A common feature among these spreaders is that two beams, or two pairs of beams, are associated with a common drive having a pusher acting on the beams, and by which the beams or pairs of beams can be driven for extension or retraction, respectively, in mutually opposite directions in the longitudinal direction of the spreader. In previous solutions, the pusher forms a fixed connection between the beams and a driving means which is effective also for holding the beams in the subject set position. In the event of a collision with a beam end, the shock load applied from the collision is transferred to the driving means via the pusher. If the shock load is heavy enough, damage may result in the driving means, in the pusher, and in other interconnected components.

In hydraulically operated spreaders this problem may at least partly be remedied by means of overload valves, e.g., that open when the system pressure reaches a predetermined, abnormal value. In an electrically operated spreader, where the drive means is an electrical motor controlling the telescopic movements of the beams, a similar remedy is not available in the electromagnetically operated brake that acts on the motor axis and which is typically used for holding the motor and the beams in the subject position.

SUMMARY OF THE INVENTION

The present invention aims to obviate this problem and to provide a protection against collision for the drive of the telescopic movement of the beams in a container-lifting spreader.

The present invention further aims to provide, in one embodiment of the invention, a simplified drive of reduced weight for the telescopic movements of the beams in an electrically operated container-lifting spreader.

Thus, according to an aspect of the invention, there is provided a container-lifting spreader comprising at least two beams which are movably supported in a housing and provided a drive by which the beams can be driven in telescopic movements for adjusting the length of the spreader, the drive comprising an electric motor and a pusher acting on the beams, the pusher interconnecting the beams for simultaneous telescopic movements in mutually opposite directions in the longitudinal direction of the spreader, and a power transmission operatively coupled between the motor and the pusher, the power transmission comprising an input shaft carrying a first external gear ring driven by the motor, and an output shaft carrying a second external gear ring that operates the pusher, the first and second gear rings in mutual engagement forming an angle gear arranged with an irreversible mesh of teeth such that rotation of the input shaft causes rotation of the output shaft whereas the reverse is prohibited by the irreversible mesh of teeth, a cut-off coupling integrated in the angle gear, the cut-off coupling holding the beams in an adjusted position at normal torsional moments and the cut-off coupling arranged to release a connection between the motor and the beams in result of an abnormal torsional moment being externally applied to the output shaft, and a frictional clutch arranged between the output shaft and the second external gear ring carried on the output shaft, wherein the frictional clutch comprises a ring having a conical outer periphery and arranged slidable on the output shaft, and which can be pressed against a conical inner periphery formed on the first external gear ring, or formed on said gear wheel carried on the output shaft.

~~Thus briefly~~In an embodiment, a container-lifting spreader as initially outlined is provided wherein a power transmission is operatively inserted between the driving means and the pusher, the power transmission comprising an input shaft driven by the driving means and carrying an external gear ring, an output shaft likewise carrying an external gear ring and operating the pusher, the gear rings in mutual engagement forming an angle gear arranged with an irreversible mesh of teeth such that rotation of the input shaft causes rotation of the output shaft whereas the reverse is

CLAIMS

1. A container-lifting spreader comprising at least two beams (1, 2) which are movably supported in a housing (3) and provided a drive by which the beams can be driven in telescopic movements for adjusting the length of the spreader, the drive comprising an electric motor (5) and a pusher (7) acting on the beams, the pusher interconnecting the beams for simultaneous telescopic movements in mutually opposite directions in the longitudinal direction of the spreader, and a power transmission (6) operatively coupled between the motor (5) and the pusher (7), the power transmission comprising an input shaft (11) carrying an external gear ring (12) driven by the motor, and an output shaft (14) likewise carrying an external gear ring (13) that operates the pusher, the gear rings (12, 13) in mutual engagement forming an angle gear (11, 12, 13, 14) arranged with an irreversible mesh of teeth such that rotation of the input shaft causes rotation of the output shaft whereas the reverse is prohibited by the irreversible mesh of teeth, characterized by a cut-off coupling integrated in the angle gear, the cut-off coupling holding the beams in the subject adjusted position at normal torsional moments and the cut-off coupling arranged to release the connection between motor and beams in result of an abnormal torsional moment being externally applied to the output shaft (14).

2. The spreader of claim 1, characterized in that a frictional clutch is arranged between the output shaft (14) and the gear ring (13) carried on the output shaft (14).

3. The spreader of claim 1, characterized in that a frictional clutch is arranged between the output shaft (14) and a gear wheel carried on the output shaft and operatively engaging the pusher.

4. The spreader of claim 2 or 3, characterized in that the frictional clutch comprises a ring (15) having a conical outer periphery and arranged slidable on the output shaft (14) and which can be pressed against a conical inner periphery formed on the gear ring (13), or formed on said gear wheel.

5. The spreader of any previous claim, characterized in that the pusher is an endless belt or an endless chain (7).

6. The spreader of any of claims 1 to 5, characterized in that the pusher is a gear rack.

CLAIMS

1. A container-lifting spreader comprising at least two beams which are movably supported in a housing and provided a drive by which the beams can be driven in telescopic movements for adjusting the length of the spreader, the drive comprising an electric motor and a pusher acting on the beams, the pusher interconnecting the beams for simultaneous telescopic movements in mutually opposite directions in the longitudinal direction of the spreader, and a power transmission operatively coupled between the motor and the pusher, the power transmission comprising an input shaft carrying a first external gear ring driven by the motor, and an output shaft carrying a second external gear ring that operates the pusher, the first and second gear rings in mutual engagement forming an angle gear arranged with an irreversible mesh of teeth such that rotation of the input shaft causes rotation of the output shaft whereas the reverse is prohibited by the irreversible mesh of teeth, a cut-off coupling integrated in the angle gear, the cut-off coupling holding the beams in an adjusted position at normal torsional moments and the cut-off coupling arranged to release a connection between the motor and the beams in result of an abnormal torsional moment being externally applied to the output shaft, and a frictional clutch arranged between the output shaft and the second external gear ring carried on the output shaft, wherein the

frictional clutch comprises a ring having a conical outer periphery and arranged slidable on the output shaft, and which can be pressed against a conical inner periphery formed on the first external gear ring, or formed on said gear wheel carried on the output shaft.

2. The spreader of claim 1, wherein the frictional clutch is operatively engaging the pusher.

3. The spreader of claim 1, wherein the pusher is an endless chain.

4. The spreader of claim 1, characterized in that the pusher is a gear rack.

5. The spreader of claim 2, characterized in that the pusher is an endless belt or an endless chain.

6. The spreader of claim 2, characterized in that the pusher is a gear rack.

7. The spreader of claim 1, wherein said conical inner periphery is formed on the first external gear ring.

8. The spreader of claim 1, wherein said conical inner periphery is formed on said gear wheel.

9. The spreader of claim 1, wherein the pusher is an endless belt.