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(12) # EUROPEAN PATENT APPLICATION

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(54) **Self elevating scaffold.**

(57) An extendable tower comprises a plurality of interconnected frame members (51,52,53 and 54), the uppermost frame member (51) being provided with a working platform (55). Each frame member has corner portions provided with connecting means (58) for slidably engaging adjacent frame members and means (57) for extending and retracting the tower are provided on the lowermost frame member (54).

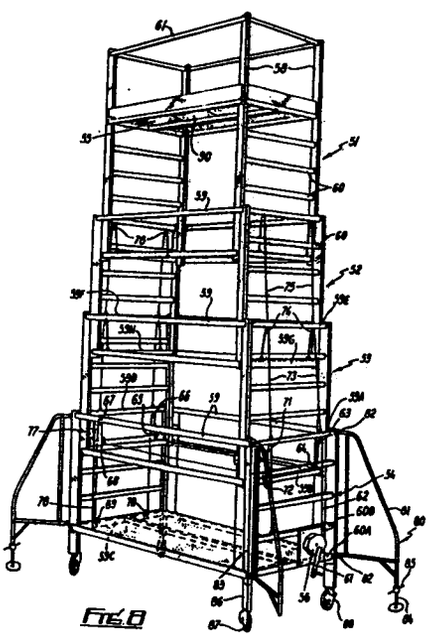

FIG 8

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Description

Extendable Tower

FIELD OF THE INVENTION

This invention relates to an extendable tower.

DESCRIPTION OF THE PRIOR ART

Scaffolding is frequently used to provide a safe working platform in all forms of above-ground and maintenance work. In situations where the scaffolding is required at a location for only a short period of time scaffolding is built up in the form of towers. However, each time the scaffolding is to be moved the tower must be dismantled before being transferred to the new location for reassembly.

It is an object of the present invention to obviate or mitigate this disadvantage.

SUMMARY OF THE INVENTION

According to the present invention there is provided an extendable tower comprising a plurality of telescopically interconnected frame members, the uppermost frame member being provided with a working platform, means for extending and retracting the tower being provided on the lowermost frame member, and each frame member having corner portions provided with connecting means for slidably engaging an adjacent frame member.

Preferably, each corner portion of the frame member is in the form of an upright elongate connecting member, each frame member being provided with connecting members of a common cross-section. The connecting members may be formed of hollow extrusions of for example, aluminium alloy.

Preferably also, the extending and retracting means is in the form of a pulley system, the pulley system being operable from a rotatable handle provided on the lowermost frame member.

Preferably also, locking means are provided on the tower to lock the frame members in desired positions relative to one another. The locking means may also be operable to ensure that the frame members are extended and retracted in a desired sequence.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a side view of an extendable tower according to a first embodiment of the present invention;

Fig. 2 is an end view of the extendable tower of Fig. 1;

Fig. 3 shows, in diagrammatic form, the layout of the pulley system as provided on the lower frame member of the extendable tower of Fig. 1;

Fig. 4 is a sectional plan view of a corner portion of a frame member of the extendable tower of Fig. 1;

Fig. 5 is a sectional view taken along line A-A of Fig. 4;

Fig. 6 is an enlarged sectional view of the connecting member of Fig. 4;

Fig. 7 is a fragmented sectional plan view of the frame members of the extendable tower Fig. 1;

Fig. 8 is a perspective view of an extendable tower according to a second embodiment of the present invention;

Fig. 9 shows, in diagrammatic form, the layout of the pulley system of the tower of Fig. 8;

Fig. 10 is a cross sectional plan view of a corner portion of a frame member of the tower of Fig 8;

Fig. 11 is a side view of a pulley assembly and a transverse member of the tower of Fig. 8;

Fig. 12 is a sectional end view of the pulley housing of the pulley assembly of Fig. 11;

Fig. 13 is a sectional end view of the pulley wheel of the pulley assembly of Fig. 11;

Fig. 14 is a plan view of the mounting plate of the pulley assembly of Fig. 11; and

Figs 15 to 19 are views of the safety lock means of the tower of Fig. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs 1 to 7 of the drawings, an extendable tower according to a first embodiment of the present invention comprises four telescopically interconnected frame members 1, 2, 3 and 4. The uppermost frame member 1 is provided with a working platform 5 and the lowermost frame member 4 is provided with the winding mechanism 6 of a pulley system 7.

Each frame member 1, 2, 3 or 4, defines a cuboid, the upright corner edges of the frame members 1, 2, 3 and 4 being formed by elongate connecting members 8 and the horizontal corner edges being formed by elongate structural horizontal corner edges being formed by elongate structural members 9.

The connecting members 8 are in the form of hollow aluminium alloy extrusions the outer edge of which define an approximately rectangular shape in cross section. The end face 10 of the connecting member 8 which forms the outer face of a corner of a frame member 1, 2, 3 or 4 is provided with an undercut groove 11. The opposite end face 12 of the connecting member 8 is provided with a T-shaped protrusion 13. Three shoulders 14, 15 and 16 extend from the protrusion 13 to provide bearing surfaces.

The structural members 9 are in the form of hollow rectangular aluminium alloy extrusions.

The connecting members 8 are welded to the ends of the structural members 9 such that the lateral axis of each connecting member 8 is positioned at an angle of 45° to the longitudinal axis of each structural member 9, as is shown in Fig. 4.

The lengths of the structural members 9 of adjacent frame members 1, 2, 3 or 4 are chosen such that the undercut groove 11 of each connecting member 8 of each frame member 1, 2, 3 or 4 may slidably receive the T-shaped protrusion 13 provided

on each connecting member 8 of the next smaller frame member 1, 2, 3 or 4 and is shown by the dotted lines in Fig. 4.

The tower is extended and retracted by means of a pulley system 7 which is operated from the winding mechanism 6 provided on the lowermost frame member 4.

The winding mechanism is in the form of a circular cross section bar 17 rotatably mounted on the frame member 4 having a winding handle 18 provided at one end and having four winding wheels 19, 20, 21 and 22 mounted thereon.

Flexible wire ropes 23, 24, 43 and 44 are wound around and extend from each wheel 19, 20, 21 and 22. The wire ropes 23 and 24 from the inner wheels 19 and 20 extend upwardly to pass over pulley wheels 25 and 26, on an upper end structural member 9, of the frame member 4, and then pass under pulley wheels 27 and 28 on a lower end structural member 9 on the next smaller frame member 3. The ropes 23 and 24 extend upwardly from the pulley wheels 27 and 28 through a similar set of pulley wheels 29 and 31, and 30 and 32, mounted on frame members 2 and 3 to pulley wheels 33 and 34 mounted on an upper end structural member 9 of frame member 2. The ropes 23 and 24 pass over the pulleys 33 and 34 and are attached to a lower end structural member 9 of the uppermost frame member 1.

