NOTE.—*The application for a Patent has become void.*
This print shows the Specification as it became open to public inspection on December 23, 1931, under Section 91 (3) (a) of the Acts.

PATENT SPECIFICATION

Application Date: Dec. 12, 1931. No. 34,504/31. **398,789**

Complete not Accepted.

COMPLETE SPECIFICATION.

Toy Tractor.

We, BING-WERKE, vorm Gebruder Bing Aktiengesellschaft, of 215, Regensburgerstrasse, Nuremberg, Germany, a Joint Stock Company registered under the Laws of Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to a toy caterpillar tractor, equipped with an arrangement that enables the direction of travel to be changed, either automatically or by hand. The arrangement is so devised that when the connection between the driving wheel of one of the caterpillars and the shaft of the spring mechanism is interrupted and the turning of the driving wheel is prevented by means of a brake, the vehicle turns about the stationary caterpillar. When the driving wheel is connected up again, the brake being released at the same time, the caterpillar tractor continues its journey straight ahead.

In order to alter the direction of travel in the case of large scale tractors of this kind, the two caterpillars are actuated so as to move in opposite directions, either at equal or unequal speeds. In the former event, the vehicle turns on its own axis, and in the second case it describes a curve of greater or smaller radius. Experiments have demonstrated that the application of this type of drive to toy caterpillar tractors entails a considerable exertion of power, so that although the usual spring mechanism of a tractor intended solely for running straight ahead is strong enough for that purpose, even in climbing steep gradients it is inadequate for effecting turning movements in the aforesaid manner. However, for practical manufacturing reasons it is necessary that an endeavour should be made to enable the same spring mechanism to serve also for steerable tractors, so that the casing and other structural parts, for example, require a minimum amount of modification. This result is achieved by stopping and fixing the one caterpillar until the tractor has turned in the desired direction. Since toy caterpillar tractors do not have to face the same difficulties of track resistance as large-scale tractors, the application of the fundamental idea of the invention affords a substantial simplification of the driving gear in comparison with the known designs, more particularly in that it dispenses with the variable speed gear necessary in their case. The change in the direction of travel by declutching and braking one of the caterpillars in accordance with the invention requires far simpler auxiliary agents, consisting for example of a dog clutch and a ratchet brake. The dog clutch may also be replaced by a disconnectable pair of pinions in which event the braking effect can be produced by immobilising the pinion that is connected to the caterpillar.

The invention will be clearly understood from the following description aided by the annexed drawings in which a typical embodiment of the arrangement for automatic change of direction is illustrated and, in which Figure 1 is a side elevation, Figure 2 a plan of part of the caterpillar tractor, the driving mechanism and other parts that are not needed for comprehending the invention being omitted.

In the present typical embodiment only the arrangement for turning in the one direction is shown, but of course it can also be designed to act on both caterpillars in order to turn the vehicles to left or right, either automatically or by means of a manual steering lever. The front axle *i* is driven by the spring mechanism. The one caterpillar wheel on the front axle is fixed, but the other caterpillar wheel *c* is mounted loose on the axle, and is prevented from lateral shifting by means of a shoulder *l* on the axle

and a check ring 2. The wheel *c* is provided with a ratchet disc 3 and with the one member 4 of a dog clutch, the other member 5 of which is adapted to slide along the driving axle *i*. The sliding movement of the clutch member 5 is effected by means of a T shaped lever 6, mounted on a pivot 7 attached to the casing of the gear mechanism or to the body of the toy. One arm of the lever 7 is shaped into a fork 8, which engages the member 5 of the clutch, whilst the opposite lever arm 9 is caused to bear against a control plate 12 by the tension of a spring 11. The lever arm 10 at right angles to the arms 8 and 9 is adapted to be brought into and out of engagement with the teeth of the ratchet disc 3.

The control plate 12 is provided with two annular projections 13, 14 which are situated in different planes and connected together by means of a transition portion 15 and a sharply descending edge 16. The plate 12 is actuated through pinion gear 17, 18 from a shaft 19 which may form the winding shaft of the spring mechanism.

For throwing the control device out of action a wedge-shaped sliding member 20 (Figure 3) is provided which is guided on the caterpillar tractor and is adapted to slide between the fork 8 and the gear plate.

The control device operates in the following manner:

In the position shown in Figure 2, the clutch 4, 5 is out, since the arm 9 of the lever 6 rests on the lower annular surface 13. The caterpillar wheel *c* is blocked by the ratchet disc 3 through the lever arm 10 being in engagement with the ratchet disc 3. The caterpillar *b* is consequently arrested, and if the caterpillar tractor is set in motion it will describe a turn in the direction of the arrow A, (Figure 2) the direction of travel being supposed to be in that of the arrow B. The control plate 12 which is revolving in the direction of the arrow C (Figure 1) turns the lever 6 by means of the intermediate portion 15 in a clockwise direction (Figure 2), so that it then comes to bear against the raised annular surface 14. By this means, the clutch 4, 5 is thrown in and the block on the disc 3 is removed since the lever arm 10 is disengaged from the disc 3. Consequently the tractor continues its forward movement, both caterpillars being now again actuated. During the continued rotation of the control plate 12, the lever arm 9 is again drawn over the descending edge 16 on to the annular surface 13 by the spring 11, thus producing a repetition of the movements just described so that the clutch 3 is again thrown out and the ratchet disc 3 and the caterpillar wheel *c* are again stopped.

