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DEVICE FOR THE COMPACTION OF SOIL AND DUMPED MATERIALS

Filed May 16, 1956

2 Sheets-Sheet 1

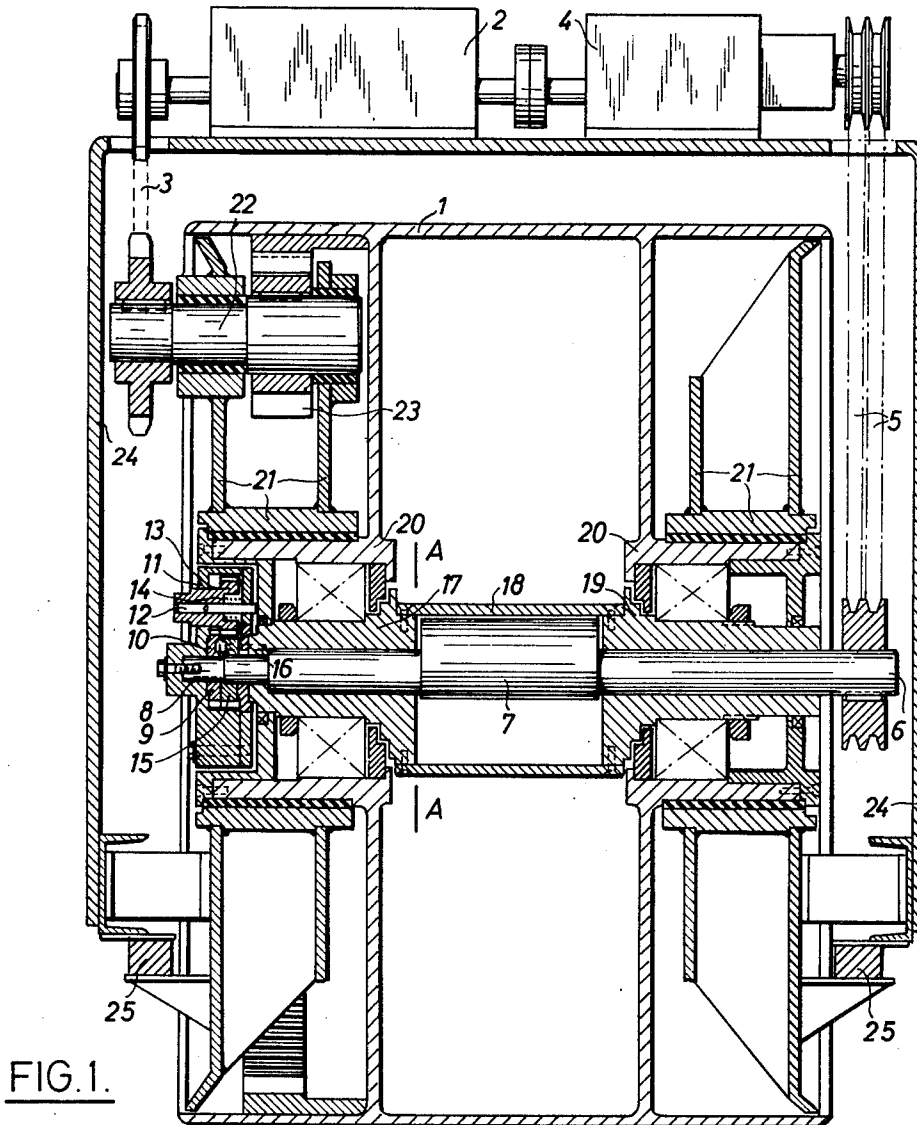


FIG. 1.

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FIG. 2.