The wire ropes 43 and 44 from the outer wheels 21 and 22 extend horizontally along the side of the frame member 4 over pulley wheels 35 and 36, mounted horizontally on corners 37 and 38 of the frame member 4, and pulley wheels 39 and 40, mounted on the opposite end of the frame member 4 from the winding mechanism 6. From the pulley wheels 39 and 40 the ropes 43 and 44 extend upwards over sets of pulleys similar to those provided at the opposite end of the frame members 1, 2, 3 and 4 for the wire ropes 23 and 24.

When the winding handle 18 is rotated by an operator the winding wheels 19, 20, 21 and 22 take in the wire ropes 23, 24, 43 and 44 causing the frame members 1, 2 and 3 to be raised from the retracted position (not shown) where the frame members 1, 2 and 3 are located within the largest frame member 4 to the extended position as shown in Figs. 1 and 2.

Locking pins 45 may be passed through predrilled holes in the connecting numbers 8 to retain the frame members in the extended position and the locking pins may also be used to permit the frame members 1, 2, 3 and 4 to be extended and retracted in a desired sequence.

Now referring to Figs 8 to 19 of the drawings, an extendable tower, according to a second embodiment of the present invention comprises four telescopically interconnected frame members 51, 52, 53 and 54. The uppermost frame member 51 is provided with a working platform 55 and the lowermost frame member 54 is provided with the winding mechanism of 56 of a pulley system 57.

In addition to the connecting members 58 and the structural members 59 the frame members 51, 52, 53 and 54 feature transverse members 60 which extend between the connecting members 58 which define the shorter ends of the frame members 51, 52, 53, and 54.

The working platform 55 is formed of aluminium checker plate and is provided with a trapdoor 90, for access to the platform 55 from the inside of the frame 51, the platform 53 being reached by means of a telescopic aluminium ladder (not shown). A guard rail 61 is fixed to the frame 51 for the safety of operators on the platform 55. The winding mechanism 56 of the pulley system 57 is in the form of a hand winder 61 and is mounted on the two lowermost transverse members 60A and 60B of the lowermost frame 54. From the winder 61 a wire rope 62 passes upwards over a pulley 63 on the top structural member 59A of the frame 54 then downwards under a pulley 64 on the lower structural member 59B of the frame 53. The rope 62 then passes across to the opposite end of the frames 53 and 54 where it passes through two similar pairs of pulleys 65, 66 and 67, 68 and two pulleys 69 and 70 on the lowermost structural member 59C on the frame 54 and passes back across the frames 53 and 54 to a further pair of pulleys 71 and 72, the end of the rope 62 being fixed to the second lowermost transverse member 60B of the frame 54. When the rope 62 is taken in on the winder 61 the frame 53 is raised.

The frame 52 is raised by means of four fixed length wire ropes 73 which pass from each end of the uppermost end structural members 59A and 59D of the frame 54 over pulleys 74 on each end of the uppermost end structural members 59E and 59F of the frame 53 and are fixed to the lowermost end structural members 56G and 59H of the frame 52.

As the frame 53 is raised, relative to the frame 54, the ropes 73 are pulled over the pulleys 74 as the distance between the structural members 59A and 59D, and 59E and 59F, increases causing the frame 52 to be raised relative to the frame 53.

The frame 51 is suspended on wire ropes 75 connected to the frame 53 and passing over pulleys 76 on the frame 52 on a similar manner.

As a safety measure lock means 77 are provided on the four corners between the lowermost frames 53 and 54 to prevent the collapse of the tower in the event of the wire rope 62 breaking.

Wire ropes 78 extend between the ends of the upper connecting members 59 and the lower connecting members 59 of the frame 54. The ropes 78 pass through safety catches 79 mounted on the frame 53. When the rate of movement of the ropes 78 through the catches 79 exceeds a predetermined rate the catches 79 lock against the ropes 78 to prevent the frame 53 from moving further.

Stabilisers 80 are provided on the frame 54. The stabiliser 80 are in the form of an roughly triangular shaped frame 81 and are pivotally mounted on pairs of brackets 82 fixed to tubular members 83. The tubular members 83 are fixed to the outer faces of the connecting members 58 of the frame 54.

The stabilisers 80 are provided with a length adjustable ground engaging legs 84 which may be locked by means of pins 85.

Extension pieces 86 are fitted to the lower ends of the connecting members 58 of the frame 54 and these receive height adjustable support wheel 87,

brakes 88 being provided on the wheels 87.

As the frame members 51, 52, 53 and 54 are of aluminium alloy the tower is relatively light when compared to steel scaffolds of conventional design.

Also, the use of only two different extrusions in the assembly of the frame members 51, 52, 53 and 54 keeps manufacturing costs to a minimum.

Modifications and improvements may be made without departing from the scope of the invention, for example the winder may be driven by an internal combustion or electrical motor.

Claims

1. An extendable tower comprising a plurality of telescopically interconnected frame members (51,52,53 and 54), the uppermost frame member (51) being provided with a working platform (55), and means (57) for extending and retracting the tower being provided on the lowermost frame member(54) characterised in that each frame member has corner portions provided with connecting means (58) for slidably engaging an adjacent frame member.

2. An extendable tower as claimed in Claim 1, wherein the corners of each frame member (51, 52, 53 and 54) are in the form of an upright elongate connecting members (58), each frame member (51,52,53 and 54) being provided with connecting members (58) of a common cross section.

3. An extendable tower as claimed in Claims 1 or 2, wherein the extending and retracting means (56) includes a pulley system (57) connecting the lowermost and the second lowermost frame members (54,53), the pulley system (57) being operable, by means of a winding mechanism (56) on the lowermost frame member (54), to raise and lower the second lowermost frame member (53) relative to the lowermost frame member (54).

4. An extendable tower as claimed in Claim 3, wherein the third lowermost frame member (52) is connected to the lowermost frame member (54) by a flexible elongate member (73) which passes over a pulley (74) on the second lowermost frame member (53) such that raising of the second lowermost frame member relative to the (54) lowermost frame member causes the third lowermost frame member (52) to be raised relative to the second lowermost member (53)

5. An extendable tower as claimed in any one of the preceding Claims wherein safety lock (77) means are provided between the lowermost and second lowermost frame members (54, 53) to prevent the collapse of the tower in the event of a failure of the extending and retracting means (57).

