The invention refers to a mobile concrete pump provided with a chassis and a distributor mast mounted on a mast stand and capable of being rotated around a vertical axis and also provided with front support struts and rear support struts. The front support strut and rear support strut on each side of the chassis have a common pivot.
ABSTRACT

The invention refers to a mobile concrete pump provided with a chassis and a distributor mast mounted on a mast stand and capable of being rotated around a vertical axis and also provided with front support struts and rear support struts. The front support strut and rear support strut on each side of the chassis have a common pivot.
MOBILE CONCRETE PUMP

This invention relates to a mobile concrete pump provided with a chassis and a distributor mast mounted on a mast stand and capable of being rotated around a vertical axis and also provided with front support struts and rear support struts.

Such mobile concrete pumps are known from practice and are used at construction sites to distribute concrete from a central position over a wide area so that large-dimensioned concrete slabs can be poured when concrete mixers are used to feed concrete continuously when pouring is in progress. In addition, mobile concrete pumps make it possible to transport concrete economically to more elevated working levels, for which purpose use is already being made in practice of mobile concrete pumps with distributor masts exceeding 60 m in height. With dimensions of this order it is obvious that the stability of the mobile concrete
pump presents a problem. In order to provide a stable platform in any working situation for the mobile concrete pump with the distributor mast in any inclined position the front and rear support struts are mounted on the chassis, being originally located at the corners of the chassis. This means, however, that the entire chassis is subjected to the force transmitted from the distributor mast and must therefore be designed to have the appropriate stability. In consequence, steps have subsequently been taken to shift the swivel mountings of the front and rear support struts farther away from the corners and closer to each other, so that the swivel mounting for the rear support struts is located near the rear axle of the chassis; it has, however, been found that as the swivel mountings are brought closer together problems of torsion make their appearance. In addition, the swivel mountings of both the front and the rear support struts are now positioned relatively far back on the chassis, so that the front support struts have to be movable very far forward, and these struts are therefore usually designed to be telescopic. Lastly, the mast stand on the chassis also projects far forward. The result is that the telescopic support struts and the projecting mast stand increase the flexibility of the mobile concrete pump, whereas what is needed and sought after is stability.

While the aim is to plant the front and rear support struts as far as possible from the chassis so that the latter is positioned securely the front and rear support struts must, when not operational, rest close to the mobile concrete pump to permit it to travel. Therefore, in order to stow enough of the length of the front and rear support struts on the
chassis, it has been proposed to have the front struts project to the rear and the rear struts project to the front and to stow them there, thus making use of the length allowed by the chassis; this however requires that adequate space be available on the site beside the concrete pump to permit the front and rear struts to be shifted from their stowed to their working position with a circular motion passing through the high point of their travel. In addition, some mobile concrete pumps have their support struts in the form of the telescopes referred to above, so that they require little space when stowed but have a large operating radius when in their working position. This has the drawback that the telescopes reduce the stability, and the more segments the telescope has the more serious this drawback becomes.

The purpose of the invention is to design a mobile concrete pump of the type referred to initially which will not necessitate expensive bracing of the chassis to prevent torsion between the swivel mountings of the front and rear support struts and will permit the front and rear struts to be designed for length and to rest on the chassis without requiring much space when shifting from their stowed to their working position.

This purpose is achieved in accordance with the invention in a mobile pump of the type referred to initially by providing the front support strut and the rear support strut on each side of the chassis with a common pivot.

The advantage of this is that only the area directly between the mast
stand and the pivot has to be designed for special stability, since the forces are transmitted directly from the distributor mast through the stand and from this intervening area to the support struts, so that the rest of the chassis is not under load. By positioning the swivel mountings on a common pivot additional space is gained, because the struts can be designed to lie at greater length along the chassis, there being no further need to maintain a distance between the swivel mountings.

An especially preferred embodiment is characterized in that the front support struts and the rear support struts rest on the mast stand. During pumping operations the distributor mast, the stand and the front and rear struts can be regarded as an autonomous unit positioned on the chassis solely for the desired mobility; the chassis does not have to be reinforced, thus offering benefits with respect to manufacturing cost, and in addition the low weight increases the possible service load. To obtain adequate space for a stable stowage it is advantageous for the mast stand to have a base plate on which the front support struts and rear support struts rest.

The invention also includes provision for the front support strut and the rear support strut on one side to pivot on a bolt set coaxially with the pivot. The bolt used for this purpose forms a common pivot for the front and rear struts and is simply secured by means of a mounting support.
A somewhat more expensive mounting support is required if the front support strut and the rear support strut on one side are pivoted on bolts set coaxially with the pivot which are kept separate. This arrangement does however have the advantage of preventing torque and buckling loads from the front strut and the rear strut from working simultaneously on a bolt.