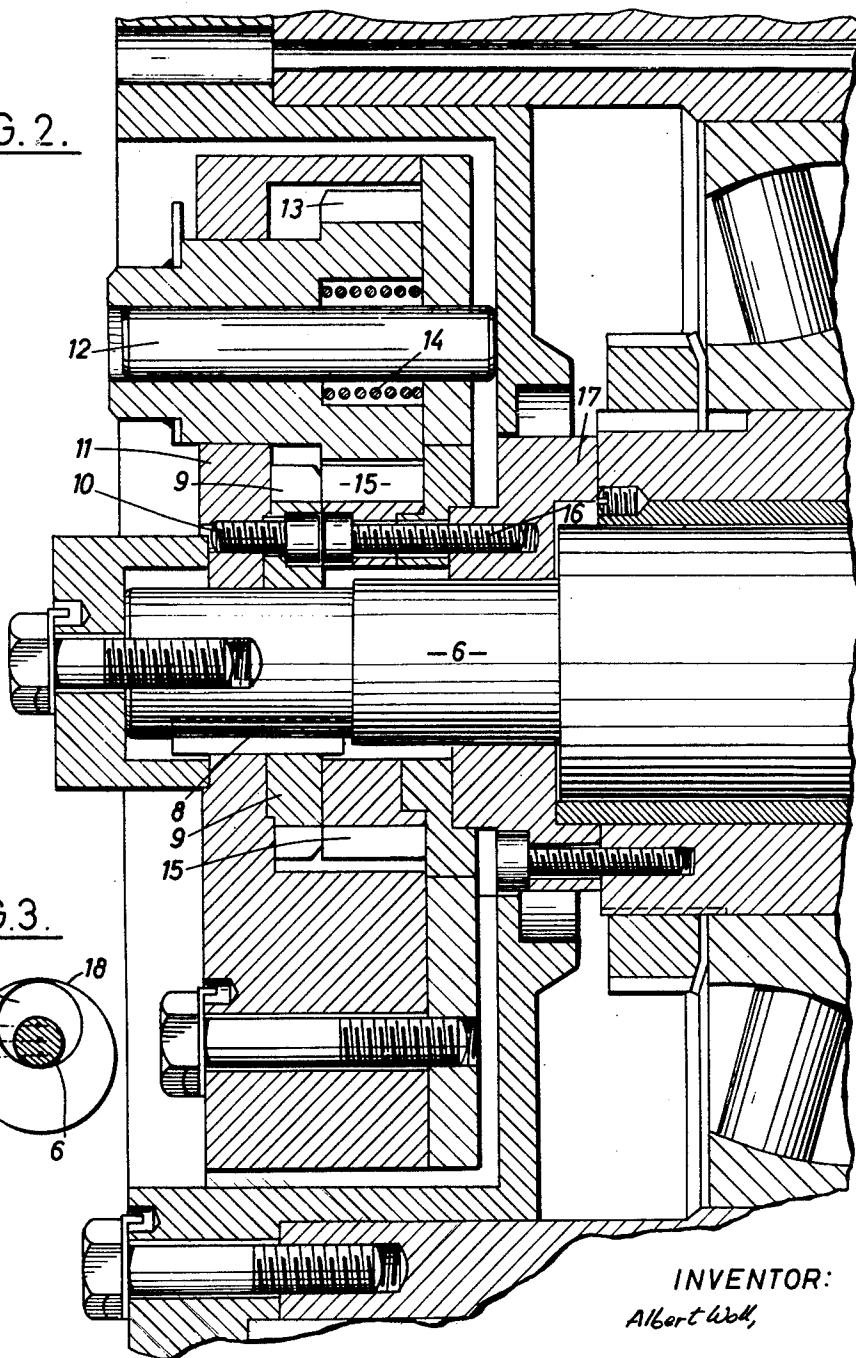
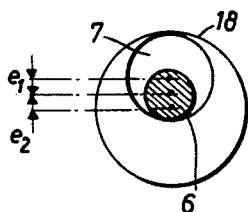


FIG. 3.



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**DEVICE FOR THE COMPACTION OF SOIL AND
DUMPED MATERIALS**

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3 Claims. (Cl. 74—61)

Soils and dumped materials are usually compacted by heavy rollers, by ramming or vibrating machinery. In particular the last mentioned type of compaction is recently of special interest.

The known devices of this type are so designed that they produce vibrations by the drive shaft provided with an unbalanced mass, which are transferred to rollers or plates and thus bring about the compaction action. In this connection it is known that the different types of soil possess different inherent frequencies. Taking advantage of this knowledge, an increase of the compaction action has been attempted by adapting the frequency of the machine to the inherent frequency of the soil.

The present invention is based on the new knowledge that in case of dry consistency of the material to be compacted, the compacting effect can be increased by controlling the number of blows per time and surface unit, by controlling the speed of travelling, and by adjusting the unbalanced masses and thus the amplitude.

According to this invention it is suggested to effect the vibration excitement of the roller by several unbalanced masses which are adjustable to each other and which are preferably arranged in an eccentric manner to the centre shaft of the roller. The adjustment of the unbalanced masses can be carried out in such a way that one of the masses is fixed on the central shaft of the roller while the other unbalanced mass is arranged eccentrically in the form of a hollow shaft body on the roller shaft, the hollow shaft body being adjustable to the roller shaft by means of a pinion.

The accompanying drawing shows, by way of example, one type of embodiment of the invention in three figures.

Figure 1 is a longitudinal sectional view of a compacting roller in accordance with the invention; and

Fig. 2 is a view of the eccentric adjusting mechanism of the compacting roller of Fig. 1, but drawn on a larger scale.

Figure 3 is a sectional view taken on the line A—A of Figure 1.

The hollow roller 1 is moved by a gear 2 over drive 3 or by a tractor forward and backward over the material to be compacted. The motor 4 drives over drive 5, shaft 6, centrally arranged in the roller. The shaft 6 bears the eccentric or unbalanced mass 7 which is eccentrically arranged on it.

On the end of shaft 6 there is keyed by key 8 a pinion 9 which is fixed by means of screws 10 to a rotating body 11. In this rotating body 11 is mounted by bolts 12 a pinion 13 which can be shifted by a compression spring 14 in such a manner that it engages with a pinion 15 or it is shifted by the spring 14 outwardly and engages with pinion 9 and partly with pinion 15. This pinion is connected by means of screws 16 with the hollow shaft body 17 and thus with the tubular shaft 18 and the hollow shaft body 19. The hollow shaft bodies 17 and 19 are both arranged eccentrically on shaft 6 and carry on their eccentrics in fixed connection the tubular shaft 18.

