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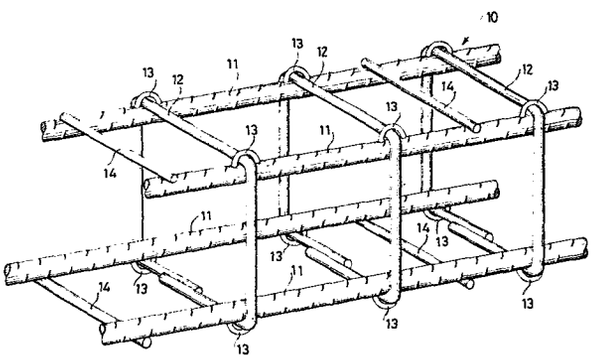
## (54) Metal frame for reinforced concrete.

(57) A metal frame for building structures made of reinforced concrete, comprising longitudinal rods and transversal rods reciprocally joined by articulated joints, for the volumetric extension of such frame.

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# METAL FRAME FOR REINFORCED CONCRETE

The present invention relates to a metal frame for embodying building structures made of reinforced concrete.

A typical configuration of the metal frame substantially provides for a complex of longitudinal steel rods interconnected by other transversal steel rods. The frame is normally formed in the building yard by disposing the steel bars in the form according to the aforesaid configuration and binding them together with iron wire so as to prevent them from slipping during the reinforced concrete casting.

As is known, this usual manner of proceeding is somewhat slow and laborious.

A proposal for remedying this situation is provided by mass producing the frames outside the building yards with an industrial process, thereafter transporting them to the building yards and assembling them, ready-for-use, in the related forms.

The operation of reinforcing the various elements is in this way considerably streamlined, since the heavy manual work of forming the frames in the building yard is done away with.

However, when these pre-formed frames have a markedly spatial configuration, as for example in the case of those used for girders and pillars, problems arise in connection with their transportation to the building yard and their handling when laid.

For, in view of their skeletal structure, their volumetric bulk is relatively much greater than their weight.

It is thus requisite to transport, in a certain volume, a weight of steel rods for reinforcement purposes very considerably less than the weight it is possible to transport with loose rods for binding in the building yard. In the former instance, therefore, costs are clearly higher.

Moreover, the aforesaid volumetric bulk does not facilitate the placing of the pre-formed frame into the form.

The object of the present invention is to provide a metal frame for reinforced concrete such as obviates the difficulties existing in the known art, as mentioned above.

Such purpose is fulfilled by embodying a metal frame characterized by the fact that it comprises longitudinal rods and transversal rods reciprocally joined by articulated joints.

The reciprocal mobility of the longitudinal rods and the transversal rods obtained as a result of the articulated joints, makes it possible to reduce the vo-

lume of the metal frame, thus overcoming the difficulties noted in the prefabricated frames at present used.

The characteristics and advantages of the present invention will be more clearly seen from the following description of a non-limiting exemplifying embodiment thereof, illustrated in the attached drawings, in which:

FIGURE 1 is a perspective view of a metal frame according to the invention in operative configuration;

FIGURE 2 illustrates the frame of FIGURE 1 in a reduced-volume configuration;

FIGURE 3 is a detailed illustration of a variant of the frame of FIGURE 1.

The frame according to the invention as illustrated, indicated generically by 10, comprises four parallel, rectilinear, rough-surfaced steel rods, indicated by 11, which will hereinafter be called length-members, articulated to a series of transversal steel rods (only three of which are illustrated) bent in the form of a closed ring, indicated by 12, which will hereinafter be called cross-members.

The connection between length-members 11 and cross-members 12 is effected by means of rings 13 consisting of arched or hooped sections of steel bars which are welded along each length-member 11 and through which pass the cross-members 12 as can be clearly seen in FIGURE 1.

The length-members 11 are rigidly restrained in

pairs by a series of transversal bars 14 welded at their ends to two length-members 11 and another series of transversal bars 14 welded at their ends to the other two length-members 11. The transversal bars 14 thus all have equal length, so as to keep the paired length-members parallel at the same distance for both the pairs.

The cross-members 12 are quadrangular in shape and the length of the transversal bars 14 is such that the pivoting between cross-members 12 and length-members 11 by means of the rings 13 is at the corners of the cross-members 12.

