The hole **32** in the hollow journal **24** is of such dimensions, apart from its outer part accommodating the bearing element **31**, that the cardan shaft **30** is able to assume the inclined position as shown in Figures 4 and 7 relatively to its normal position which is illustrated in Figures 3 and 6.

In the constructional examples which are illustrated and which have a drive means on both sides, the cardan shafts **30** to a certain extent form an oscillating shaft with the shaft **7** of the driving motor **6** as the pivot.

The invention is not restricted to the constructional form of the intermediate gearing and the arrangement of the cardan shafts, as illustrated. For example, instead of a belt drive, it would obviously also be possible to employ a chain bearing or in fact any gear which is per se suitable for the mutual drive of two shafts arranged one above the other. Furthermore, it is also possible to use an intermediate gear arranged on only one side, and the said intermediate gear or gears could also be fixed to the non-vibrating driving part of the appliance instead of to the vibrator part. In this case, the cardan shaft would then have to be connected between the intermediate gear and the shaft of the oscillation generator.



I claim:

1. A freely movable vibrator mechanism, comprising a vibrator plate device, an oscillation generator device mounted on said plate, a driving motor elastically supported toward the center of said plate, a coupling member, said motor being coupled to the oscillation generator device by said coupling member, bearing members positioned at fixed distances from one another on one of said devices, coupling member supports positionally corresponding with the driving motor and the oscillation generator device supported by said bearing members, and cardan shafts coupled between the motor and the oscillation generator device to transmit power from the motor via the supports and coupling member to the oscillation generator device.

2. A vibrator appliance comprising a vibrator plate adapted for freely resting on material to be consolidated and being freely movable in every direction along said material, a member firmly fixed on the vibrator plate, a driving motor resiliently supported by and approximately in the center of said vibrator plate, said motor constituting a mass statically loading the vibrator plate and independent of the oscillations of said vibrator plate, an oscillation generator mounted on the vibrator plate, an intermediate gear coupled between said motor and generator for transmitting driving force therebetween, bearing members superposed at a fixed distance from one another on said fixed member, said gear including devices rotatable in the bearings and means coupling said devices for the transfer of forces therebetween, and cardan shafts coupling selected of said devices to said motor for the transmission of power and to permit relative changes in distance between the motor and the oscillating plate.

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