

[54] **ROCKET PROJECTOR MAGAZINES**
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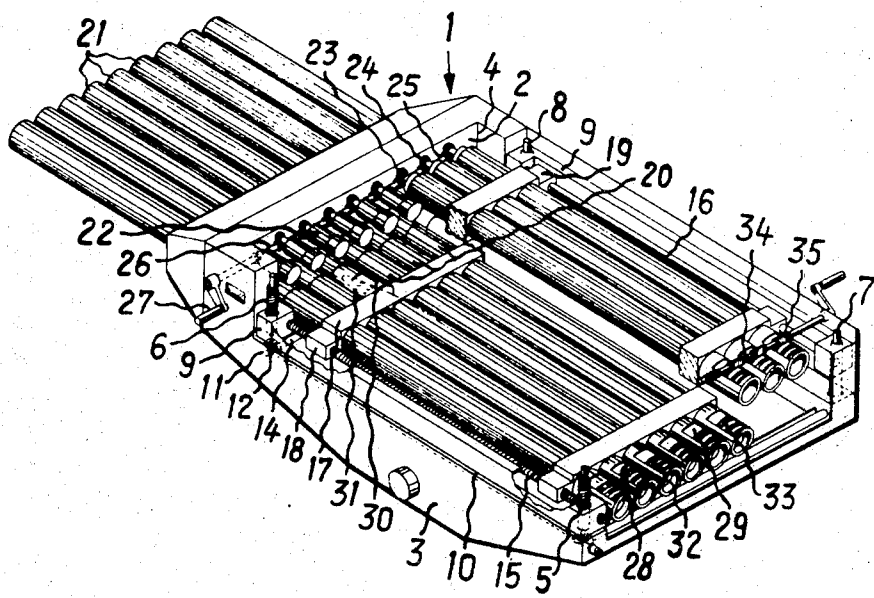
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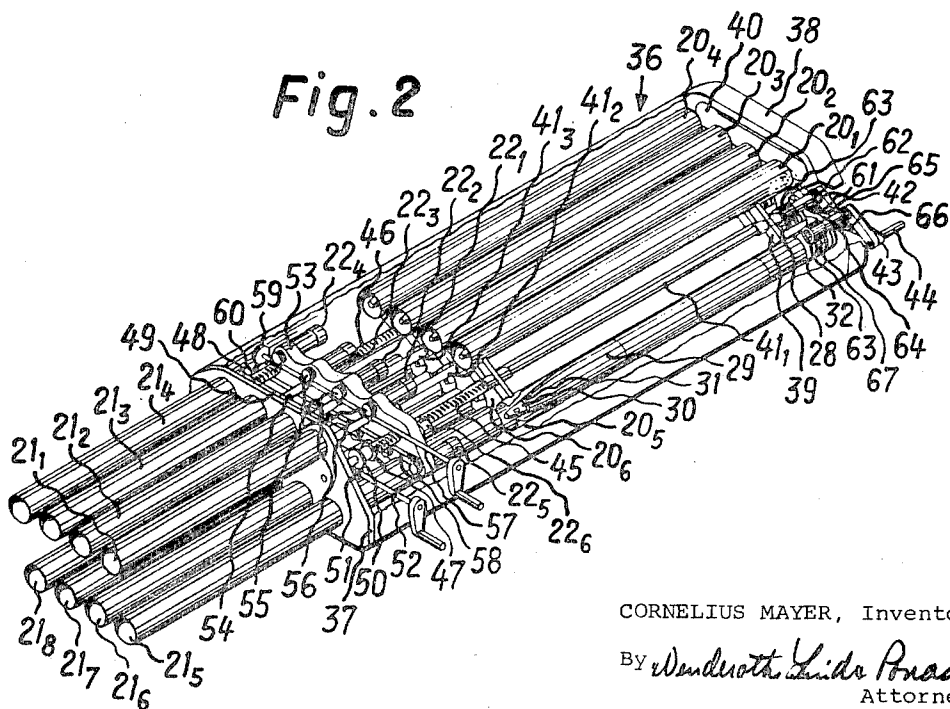
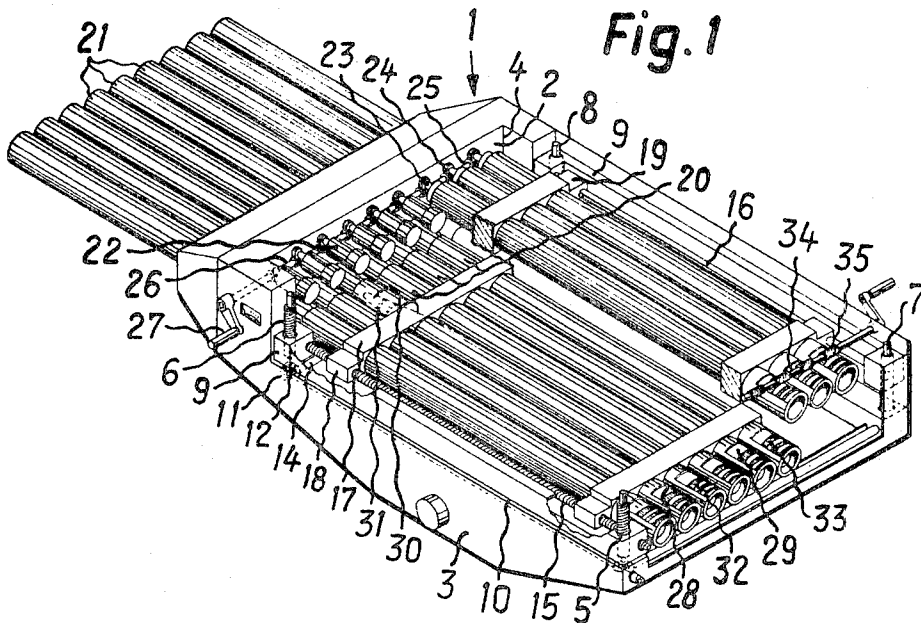
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[57] **ABSTRACT**