The frame 10 which has been described and illustrated can have its volumetric extension varied. In effect, the pivoting provided enables the cross-members 12 to describe a rotation of 180° about their pivot-points, with a related oscillation of the two pairs of length-members 11, parallel-wise one to the other, between a distanced position and a juxtaposed position.

It is thus possible to open the frame 10 in a position of maximum volumetric extension as shown in FIGURE 1, or to fold it back into a position of minimum volumetric extension as shown in FIGURE 2.

This characteristic of the frame 10 according to the invention leads to a streamlining and simplification of all the operations indirectly or directly required for reinforcing concrete structures.

In the first place, the frame 10 can be volume-manufactured outside the building yard by an industrial

process.

During the transportation stage, the fact that the frame can be reduced in volume makes it possible to optimize the ratio between quantity of material transported and volume occupied.

The same consideration naturally also applies to the storage of the frames in question.

In the building yard, in the folded-back configuration of FIGURE 2, it is very manageable and easy to place into the form. Once it has been so placed, it opens out into the operative configuration shown in FIGURE 1.

If required, it can be locked in this configuration by means of iron wire or by hooks suitably latched onto the cross-members, or by other means, to prevent reciprocal movements of the component members, which could alter the operative configuration, during the casting of the concrete.

The frame 10 as illustrated is particularly indicated for the reinforcement of girders or beams or, in vertical configuration, of pillars.

The proposed arrangement of longitudinal and transversal rods, as also their shape and number, can in any case vary depending on the building structure to be reinforced, provided that the longitudinal rods and the transversal rods are reciprocally joined by means of articulated joints such as allow an articulation between them of a kind that will vary the volume of the frame.

In particular, FIGURE 3 shows a variant of the articulated joint. This variant consists in the fact that, around each length-member 11, correspondingly to each cross-member 12, there is wound an iron wire 15 with a broader central turn which forms a ring 16 into which the cross-member 12 enters. The surface roughness of the length-members 11 which is provided for in order to ensure that they have perfect adherence in the concrete, prevents any longitudinal slipping of the iron wires 15.

Both this and the previous solution featuring welded metal rings 13 show themselves to be considerably economical for volume-production, and are at the same time functionally effective.

C L A I M S :

1. A metal frame for building structures made of reinforced concrete characterized by the fact that it comprises longitudinal rods (11) and transversal rods (12) reciprocally joined by articulated joints (13,16).

2. A frame according to Claim 1, characterized by the fact that said articulated joints are realized by means of rings (13, 16) which are secured to said longitudinal rods (11) and into which the said transversal rods (12) fit.

3. A frame according to Claim 2, characterized by the fact that each of said rings consists of an arched or hooped section (13) of rod welded to the longitudinal rod (11).

4. A frame according to Claim 2, characterized by the fact that each of said rings consists of a turn (16) of an iron wire (15) wound around the longitudinal rod (11).

5. A frame according to Claim 4, characterized by the fact that the surface of said longitudinal rods (11) is rough, to prevent the longitudinal slipping of the wound iron wires (15).

6. A frame according to Claim 1, characterized by the fact that said longitudinal rods (11) are joined in pairs disposed on parallel planes and that said transversal rods (12) are bent in the form of a closed ring, each restraining two contiguous pairs of said longitudinal rods (11).

7. A frame according to Claim 6, characterized by the fact that each of said pairs of longitudinal rods (11) consists of two parallel rectilinear rods rigidly connected by transversal bars (14).

