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(54) Checking the loading capacity of flooring parts for scaffolding

(57) A flooring part 3 that is to be tested is inserted in a frame 11, 12 and by swinging a hand-actuated lever 17 the part 3 is loaded via a pressure-transmitting arrangement 2, and a pressure beam 25, the magnitudes of the pressure loading and of the elastic deformation caused by it being displayed simultaneously. The pressure transmitting arrangement 2 comprises a spring (22 Fig. 3) whose degree of compression is displayed on a scale (29 Fig. 3) and serves as a measure of the applied force. In an alternative embodiment, the spring is replaced by a hydraulic box and the hydraulic pressure is monitored. The elastic deformation is measured by means of a sensing lever/indicator arrangement (33′, 33, 34, 35 Fig. 2).

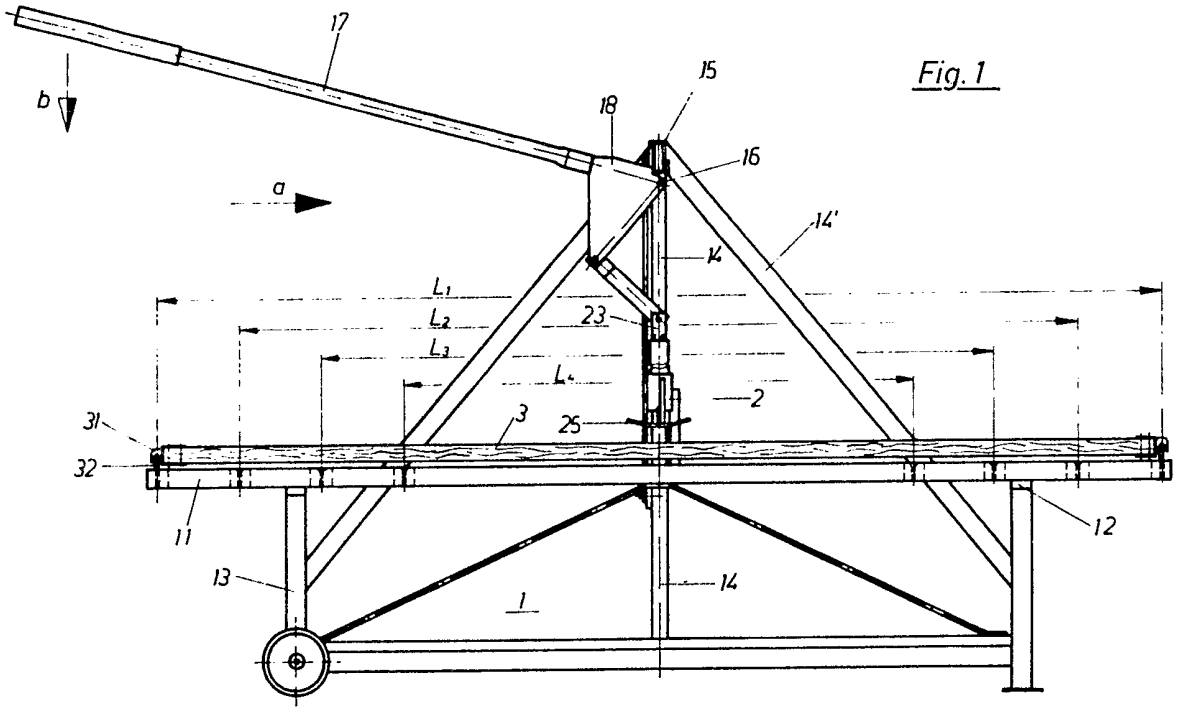

Fig. 1

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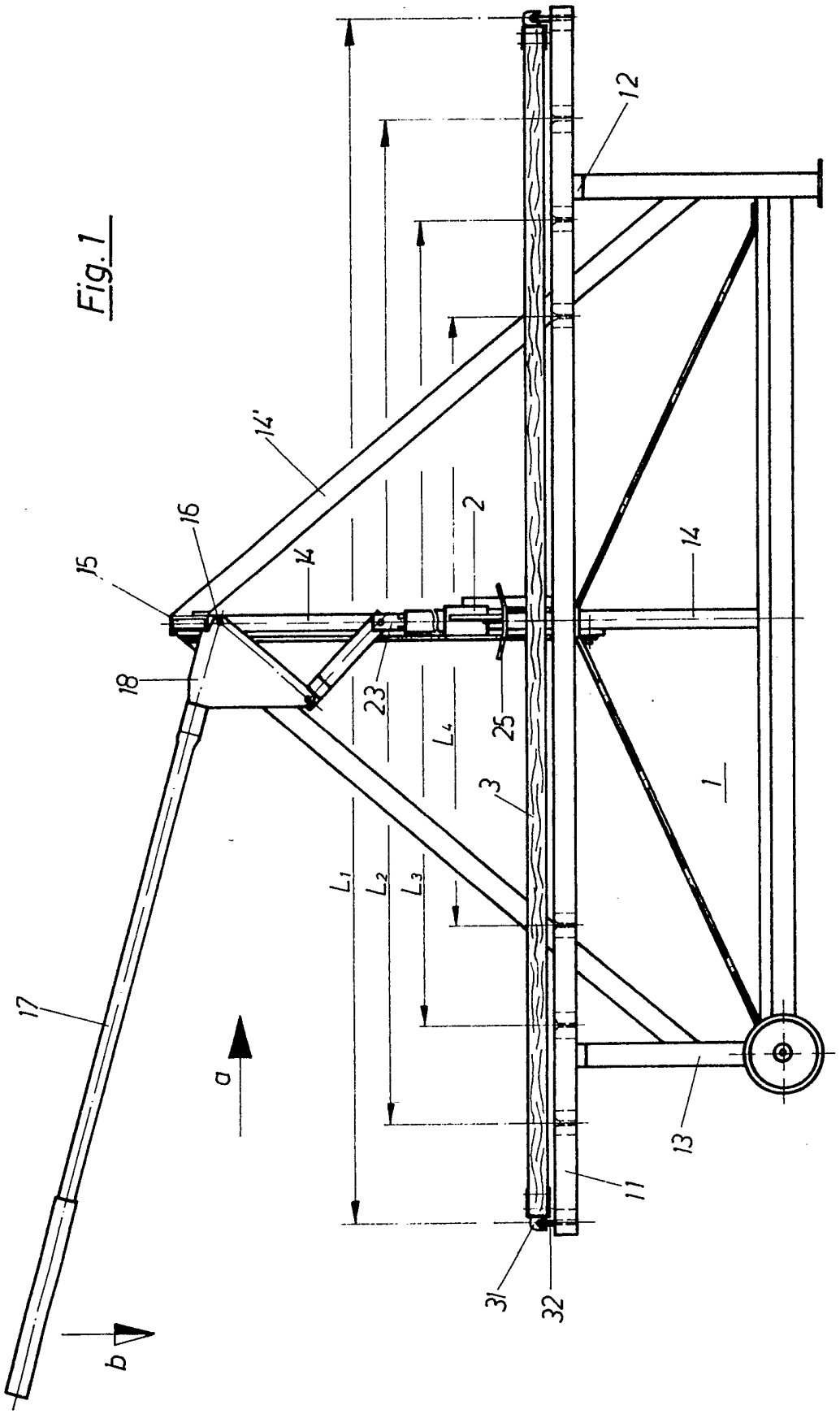
Fig. 1