6. An extendable tower as claimed in Claim 5, wherein the safety lock means (77) comprises a wire rope (78) which extends vertically between upper and lower portions of the lowermost frame member (54) the wire rope (78) passing through a safety catch mechanism (79), mounted on the second lowermost frame member (53), being preset to lock against the rope (78) when the rate of movement of the rope (78) through the mechanism (79) and thus the rate of movement of the second lowermost frame member (53) relative to the lowermost frame member (54) exceeds a predetermined rate.

7. An extendable tower as claimed in any one of the preceding Claims, wherein the lowermost frame member (54) is provided with lockable ground engaging wheel means (87).

8. An extendable tower as claimed in any one of the preceding Claims wherein the working platform (55) includes a trapdoor such that access to the platform (55) may be gained from the inside of the tower.

9. An extendable tower as claimed in any one of the preceding Claims wherein co-operating openings are provided in adjacent frame members (1, 2, 3 and 4) to receive locking pins (45) to retain the frame members (1, 2, 3 and 4) in a desired position.

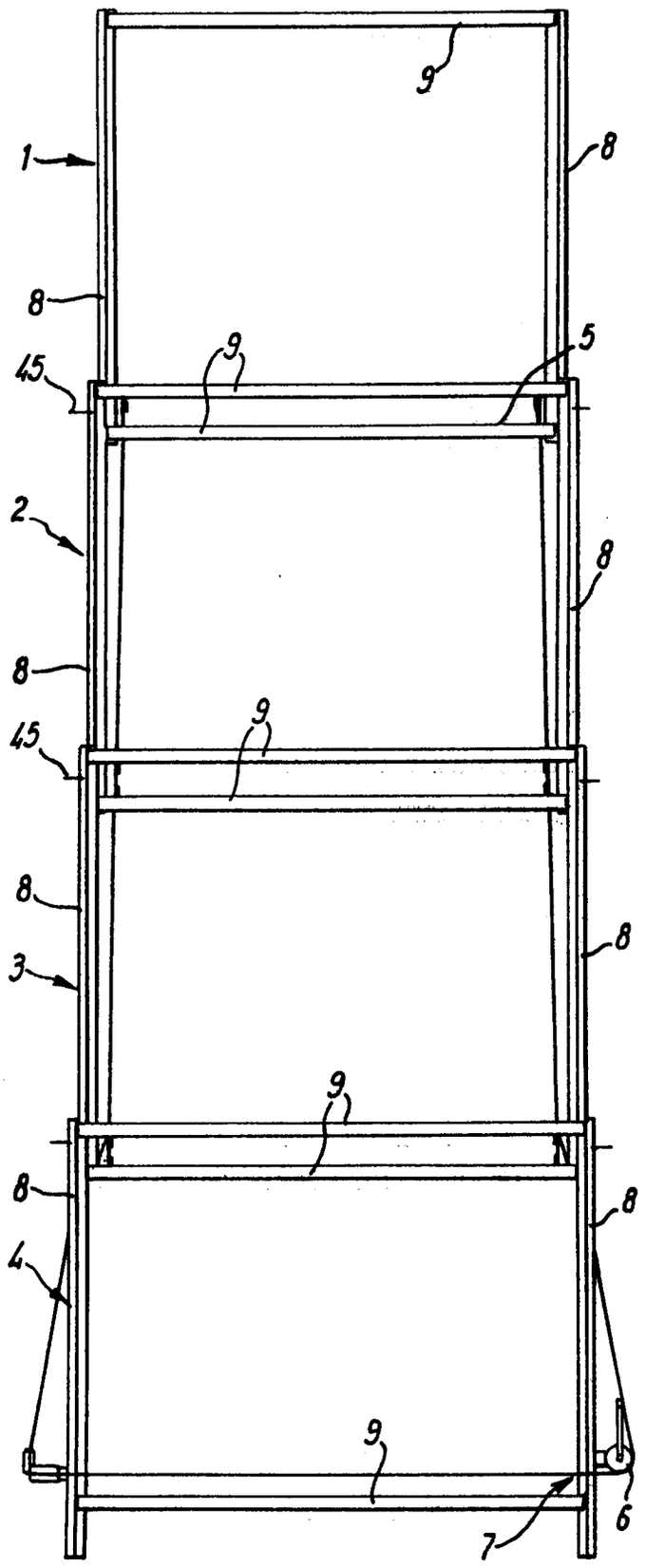
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FIG.1

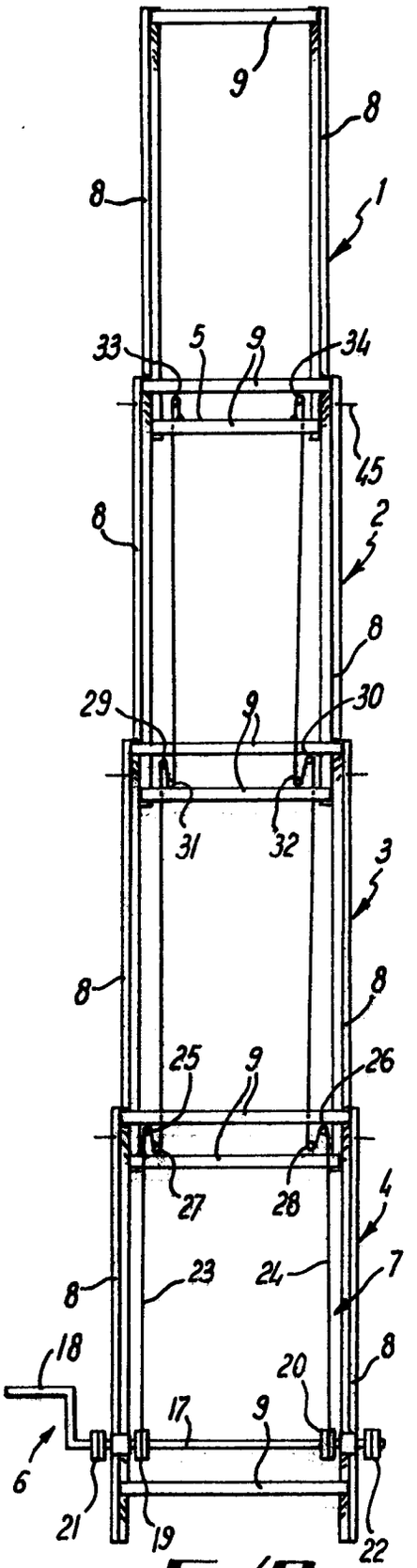
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FIG2