A rocket projector magazine for rockets having an adjustable time fuze on the nose portion of each rocket. A plurality of loading chamber tubes having each a rocket. Adjusting means for said time fuzes positioned outside the firing trajectory of the rockets. Means for producing a relative movement between the adjusting means and the loading chamber tubes so that the adjusting means engage and adjust the time fuzes of the rockets in the loading chamber tubes.

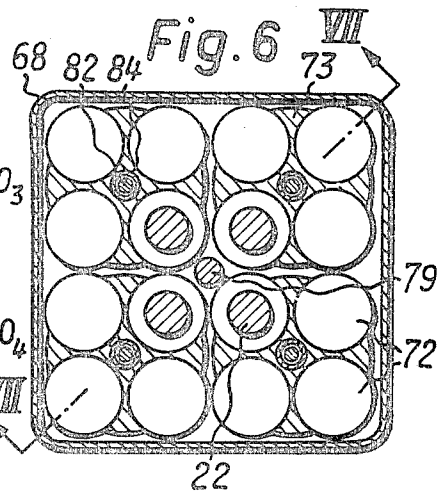
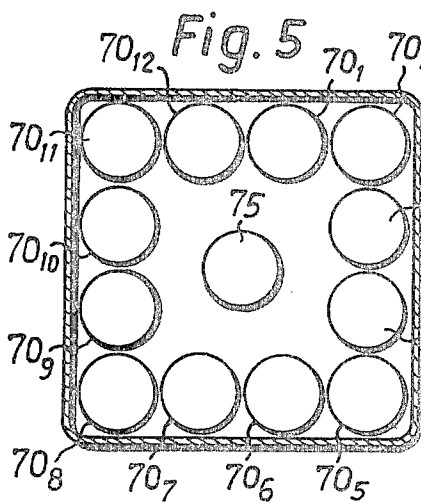
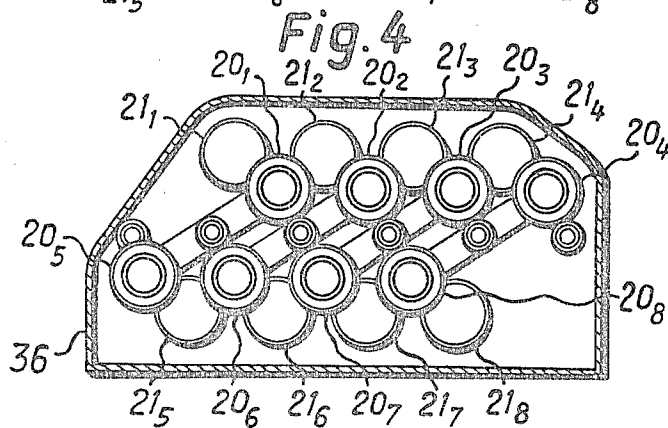
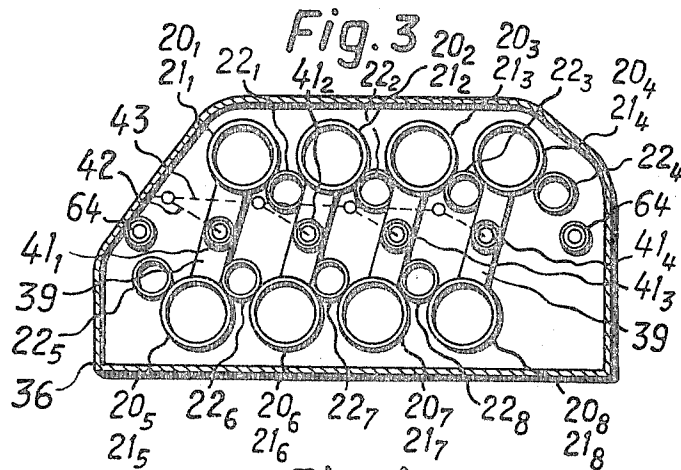
10 Claims, 7 Drawing Figures