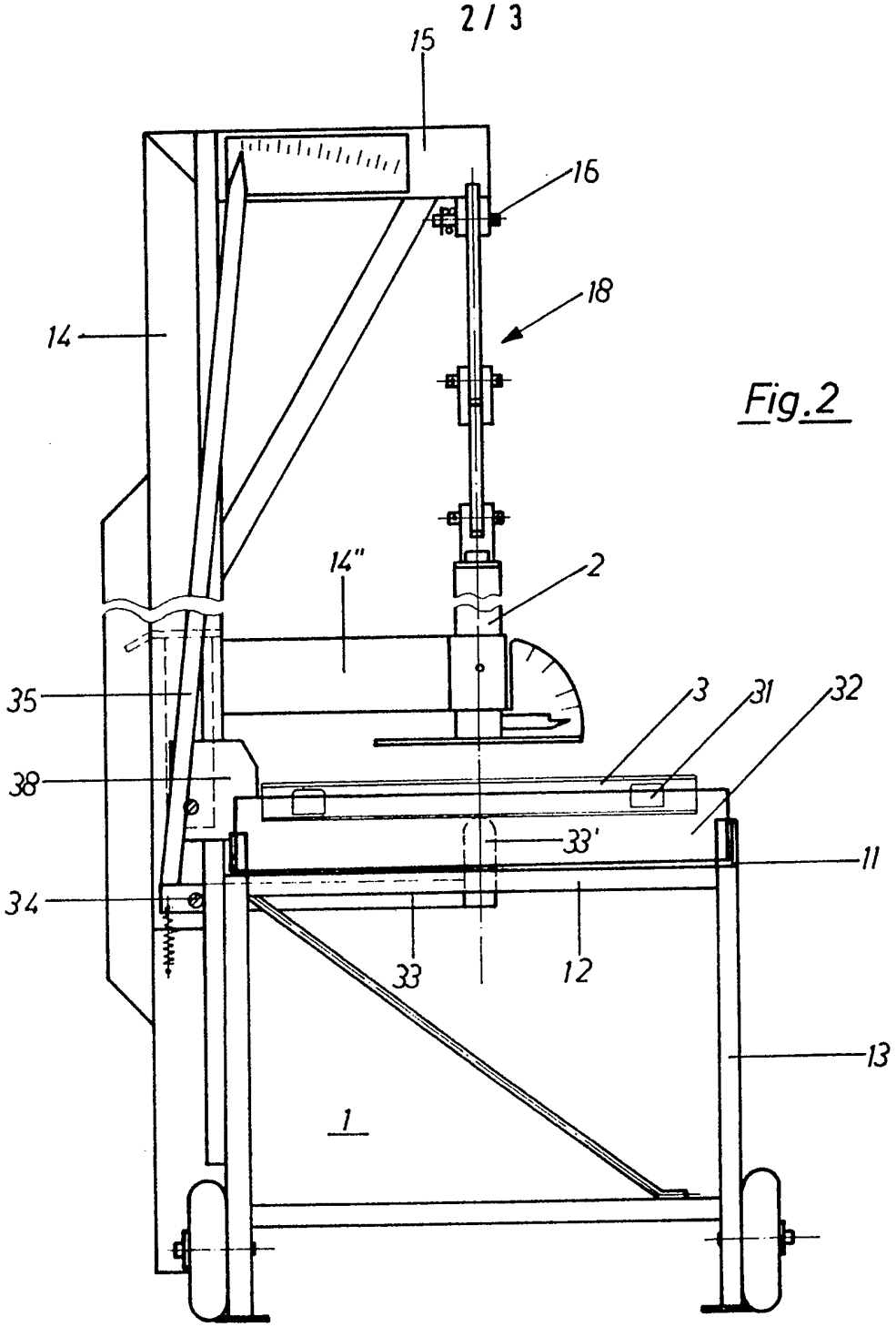