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It is to be seen from Figure 2 that the hollow shaft bodies 17 and 19, serving as unbalanced masses, can be so adjusted to the mass 7 by simultaneously changing the components in one plane of the eccentricities e_1 and e_2 in order to obtain the desired eccentricity compared with shaft 6, that the unbalanced masses are partly or entirely in one plane or line. Changing the eccentricity of shaft 6 to that of the hollow shaft bodies 17 and 19 within a range of 180° leads to any desired position of the masses to each other. In border cases the mass of the shafts reaches a certain maximum or the masses practically annul each other.

The relative position of the unbalanced masses can be adjusted by placing a wrench onto the outer wrench part of the pinion 13, overcoming the spring pressure and interengaging the pinion 13 with the pinion 15. By turning the pinion 13, any desired position of the unbalanced masses relative to each other can be obtained within 180° .

When the wrench is withdrawn from pinion 13, this will be pushed outwardly by the spring 14 and will engage with pinion 9 but partly remain engaged with pinion 15. Thus, further turning is prevented. Due to this locking arrangement, shaft 6 will, when rotating, also drive the shaft bodies 17, 18 and 19. In this way, any desired efficiency of the blows within the given limits can be obtained.

The operation is as follows: Normally, the pinion 13, owing to the pressure exerted by the spring 14, is positioned so as to engage simultaneously the pinion 9 and the pinion 15. Since the pinion 15 is secured by the screws 16 to the shafts 17, 18 and 19, and on the other hand the pinion 9 is keyed by the key 8 to the shaft 6, the engagement by the pinion 13 simultaneously of the pinions 9 and 15 effectively locks the shaft 6 in position relative to the shafts 17, 18 and 19. Therefore, when the shaft 6 is rotated by the drive 5, the shafts 17, 18 and 19 will rotate along with the shaft 6 in the same direction of revolution. The overall vibration effect will be determined by the relative position of the eccentricity of the shaft 6 and of the eccentricity of the aggregate of the shafts 17, 18 and 19.

If it is desired to change the vibration amplitude, it will be necessary to change the relative position of the eccentricities. This can be done, as described in the foregoing, by turning the shaft aggregate 17, 18 and 19 relative to the shaft 6. Prior to this relative turning, it is necessary to depress the pinion 13 on its shaft 12, against the force of the spring 14, so that it releases the pinion 9 and engages only the pinion 15; by turning thereafter the pinion 13, the angular position between the shaft aggregate 17, 18 and 19 will be changed relative to that of the shaft 6. Since the pinion 13 is disposed on the shaft 12, and the shaft 12 in turn is disposed on the rotating body 11 that is secured to the pinion 9 and hence to the shaft 6, engagement of the pinion 13 with the pinion 15 and rotation of the pinion 13 will result in the aforesaid relative angular displacement between the two shafts.

This angular displacement results in a change in position of the component of eccentricities in any one plane; this regulation permits an adjustment between a maximum amplitude position wherein the eccentricity components e_1 and e_2 are added (as shown in Fig. 2) and, respectively, a minimum amplitude position wherein the two eccentricity components e_1 and e_2 are subtracted from each other practically resulting in no vibration at least in the lower harmonics, as well as any position between these two extreme positions.

Naturally, such adjustment can take place only when the machine is at standstill. After the adjustment, the

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pinion 13 will be released to snap back under the urging of the spring 14 into the operating position wherein it locks the pinions 9 and 15 by simultaneously engaging both of them.

According to the invention there is provided a further advantage of the device by arranging the drive more favourable to the travel of the roller body 1 in fixing on the bearing points 20 rotary bearing bodies 21 which permit shifting the drive shaft 22 to a more favorable position to pinion 23 and also a better suspension of the roller frame 24 in the vibrating metal body 25.

What I claim is:

1. A vibrator, for use in connection with an earth-working roller, comprising in combination, a first revoluble shaft having a first eccentric mass and adapted to be journaled relative to said roller, a second revoluble shaft being hollow and surrounding said first shaft and co-axial therewith and having a second eccentric mass formed of two interconnected parts spaced apart from each other along said axis, said shafts being angularly displaceable relative to each other about said axis, and said first mass being disposed between the two parts of said second mass, means interconnecting said shafts comprising an adjusting mechanism for angular displacement of one shaft relative to the other and including gear means connected to each shaft and a movable gear engaging member adapted selectively to engage one and alternatively both gear means for adjustment of the relative

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angular position between the shafts and for locking of the shafts against angular displacement relative to each other, respectively.

2. A vibrator, as claimed in claim 1, said gear means including a pair of gears disposed in axial alignment and each secured to a shaft, said gear engaging means including a pinion movable axially of said axis of alignment and in all positions meshing with one of said gears and in one position meshing with both gears.

3. A vibrator, as claimed in claim 2, together with resilient means operable to urge said pinion into said one position wherein it meshes with both gears.

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