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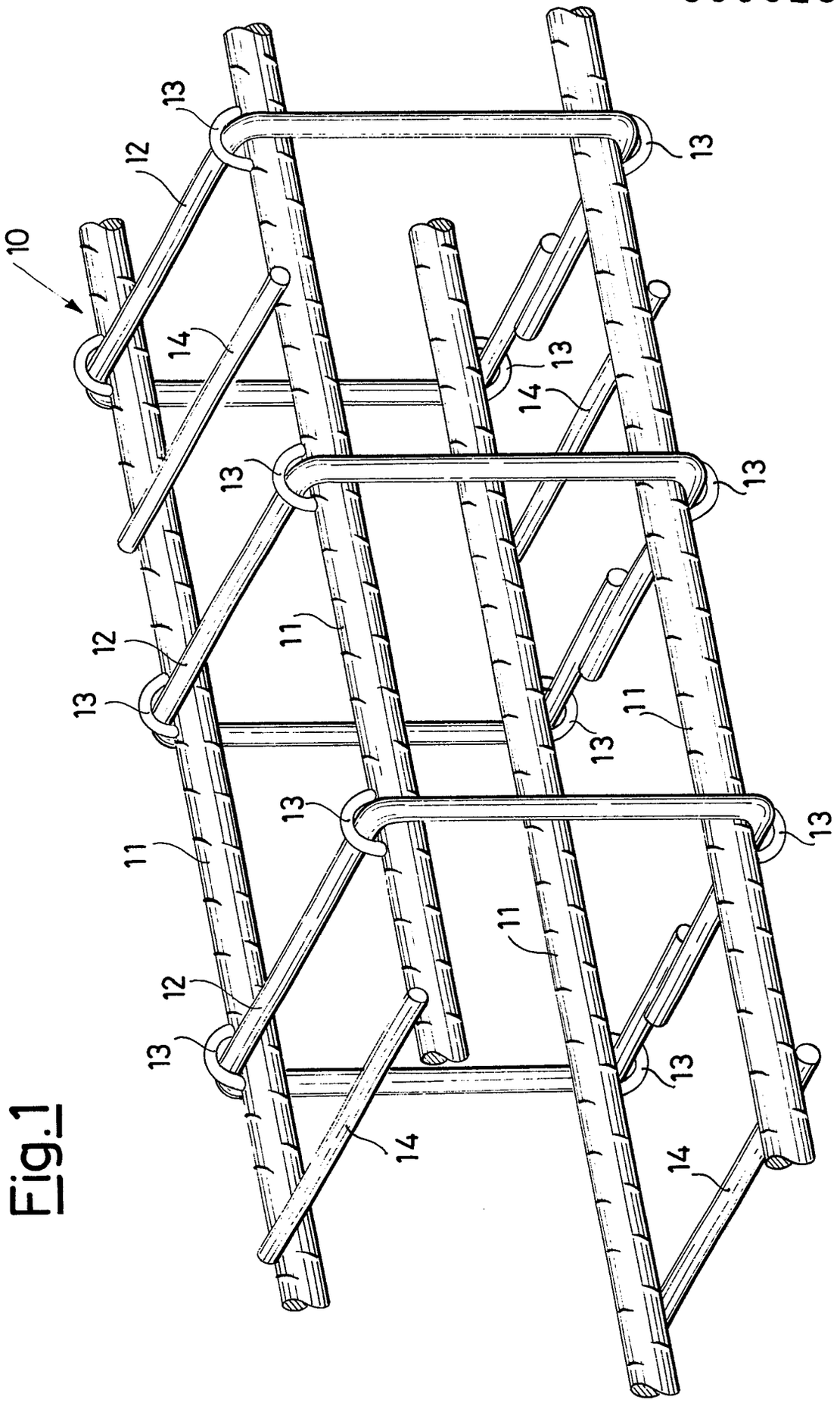