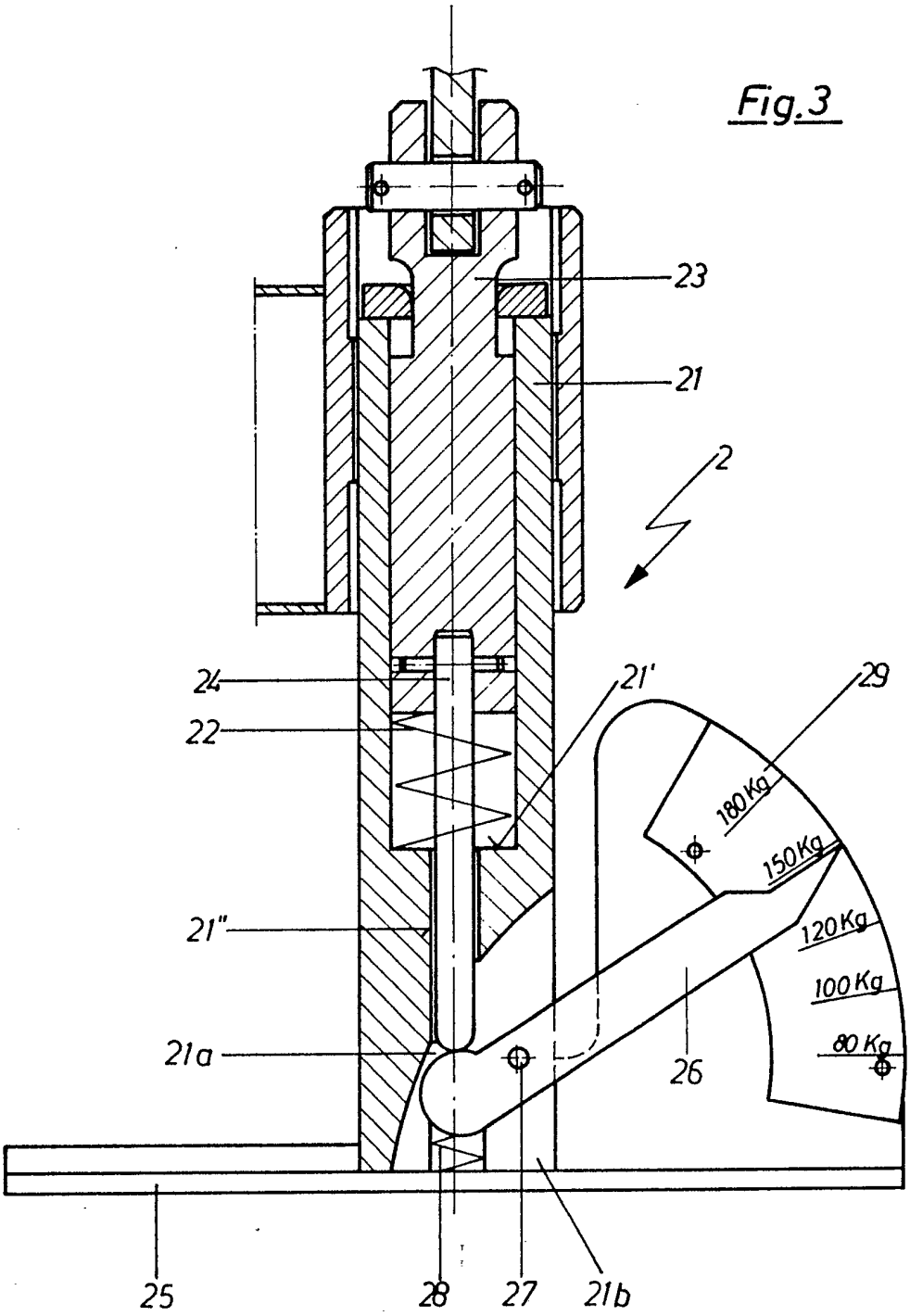