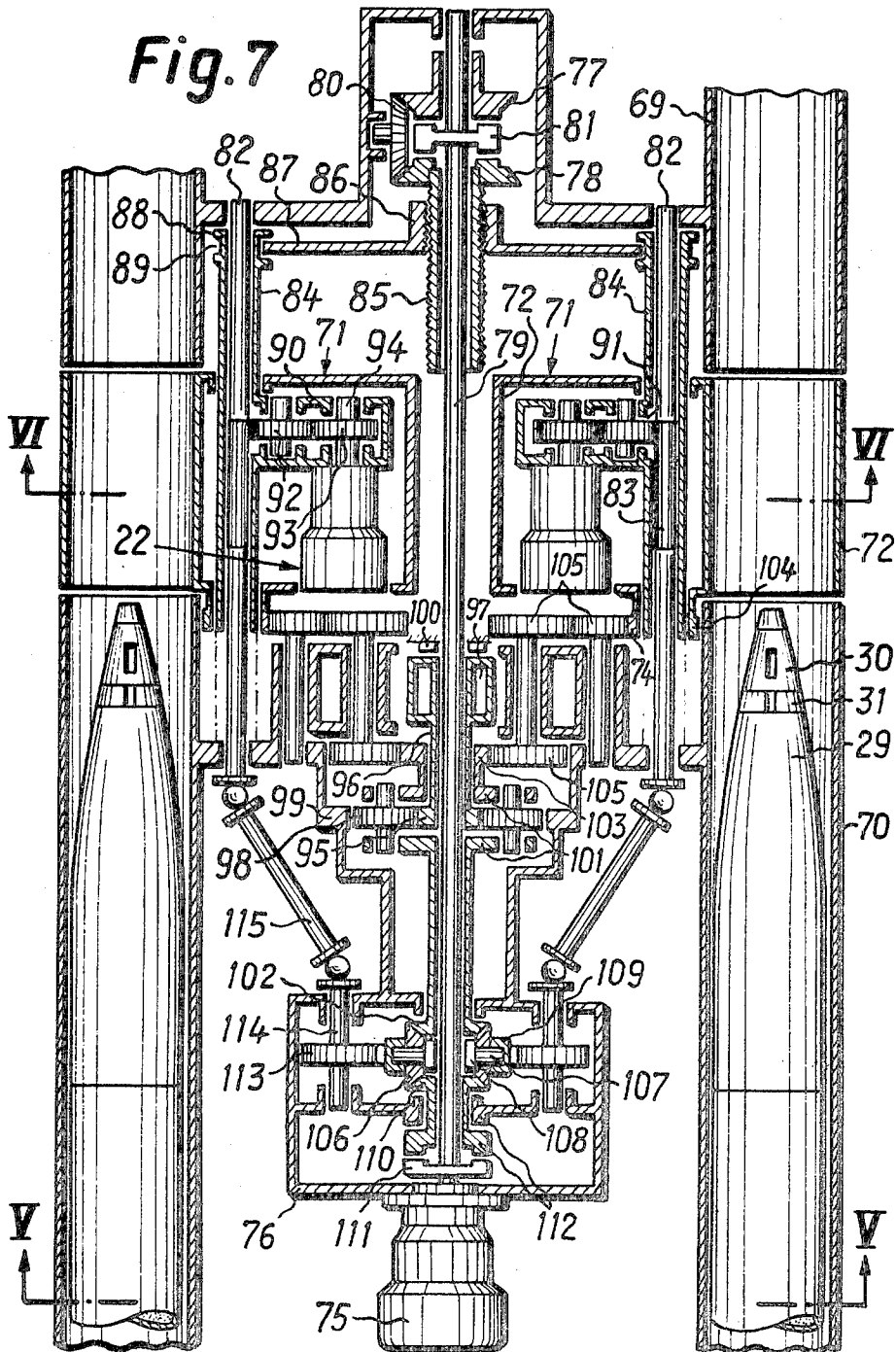
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ROCKET PROJECTOR MAGAZINES