The invention also includes provision for each front support strut to take the form of a tubular guide swivelling around the pivot in which guide is inserted an adjustable sliding tube holding the front support leg and when stowed projecting through the tubular guide. This embodiment has the advantage that the front support strut when stowed can be so positioned on the chassis that it does not project into the wheel boxes which must be kept free for the wheels. Here the front strut as compared with an embodiment which designed solely as a telescope has the advantage that the segment attached to the swivel mounting does not limit the base length formed by the distance between the gap available on the chassis for the support leg and the swivel mounting. There is no need for the frequent practice of shifting the swivel mounting further back to obtain an adequate base length and thus accepting a shortening of the rear struts and a necessary reinforcement
of the chassis.

It is of course possible to obtain a larger operating radius for the front support struts by designing the sliding tube as a telescope and thus benefiting from the advantages related to the fact that the first segment of the telescope can use the full length of the sliding tube.

In order to achieve the most compact possible stowage of the front support struts on the chassis it is advantageous to provide the chassis with a recess into which the rear end of the sliding tube can project. The portion of the sliding tube projecting to the rear over the pivot can enter into this recess so that the sliding tube can be pivoted from its stowed position and guided past the superstructure on the chassis in order to adjust the sliding tube to the tubular guide.

An alternative embodiment features on the rear support strut a receptacle into which the sliding tube projects when in its stowed position, because this permits the rear strut to be designed thicker and stiffer without any increase in the cumulative overall height of the rear and front struts.

In this embodiment it is useful for the rear support strut to have two mounting plates by means of which it is attached to the bolt and between which the front support strut is coupled to the bolt. The rear strut is then cut away between the mounting plates sufficiently to prevent restriction of the angle of traverse.
The distributor mast together with the mast stand is attached directly to the chassis in the vicinity of the front axle, thereby increasing rigidity and enhancing stability because no connecting links are used.

A detailed explanation of the invention is given below on the basis of the examples of embodiments illustrated in the drawings, as follows:

**Fig. 1** side view of the mobile concrete pump to which the invention refers with front and rear support struts in stowed position,

**Fig. 1a** illustration of an embodiment as in Fig. 1 with the sliding tube of the front support strut projecting into the rear support strut,

**Fig. 2** plan view of a schematic illustration simplified from Fig. 1 without distributor mast,

**Fig. 3** illustration as in Fig. 2 with an alternative position for the front and rear support struts,

**Fig. 4** illustration as in Fig. 2 with location of the front support strut under conditions of limited space,

**Fig. 5** illustration as in Fig. 2 of an embodiment with maximum extension of the front and rear support struts requiring the
largest possible working surface,

Fig. 6 plan view of a mast stand with front and rear support struts, with sequence of possible positions of the front support strut during the shift from the stowed to the working position,

Fig. 7 schematic illustration of the two coaxially set bolts forming the swivel mountings for the front and rear support struts,

Fig. 8 illustration as in Fig. 7 of an embodiment with a common bolt for the swivel mounting of the front and rear support struts, and

Fig. 9 illustration as in Fig. 7 of an embodiment with sliding tube projecting into the rear support strut as in Fig. 1a.

The concrete pump 1 illustrated in Fig. 1 consists of a chassis 2 composed of a conventional truck with driver's cab 3, front axle 4, a rear double axle 5 and a frame 6 connecting these components. On the chassis 2 a distributor mast 7 is shown in stowed position, which in the embodiment illustrated has four sections 8 connected by joints 9 and can be adjusted to one another by means of hydraulic devices 10. The bottom section 8 which is the strongest is attached to a mast stand 11 which
rests directly on the chassis 2 in the vicinity of the front axle 4 and in the front third of the distance between the front axle 4 and the double axle 5. The distributor mast 7 can be rotated around a vertical axis 12 so that by interaction with the joints 9 of the distributor mast 7 it can reach any position within the radius described by the distributor mast 7 in its extended configuration. At the rear end of the chassis 2 there is mounted a charging bin 13 through which concrete is fed to a pump 14 for solid materials which pumps the concrete through a pipe 15 to the mast stand 11 and through the latter to a hose positioned on the distributor mast 7, so that the concrete fed through the charging bin 13 emerges from the hose at the free end of the distributor mast 7 and can be processed there.