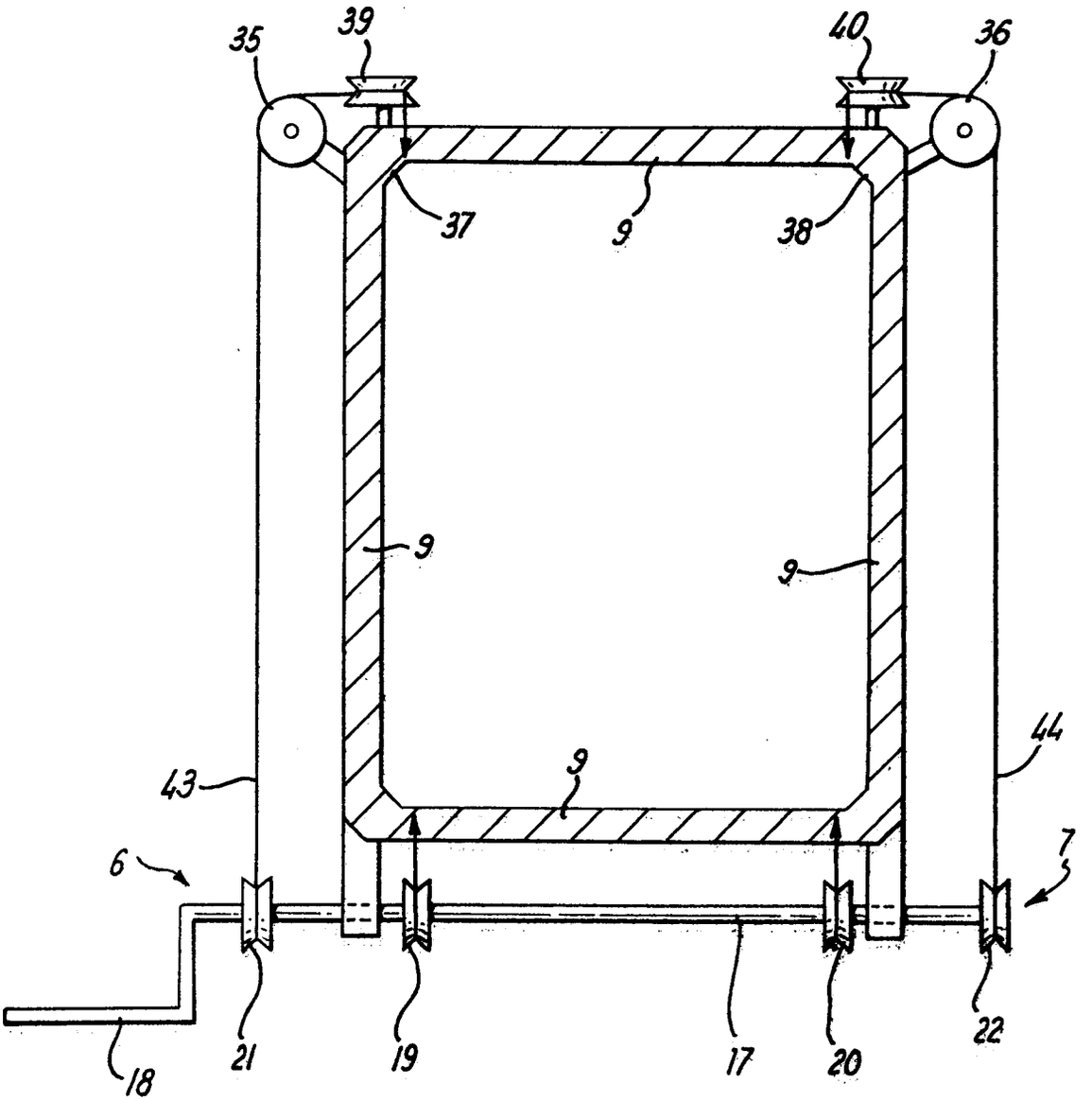
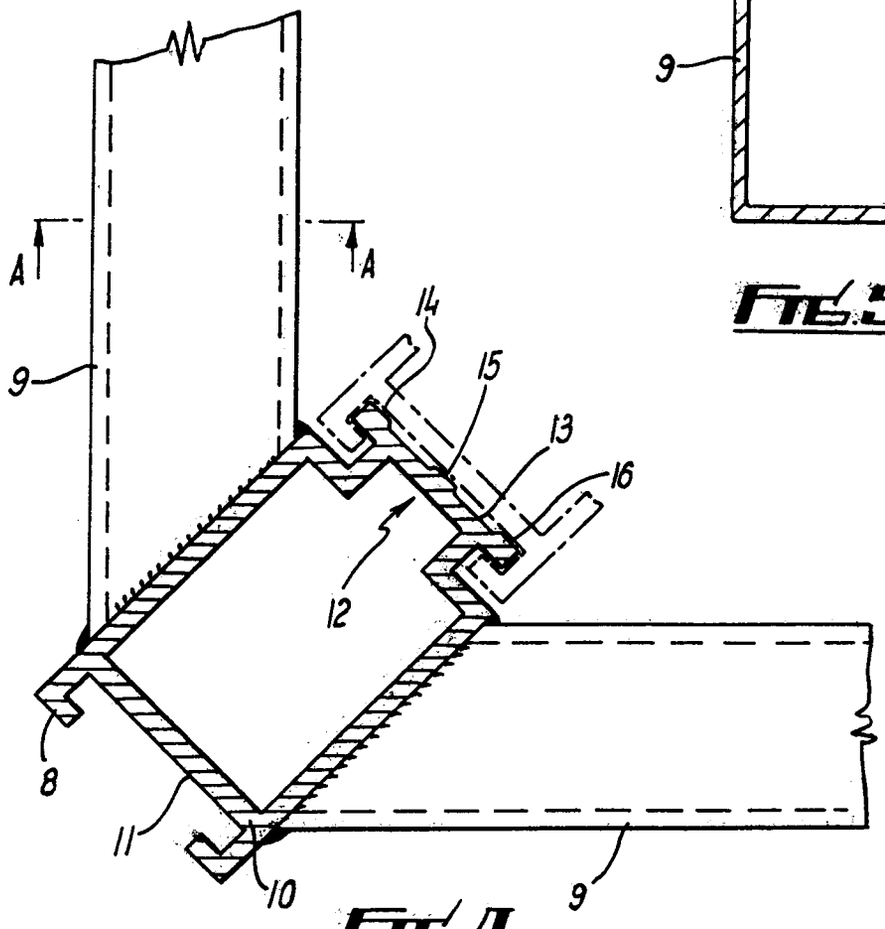
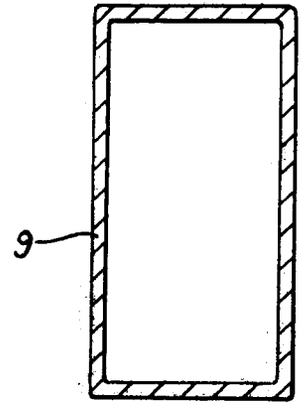