Fig.2

Fig.3


23
21
2
24
21'
29
22
180Kg
150Kg
120Kg
100Kg
80Kg
21"
21a
26
25
28
27
21b

SPECIFICATION

A method of and apparatus for checking the loading capacity of flooring parts for scaffolding

This invention relates to a method of checking the loading capacity of flooring parts for scaffolding, such as planks or frame panels made of wood, as well as to apparatus for carrying out this method.

The flooring parts for scaffolding, which generally remain in use for many years, are very much exposed to the influences of the weather. Thus quite apart from the wear caused by everyday use, which is in any case rough in building operations, there is an additional diminution in the quality of the wood due to weathering so that in time, through the joint action of use and weather the bearing strength of these flooring parts decreases. In view of the safety required in scaffolding construction, the flooring parts, at least insofar as they consist of wood, must be checked from time to time as to whether their loading capacity still satisfies the requirements or regulation.

An object of the invention is to propose a method of carrying out such a check in a simple manner and at the same time provide a device (hereinafter called "testing apparatus") which is not excessively expensive or complicated and which makes it possible to carry out this method.

In accordance with the invention this object is achieved by a method comprising supporting at both ends a flooring part that is to be checked, placing a pressure beam along the transverse central line of the flooring part, applying a continuously increasing force on that beam by means of a hand-actuated lever acting by way of a compression spring so as to bring about elastic deformation of the flooring part, constantly reading off the magnitude of the force applied and of the flexure caused by the elastic deformation of the flooring part from readily visible scales.

The performance of this method and its mode of operation will be described hereinunder with reference to the testing apparatus intended for this purpose.

In a further development of the invention designed the testing apparatus for carrying out the above method method comprises a horizontally arranged frame supported on legs for reception of the flooring part that is to be checked, a superstructure situated laterally at the centre of the frame to the upper end of which is hinged a lever which is connected, by way of a vertically guided pressure rod, to a compression spring located in a housing or to the piston of a hydraulic pressure cylinder, a pressure beam extending transversely to the longitudinal direction of the frame being attached to the spring housing or the pressure cylinder respectively for application of force to any flooring part disposed on the frame.

To carry out the method it is, of course, necessary to monitor constantly both the degree of flexure or sage and the magnitude of the pressure acting on the floor part during the checking procedure. For this prupose two indicator devices are provided. One of these directly indicates the deviation of the flooring part from its flat normal position, in other words its flexure or sag starting from the horizontal for any point in time of the checking procedure, by means of an angle lever. The other indicates either by evaluation of the change in length of the compression spring or, in the case of hydraulic pressure transmission by means of a gauge, the magnitude of the force or pressure transmitted in each case to the flooring part.

In order to be able selectively to insert flooring parts of different dimensions into the testing apparatus, the frame may be provided with two adjustable supporting rails which are arranged transversely to its longitudinal direction and which can either be located by means of clamping devices on the longitudinal spars of the frame or, if the testing apparatus is used exclusively to monitor a specific scaffolding system working with standardised elements, are inserted in notches provided in the spars. The supporting rails themselves may consist of flat material, for instance for the suspension of frame panels provided with claws, or of angle profiles for the insertion of simple planks. An adjustable lateral stop ensures that, with the various widths of the flooring parts, these at all times come to rest symmetrically to the central longitudinal axis of the frame.

The testing apparatus and its use for carrying out the method in accordance with the invention will be described further with reference to the accompanying drawings, in which:

Figure 1 is a side view of a preferred embodiment of the testing apparatus of the invention;

Figure 2 is a view of the same apparatus at right angles to Fig. 1 in the direction of the arrow *a*, and

Figure 3 is a cross-section, to an enlarged scale, of the spring arrangement of the apparatus of Figs. 1 and 2 which serves to transmit pressure.

As illustrated in Figs. 1 and 2, a frame chassis 1 includes a horizontally arranged frame, formed from longitudinal spars 11 and transverse spars 12, which is supported by legs 13 and onto which a flooring part which is to be checked, for example a frame panel 3, is placed. Mounted laterally on the frame chassis 1 in the centre of its longitudinal extent is a vertically arranged superstructure 14. At its upper end the superstructure 14 has a jib 15 projecting horizontally over the

centre of the frame 11, 12. The superstructure 14 is advantageously reinforced by struts 14'. On the jib 15 a lever 17 extending in the longitudinal direction of the frame 11, 12 is fastened above the chassis centre by means of a bearing 16. The lever 17 is swingable upwards and downwards in vertical plane extending through the longitudinal central axis of the frame 11, 12. The length of the lever 17 is chosen such that its free end projects sufficiently beyond the end of the frame 11, 12 that an operator standing there can swing it without any difficulty. By way of a lever arrangement 18 which serves as deflection and straight guide, the lever 17 is hinged to a vertical pressure rod 23 which is moved upwards and downwards by the swinging movement of the lever 17.