The length of the annular surface 13 determines the amplitude of the wheel lock of the vehicle, whilst the distance traversed by the tractor straight ahead depends on the length of the annular surface 14. The intermediate portion 15 connecting the two annular surfaces 13 and 14 is made as short as possible. The transmission ratio of the pinions 17, 18 determines the number of changes in direction during the complete running down of the spring mechanism.

The action of the control device can be suspended by adjusting the wedge-shaped slider 20 by hand. If the slider 20 be pushed downwards, the wider portion of the slider, which is seated between the fork 18 and the gear plate prevents the lever arm 9 from bearing against the control plate 12, and consequently prevents the declutching of the members 4, 5. Hence, depressing the slider 20 allows the tractor to move straight ahead.

The device can also be arranged in such a manner as to act automatically on the one caterpillar or the other, alternately so that an alternate change of direction to left and right ensues. In this case also it can be put out of operation by means of two manual sliders.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. Toy caterpillar tractor with an automatic or manual device for changing the direction of travel, characterised in that for this purpose, a clutch and brake mechanism is employed which temporarily disconnects one of the caterpillars from the driving mechanism, and at the same time immobilises said caterpillar.

2. Toy caterpillar tractor according to Claim 1, characterised in that the clutch and release mechanism is automatically operated by a control actuated by the driving mechanism.

3. Toy caterpillar tractor according to Claims 1 and 2, characterised by a lever which is controlled by a drum on the driving mechanism and acts on a caterpillar wheel, mounted idly on the driving axle, so as either to couple said wheel with the driving axle or immobilise it, and in that the caterpillar wheel is integrally connected to a ratchet disc which is braked by an arm of the control lever when the clutch disposed between the caterpillar wheel and the driving

shaft is let out.

4. Toy caterpillar tractor according to Claims 1—3 characterised in that the control drum is provided with two annular surfaces lying in different planes and connected together by an intermediate portion and a steep edge.

5. Toy caterpillar tractor according to Claims 1—4, characterised in that the control lever has three arms, one of which bears resiliently against the control drum, the second is designed as a fork for displacing the one clutch member and the third forms a braking member for the ratchet disc of the caterpillar wheel.

6. Toy caterpillar tractor according to Claims 1 and 2 characterised in that the clutch and brake mechanism can be set in and out of operation, as desired, by means of a manual slider or lever mounted on the vehicle.

7. The steering mechanism for toy tractors constructed substantially as described with reference to the annexed drawings.

Dated this 12th day of December, 1931.

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Fig.1

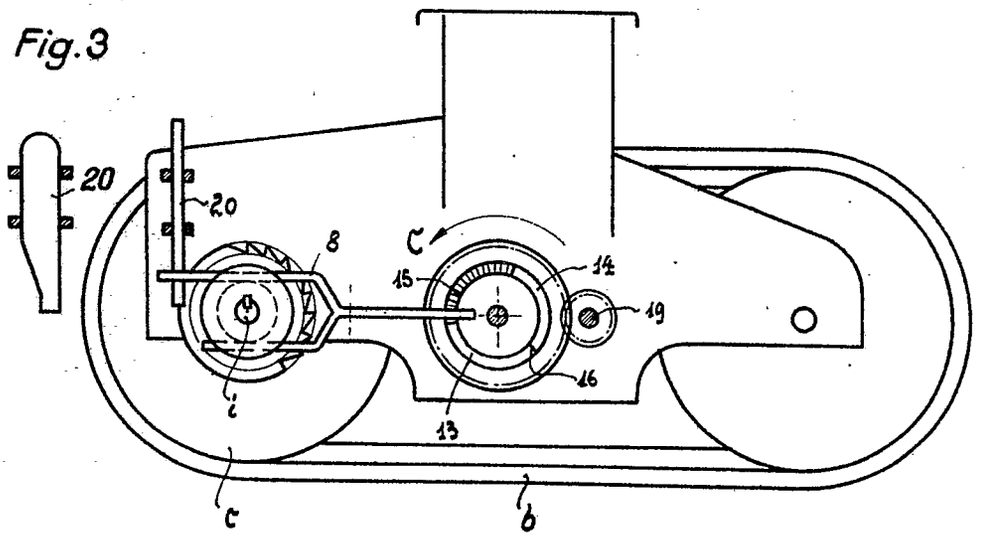
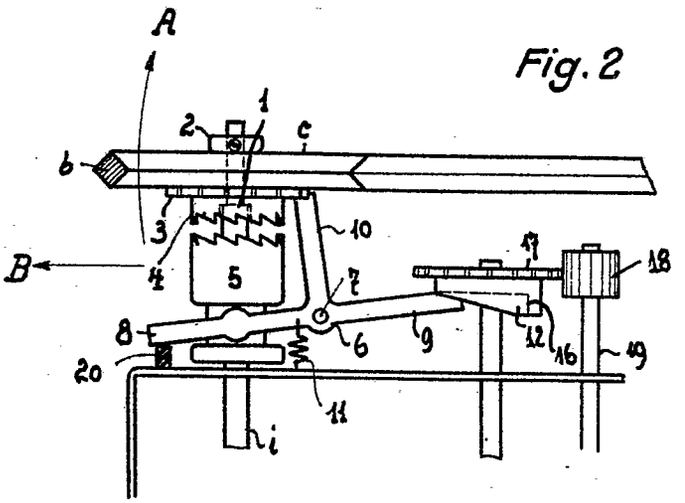


Fig.3

Fig.2



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