The invention relates to rocket projector magazines having a number of chamber loading tubes which contain rockets from which the rockets are fired along a firing trajectory, and with adjustable time fuse situated on the nose portion of each rocket.

During a battle it is often necessary to charge the range of such rockets. To do this it is necessary to re-adjust the time fuses fitted to the rocket noses. If the rockets are already inside the projector magazine the adjusting rings arranged on the rocket noses can no longer be reached. It becomes necessary, therefore, to remove the rockets again from the magazine to reset the time fuses at new values. This is both cumbersome and time consuming and, therefore, undesirable in a battle situation.

The invention substantially overcomes these disadvantages. A rocket projector magazine according to the invention comprises a plurality of loading chamber tubes, a rocket within each tube, an adjustable time fuse situated on the nose portion of each rocket, devices for adjusting the time fuses positioned outside the firing trajectory of the rockets, and means for producing a relative movement between the adjustment devices and the load chamber tubes so that the adjustment devices engage the time fuses of the rockets.

The invention is illustrated by way of example in the accompanying drawings of which:

FIG. 1 is a perspective view of a rocket projector magazine according to the invention.

FIG. 2 is a perspective view of an alternative embodiment of a rocket projector magazine according to the invention.

FIG. 3 and 4 are front elevations showing various positions of the loading chamber tubes in the magazine of FIG. 2.

FIG. 5 is a view along the cross section line V—V of FIG. 7 of a third embodiment of a rocket projector magazine according to the invention.

FIG. 6 is a view along the line VI—VI of FIG. 7 and

FIG. 7 is a view along the section line VII—VII of FIG. 6.

With reference to FIG. 1 the frame 1 of the rocket projector magazine consists of a front wall 2 and two side walls 3 perpendicular to the front wall.

Threaded spindles 5, 6, 7 and 8 pass through the side walls 3 parallel to corner edges 4. The spindles 5, 6, 7, 8 engage threads in support pieces 9. A shaft 10 supports two bevel gears 11 which are in mesh, with gear wheels 12 connected to the spindles 5, 6. Gear wheels 13 which are in mesh with the bevel gears 11 are supported on shafts 14 parallel to the front wall 2. The gear wheels 13 are also in mesh with gear wheels 12 on the spindles 7 and 8.

A threaded spindle 15 and a bar 16 are disposed perpendicular to the front wall 2. The threaded spindle 15 engages a thread in the support pieces 9. The bar 16 is fastened to the other support pieces 9. The spindle 15 engages threads within end portions 18, of two supports 17 arranged behind each other parallel to the front wall 2. The bar 16 passes through other ends 19 of the supports 17. Loading chamber tubes 20 are fastened to supports 17 so that the axes of the tubes are perpendicular to the front wall 2 and lie in one plane. Firing tubes 21 are mounted in the front wall 2. The firing

tubes 21 have the same inner diameter as the loading chamber tubes 20 and are coaxial with the loading chambers (see left half of FIG. 1.)

Cylindrical adjusting devices 22 are fixed above and in front of the loading chamber tubes 20. The diameters of the adjusting devices 22 are smaller than the inner diameters of loading chamber tubes 20. The axes of the adjusting devices 22, are perpendicular to the front wall 2 and lie in a single plane parallel to that of the axes of the loading chamber tubes 20.