FIG.3



ФИГ. 4



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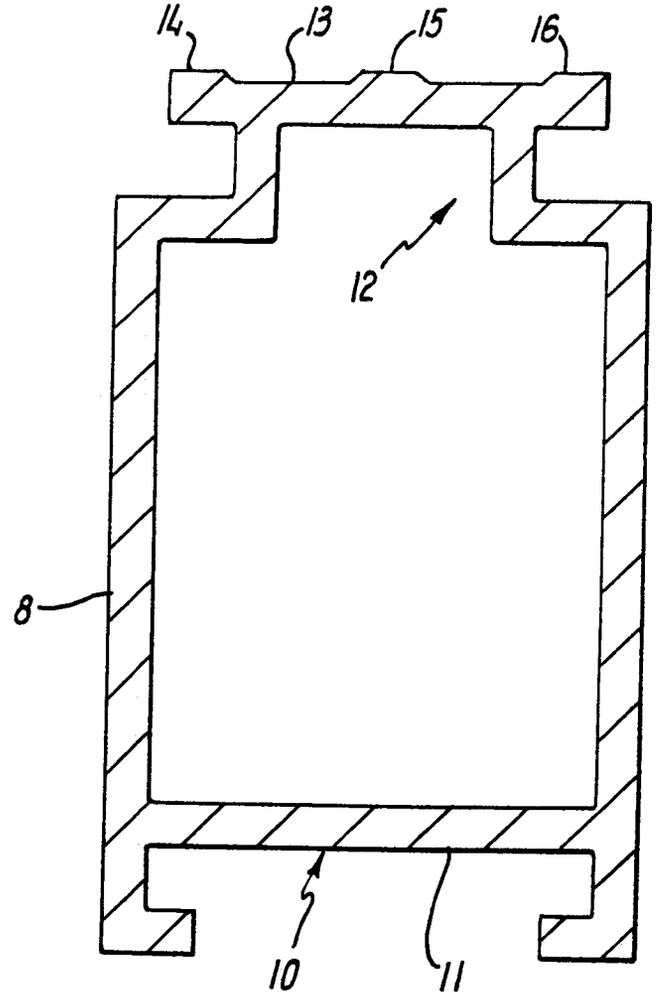