The pressure rod 23 is part of a pressure transmission arrangement 2 (see Fig. 3) which is fastened to a carrier 14'' mounted on the superstructure 14. The arrangement 2 comprises a powerful compression spring 22 accommodated in a housing 21, the upper end end of the spring 22 being supported against the lower end surface of the pressure rod 23 and the lower end of the spring 22 being supported against an internal basal surface 21' of the housing 21. The lower part of the housing 21 is extended downwards and shaped in such a way that it encloses downwardly-open space 21*a* which accommodates a mechanism transmitting the pressure indication. A pressure beam 25 acting on the flooring part to be checked is securely connected to the lower surface of the housing 21.

In order to indicate the pressure acting in each case on the flooring part 3, a central bore 21'' is provided in the basal surface 21' or the downwardly extending lower part of the housing 21. A pressure pin 24 connected to the lower end surface of the pressure rode 23 is arranged coaxially inside the compression spring 22 which is designed as a spiral sping, and extends through the aforesaid bore 21''. The lower end of the pin 24 actuates an indicator 26 which is mounted rotatably in the space 21*a* about an axis 27. The free end of the indicator 26 projects through an outwardly-leading recess 21*b* in order to indicate on a scale 29 the magnitude of the pressure exerted on the flooring element 3. Disposed opposite the point of attack of the pin 24 on the indicator 26 there is a restoring spring 28 which is supported on the pressure beam 25.

Of course, instead of this purely mechanical indicator arrangement, an arbitrary different indicator system can be selected. For example, it is possible to dispense with the space 21*a* and provide a hydraulic box between the lower surface of the pressure transmitting arrangement 2 and the pressure beam 25, a gauge being connected to the hydraulic box.

The frame 11, 12 serves to receive the flooring element that is to be checked. If this is simply a plank to the front surface of which no fastening elements are attached and the length of which is generally not standardised, then the supporting rails for its ends can simply be angled profiles. These are secured, at an appropriate distance from one another and symmetrically with respect to the transverse central axis of the frame 11, 12, by clamping devices (for example scaffolding couplings) to the longitudinal spars 11 and the plank ends rest on the horizontally extending limbs of these angled profiles.

Generally, however, flooring parts of standardised scaffolding systems, the dimensions of which are fixed, will be subjected to checking by the method in accordance with the invention. In this case the longitudinal spars 11 are advantageously provided, symmetrically to the transverse central axis, with notches, lugs or other reception devices for the insertion of the supporting rails at intervals corresponding to the various length dimensions L_1, L_2, L_3, L_4 of the floor parts provided for in the scaffolding system. In order to insert the frame panel 3 shown in the illustrated example, supporting rails 32 made from flat material can be used. These are inserted into recesses provided in the longitudinal spars 11, which consist of U-profiles and the claws 31 of the frame panel 3 are hooked over said rails 32.

To display the flexure of the flooring part, i.e. the frame panel 3 in the illustrated example, a sensing lever 33 is used. This is swingably mounted on a bearing 34, which is situated laterally on the frame 11, 12 and butts against the underside of the frame panel 3 with its upwardly-angled free end 33' which serves as a sensing member, The free end 33' actually butts against the frame panel 3 directly opposite the pressure beam 25 in the central longitudinal axis of the frame panel 3. The lever 33 is, of course spring-loaded towards the frame panel 3. An indicator 35 which is securely connected to the sensing lever 33 at right angles and points upwardly directly indicates the extent of flexure of the frame panel 3 on a scale on the jib 15.