On the chassis 2 there are two front support struts 16 and two rear support struts 17 which serve to stabilize the mobile concrete pump 1 while it is pumping so that it is possible to swivel the distributor mast 7 without risk to personnel or materials. The front support strut 16 and the rear support strut 17 positioned on each side of the chassis 2 have a common vertical pivot 18 around which the swivel mounting for the front support strut 16 and the rear support strut 17 is rotated, the front support struts 16 and the rear support struts 17 being secured by means of the swivel mountings to a base plate 19 for the mast stand 11. Fig. 7 shows for the swivel mounting an embodiment in which the front support strut 16 and the rear support strut 17 are seated on separate bolts 20, 21 set coaxially to each other and to the pivot 18, while Fig. 8 shows an embodiment which uses only one bolt 20 set coaxially to the
pivot 18.

In addition, it can be seen from Fig. 1 that the front support strut 16 takes the form of a tubular guide 22 which can be swivelled around the pivot 18. In this tubular guide 22 an adjustable sliding tube 23 is inserted which in the stowed position of the forward strut 16 shown in Fig. 1 projects through the tubular guide 22 to the rear so that the support leg 24 positioned on the sliding tube 23 is when in the stowed position located in a gap provided on the chassis 2. On the chassis 2 there is also a recess 25 as shown in Fig. 2 into which the rear end of the slide tube 23 can project, so that when the front support strut 16 is shifted from the stowed position shown in Fig. 1 to the working position shown in Fig. 2 the tubular guide 22 together with the slide tube 23 can be swivelled from a position parallel to the longitudinal axis 26 of the chassis 2. This swivelling movement requires only a small amount of space on the site for the operation of the mobile concrete pump 1 itself, because the slide tube 23 is adjusted inside the tubular guide 22 only when the angle of traverse is attained. When this happens the slide tube 23 is adjusted in order to displace the front support point sufficiently far from the mast stand 11. Figures 2-5 show that for each available amount of space it is possible to position the front support struts 16 differently. In addition, it is possible to increase the operating radius of the front support struts 16 by designing the sliding tube 23 as a telescope.

Fig.1a shows an additional embodiment in which the rear support strut 17
has a receptacle 26 into which the sliding tube 23 projects when in
stowed position. The rear support strut 17 has in this case two
mounting plates 27 by means of which it is attached to the bolt 20, the
front support strut 16 being led in to the bolt 20 between the mounting
plates. In this configuration reduction of the angle of traverse of the
tubular guide 22 is avoided by cutting away the rear support strut 17
between the mounting plates 27 sufficiently to permit the end of the
tubular guide 22 facing the rear support strut 17 to be swivelled freely
around the bolt 20.
Claims:

1. A mobile concrete pump, comprising a chassis, a mast stand, a distributor mast mounted on the mast stand and rotatable about a vertical axis, a front support strut and a rear support strut on each side of the chassis, wherein the front strut and the rear strut on each side of the chassis have a common pivot.

2. A mobile concrete pump as claimed in claim 1, wherein the front support struts and the rear support struts are mounted on the mast stand.

3. A mobile concrete pump as claimed in claim 2, wherein the mast stand has a base plate on which the front support struts and the rear support struts are mounted.

4. A mobile concrete pump as claimed in any one of claims 1 to 3, wherein the front support strut and the rear support strut on each side are mounted and pivot on a bolt set coaxially to the common pivot.

5. A mobile concrete pump as claimed in any one of claims 1 to 3, wherein the front support strut and the rear support strut on each side are mounted and pivot on separate bolts set coaxially to the common pivot.

6. A mobile concrete pump as claimed in any one of claims 1 to 5, wherein each front strut takes the form of a tubular guide swivelering around the common pivot, in which guide there is mounted an adjustable sliding tube holding a support leg of the front support strut and,
when in a stowed position, projecting through the tubular guide.

7. A mobile concrete pump as claimed in claim 6, wherein the sliding tube is designed to slide telescopically.

8. A mobile concrete pump as claimed in claim 6 or claim 7, wherein the chassis has a recess into which a rear end of the sliding tube can project.

9. A mobile concrete pump as claimed in any one of claims 1 to 8, wherein each rear support strut has a tubular guide and the chassis has a recess into which the tubular guide can project.

10. A mobile concrete pump as claimed in claim 9, wherein each rear support strut has two mounting plates by means of which the strut is attached to the bolt and between which the front support strut is coupled to the bolt.

11. A mobile concrete pump as claimed in claim 10, wherein each rear support strut is cut away between the mounting plates sufficiently to prevent restriction of the angle of traverse of the tubular guide.

12. A mobile concrete pump as claimed in any one of claims 1 to 11, wherein the chassis is provided with a front axle and the distributor mast together with the mast stand is attached directly to the chassis in the vicinity of the front axle.