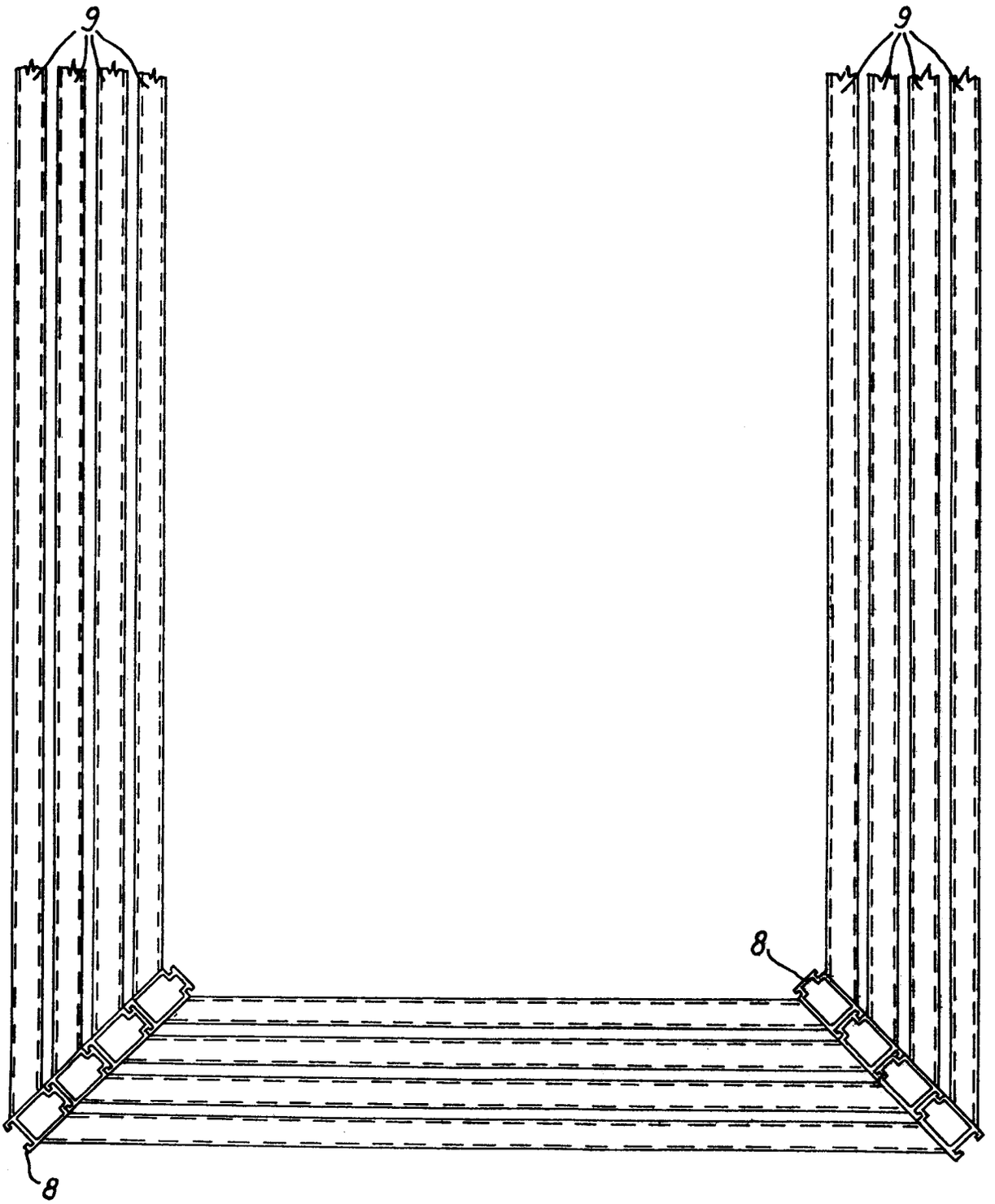
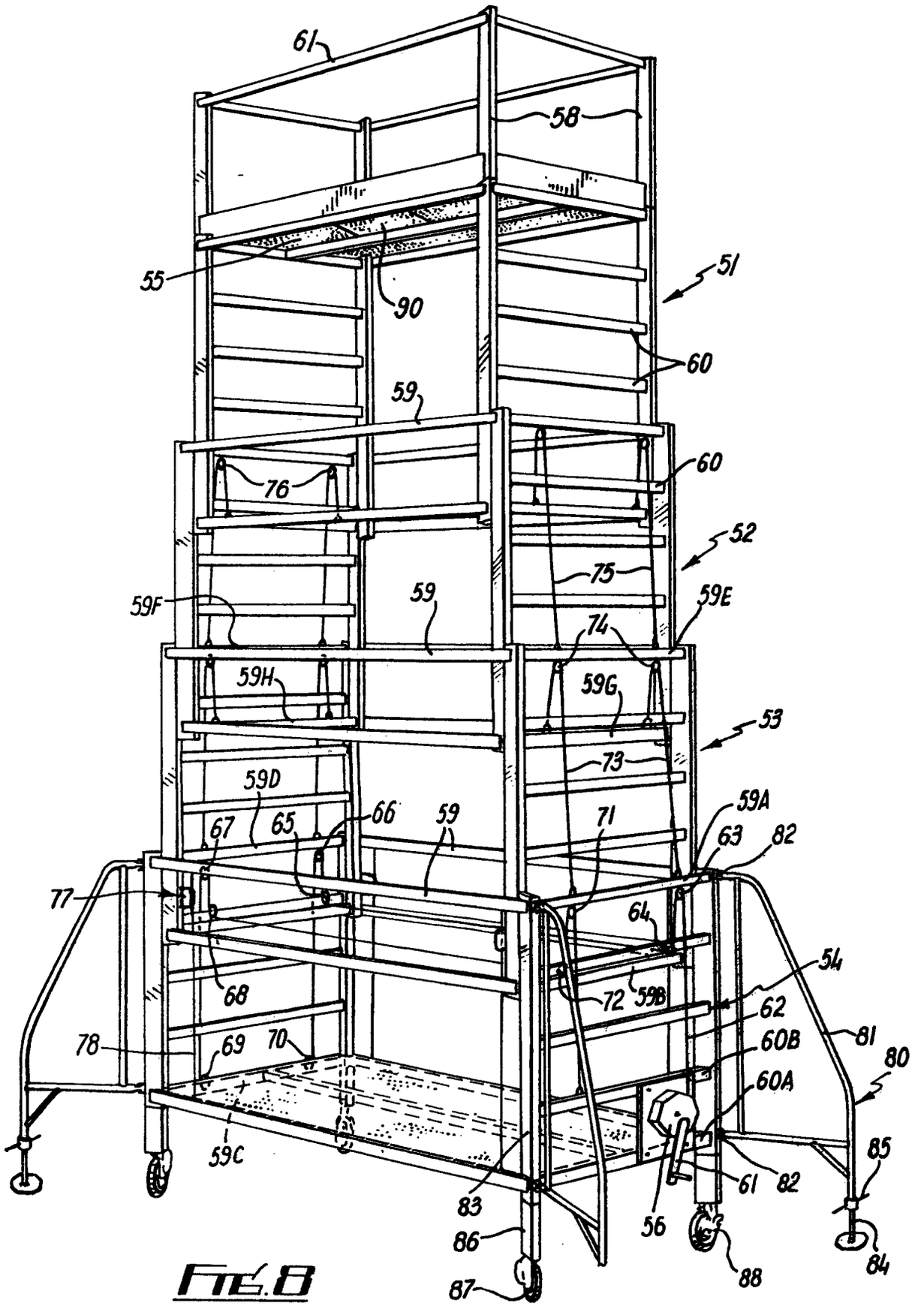