Fig.1

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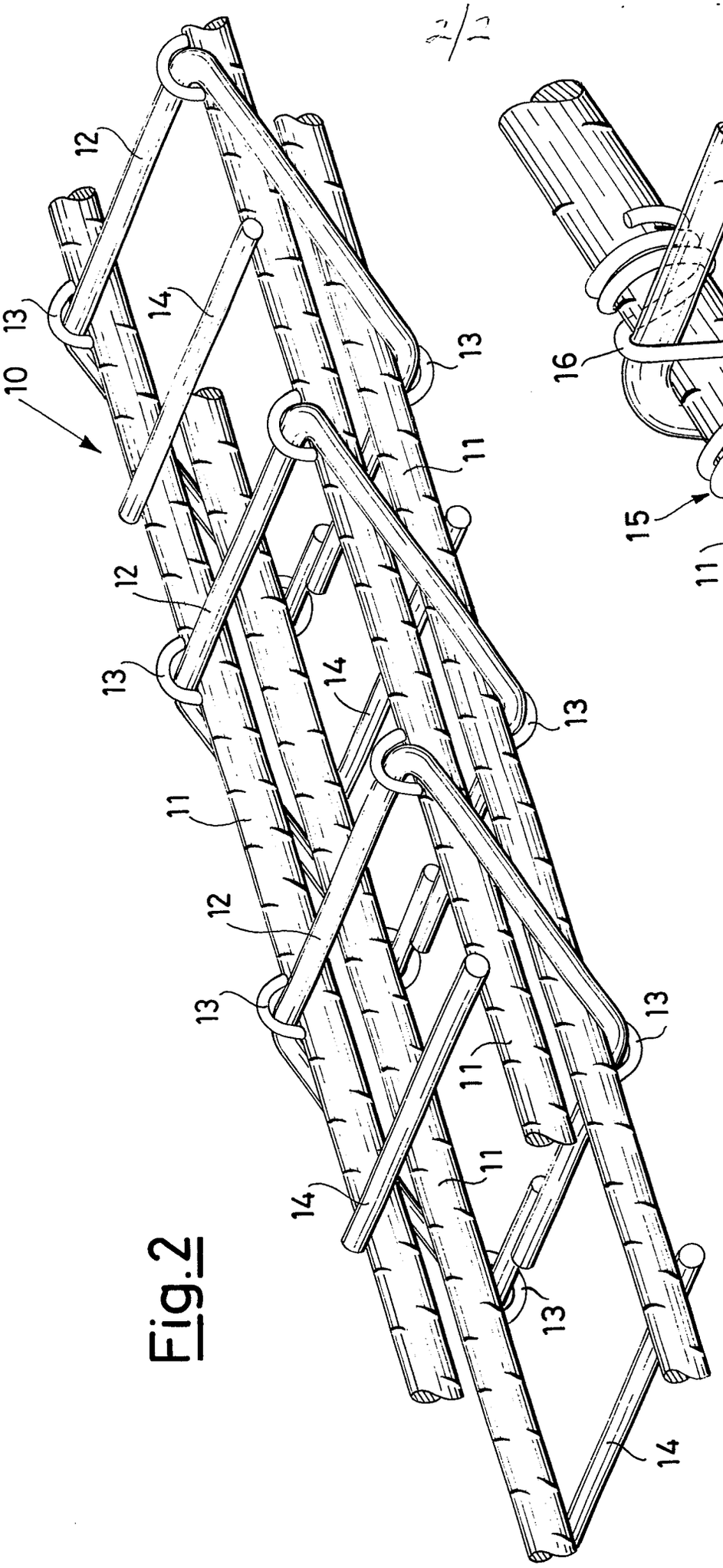


Fig.2

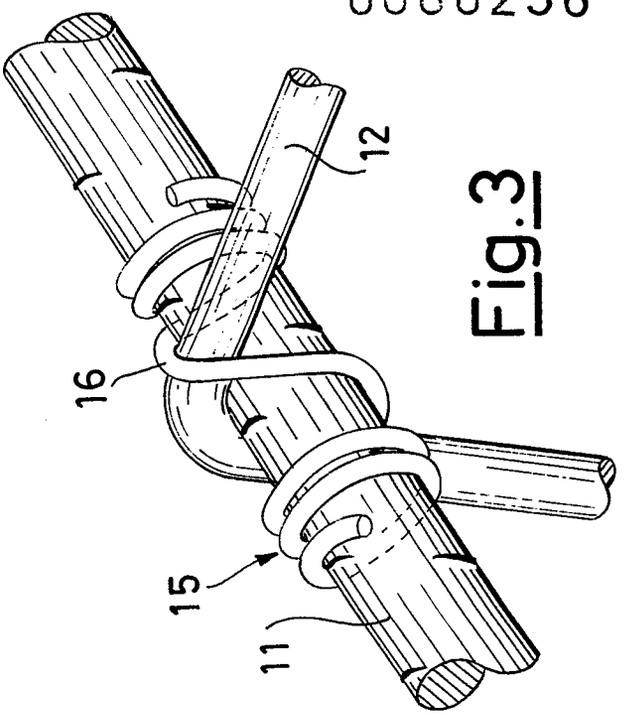


Fig.3