For scaffolding systems including frame panels of different width, an adjustable lateral stop 38, is provided. The stop 38 is so dimensioned that the individual frame panels are always inserted into the testing apparatus in such a way that their longitudinal central axis lies directly above the longitudinal central axis of the frame 11, 12. This stop 38 may, for example, consist of a swingable angle or a plate which is displaceable transversely to the longitudinal direction of the frame.

To carry out the checking method, the flooring part that is to be checked e.g. the frame panel 3, is inserted into the frame 11, 12 in a manner which is clear from the above description. The pressure beam 25 is placed

above the panel 3 and the lever 17 is swung slowly downwards by the operator in the direction of the arrow *b* in Fig. 1. By way of the lever arrangement 18, the pressure rod 23 is moved downwards and compresses the helical compression sping 22, whereby a pressure corresponding to the axial shortening of the compression spring 22 is exerted on the frame panel 3, the respective magnitude of which is displayed continuously by the indicator 26. The frame panel 3 flexes as a result of the pressure acting on it, in which respect the degree of the flexure can be read off directly by means of the sensing lever/indicator arrangement 33'/33/34/35. If desired the maximum permissible values for the pressure and the flexures can be designated on the read-off scales by red marks so as to readily ascertain whether the flooring part being tested still meets the safety requirements.

CLAIMS

1. A method of checking the loading capacity of flooring parts for scaffolding, such as planks or frame panels made of wood comprising supporting at both ends a flooring part that is to be checked, placing a pressure beam along the transverse central line of the flooring part, applying a continuously increasing force on that beam by means of a hand-actuated lever acting by way of a compression spring so as to bring about elastic deformation of the flooring part, constantly reading off the magnitude of the force applied and of the flexure caused by the elastic deformation of the flooring part from readily visible scales.

2. Testing apparatus for carrying out the method as claimed in claim 1 comprising a horizontally arranged frame supported on legs for reception of the flooring part that is to be checked, a superstructure situated laterally at the centre of the frame to the upper end of which is hinged a lever which is connected, by way of a vertically guided pressure rod, to a compression spring located in a housing or to the piston of a hydraulic pressure cylinder, a pressure beam extending transversely to the longitudinal direction of the frame attached to the spring housing or the pressure cylinder respectively for application of force to any flooring part disposed on the frame.

3. Testing apparatus as claimed in claim 2 including for transmission of force, a helical compression spring accommodated in a housing wherein the upper end of the spring is supported against the lower end surface of the pressure rod, which projects downwards into and is longitudinally displaceably in the housing, and the lower end of the spring is supported against the basal surface of the housing, and wherein the pressure beam is connected securely to the lower end of the housing transversely to the longitudinal direction of the frame.

4. Testing apparatus as claimed in claim 3 wherein the lower part of the housing extends downwardly and is shaped in such a way that it encloses a downwardly-open space on the lower side of which the pressure beam is mounted, wherein a central bore is provided in the housing base or the extended lower part of the housing into which a pressure pin arranged coaxially inside the pressure spring engages, the upper end of the pin being connected to the lower end surface of the pressure rod and the lower end of the pin acting upon an indicator which is mounted rotatably about an axis in the space in the lower part of the housing and the free end of which projects out of the housing through an outwardly-leading recess.

5. Testing apparatus as claimed in claim 2 or 3 wherein a hydraulic box to which a gauge is connected is arranged between the spring and the pressure beam for transmission of pressure therebetween.

6. Testing apparatus as claimed in claim 2, 3, 4 or 5 wherein a sensing lever mounted swingably on a bearing at the side of the frame has a sensing member acting on the underside of the flooring part opposite the pressure beam, an indicator is securely connected to this sensing lever.

7. A method of checking the loading capacity of flooring parts for scaffolding substantially as herebefore described.

8. Testing apparatus for carrying out the method as claimed in claim 1 substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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