ФИГ. 6



ФИГ. 7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59F
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59E
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59H
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59D
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59A
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59B
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60A
59C
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FIG.8

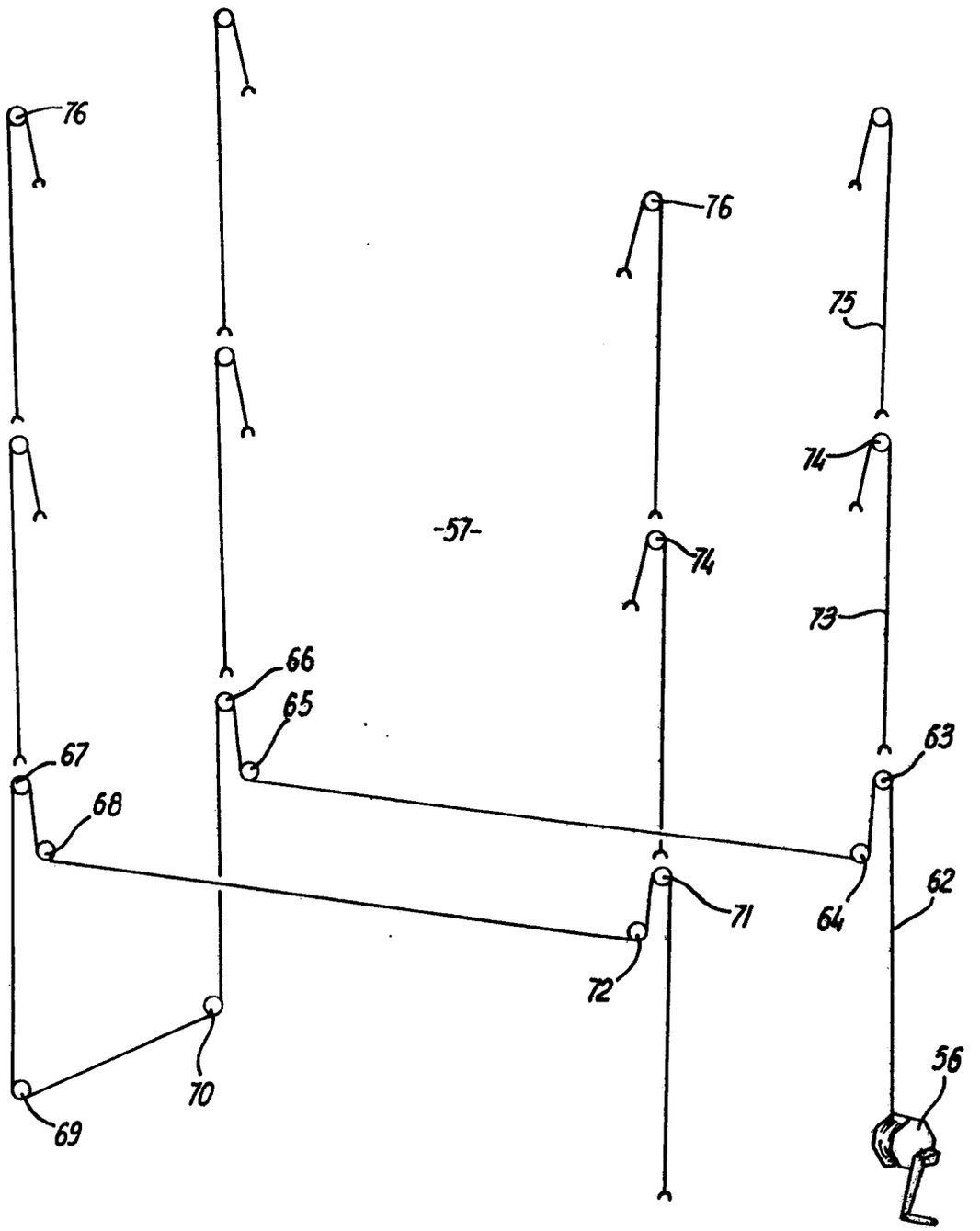
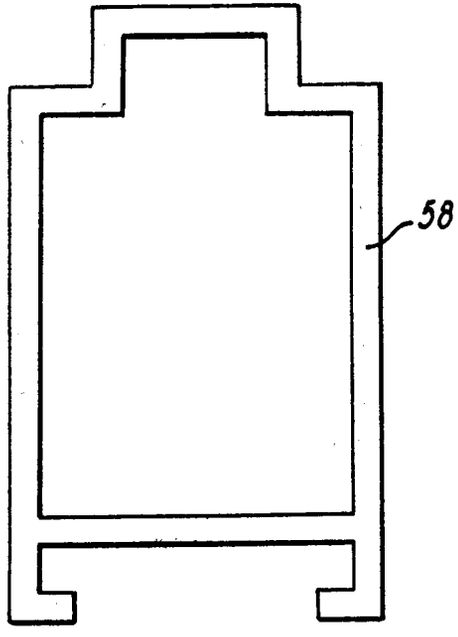
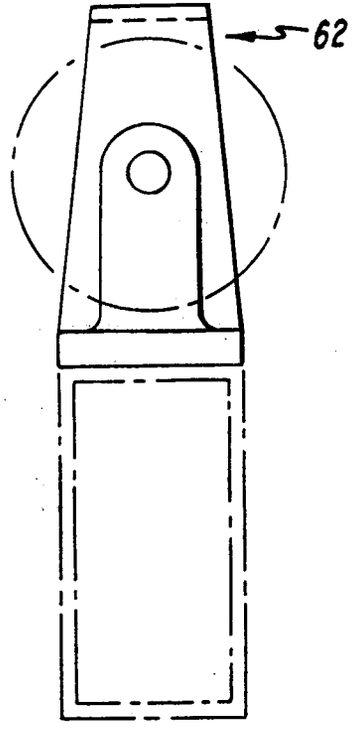


FIG. 9



ФИГ.10



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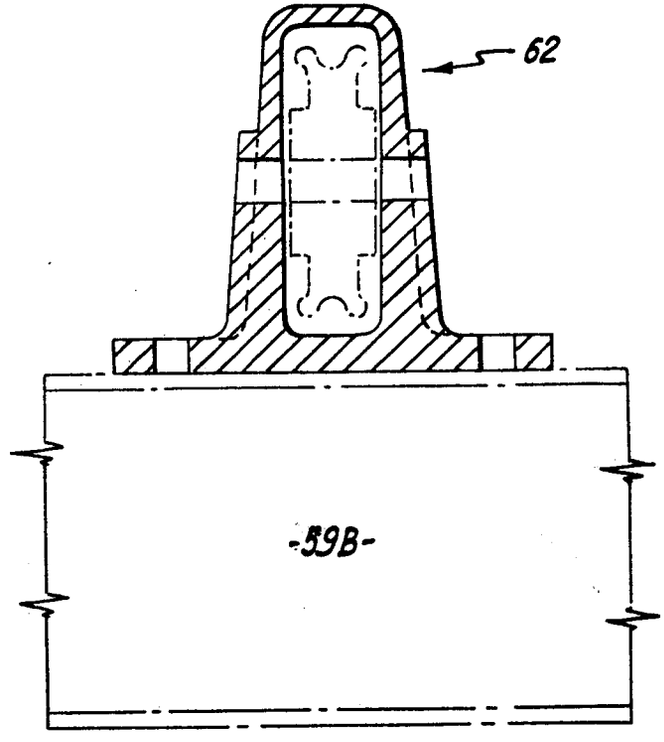
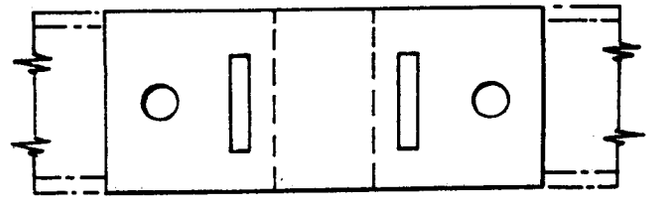


ФИГ.12

ФИГ.13



ФИГ.14

FIG.15

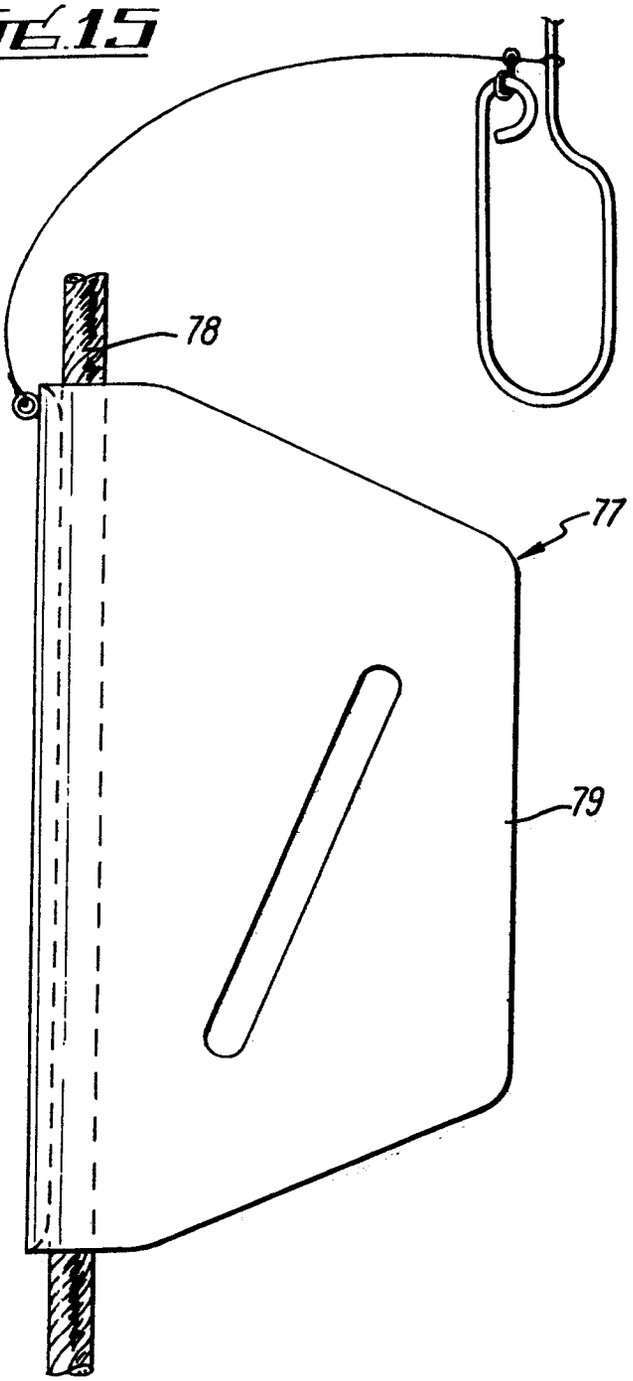
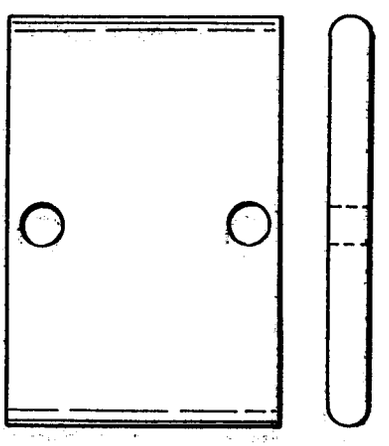


FIG.16



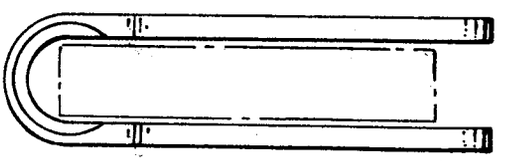


FIG.17

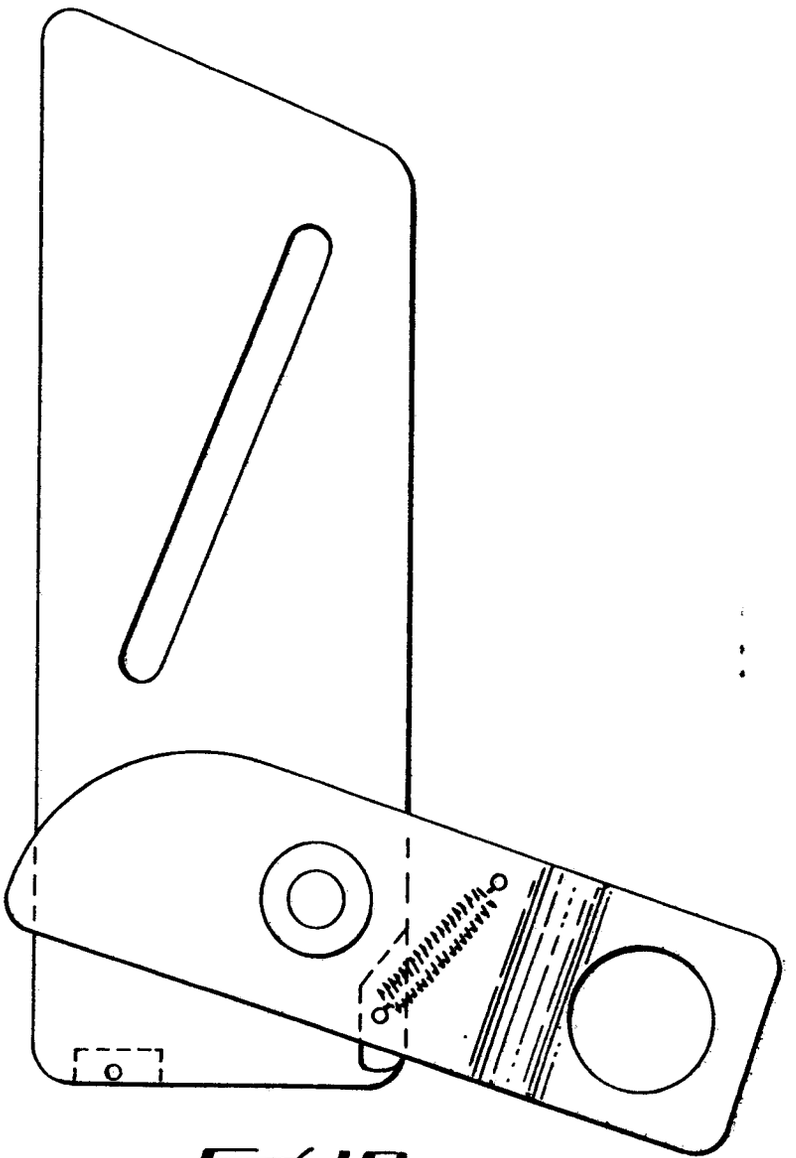


FIG.18

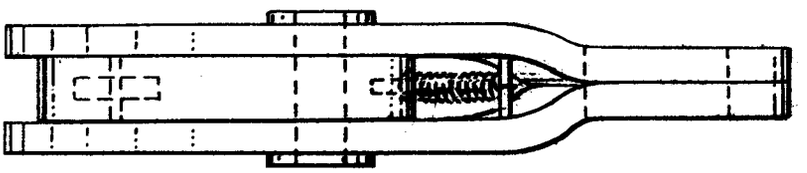


FIG.19