An adjusting device is assigned to each loading chamber tube 20. The axes of each loading chamber tube 20 and its associated adjusting device 22 lie in a single plane when the tubes 20 are in an adjusting position (as explained hereinafter.) This plane is parallel to that of the axes of the tubes 30 in their initial position and vertically above it.

Shafts 23 mounted in the front wall 2 of the frame 1 protrude into the adjusting device 22 and are adjustably connected thereto by means (not shown). The shafts 23 support worm gears 24 which are in contact with gears 25 supported on a shaft 26 whose axis is perpendicular to that of the shafts 23. A handle 27 is connected to the shaft 23.

The rear ends of loading chamber tubes 20 are provided with rectangular indentations 28 parallel to the loading tubes axis. Each loading chamber tube 20 contains a rocket 29 on the noses of which are arranged time fuses 30 having rotatable setting rings 31. A ring 32 is screwed onto the rear end of each rocket 29. These rings 32 are for preadjusting the inclination of wings which provide aerodynamic braking and which are attached to the rockets 29. The rockets 29 are secured inside the loading chamber tubes 20 so they cannot rotate. The adjusting rings 32 have crowns 33 equipped with worm gear teeth. A shaft 34 runs perpendicular the axes of the loading chamber tubes 20 and supports a number of worm gears 35.

The operation of the rocket projector magazine is as follows:

So that the time fuses 30 of the rockets 29 may be set and the adjusting rings 32 of the braking flights turned, the loading chamber tubes 20 are first lifted from the initial position shown in the left half of FIG. 1. This operation is carried out turning the shaft 10. Rotation of these shafts causes the spindles 5, 6, 7, 8 and 10 to rotate (through rotation of the shafts 14.) The supports 9 are moved upwards by the rotating spindles 5, 6, 7, 8 and the two supports 17 with loading chamber tubes 20 lifted. When the axes of the loading chamber tubes 20 are in line with those of the adjusting devices 22, the spindle 15 is rotated. The supports 17 are thereby moved forward with the loading chamber tubes 20 until their front ends surround the adjusting devices 22 (see FIG. 1, right hand side.) The setting means of the adjusting devices 22 now contact the setting rings 31 of the fuses 30. The shaft 26 is now rotated by turning handle 27. This movement is transmitted through gears 25, 24 to the shafts 23 of all of the adjusting devices 22, causing all setting rings 31 to be turned at an angle corresponding to the required running time of the fuse clockwork.

At the end of the forward and upward movement of the loading chamber tubes 20 the worm gear teeth of the crowns 33 of the adjusting rings 32 of each rocket

29 engage the associated gear wheel 35. By rotating the shaft 34 the adjusting rings 32 are turned to adjust the angle of rocket braking wings.

After the fuses 30 have been set and the adjusting ring 32 turned the supports 17 with the loading chamber tubes 20 are moved back to their original position and lowered. The axes of the loading chamber tubes 20 are then in line and are behind the axes of the firing tubes 21 so that the projector is ready to fire the rockets 29.

In the description relating to FIG. 2 similar parts as those described with reference to FIG. 1 are indicated by identical reference numerals.

With reference to FIG. 2 there are mounted in a front wall 37 of a housing 36 of the rocket projector magazine a number of parallel firing tubes 21. The firing tubes 21 are arranged in two rows 21₁, 21₂, 21₃, 21₄ and 21₅, 21₆, 21₇, 21₈. The firing tubes of each row are identical. Loading chamber tubes 20, containing rockets 29 are situated behind and coaxially with respect to the firing tubes 21 as seen in FIG. 3. The loading chamber tubes 20 terminate in front of a rear wall 38 of the housing 36. The back wall 38 has two slotlike openings 40 (only one of which is shown) level with the rear ends of the loading chamber tubes 20 which are arranged in two rows 20₁, 20₂, 20₃, 20₄ and 20₅, 20₆, 20₇, 20₈, (corresponding to the two openings 40.)

Each pair of loading chamber tubes such as 20₁ and 20₅, . . . 20₄ and 20₈ of the two rows are connected by two spokes 39. The two spokes 39 of each of the pairs 20₁, 20₅, . . . 20₄, 20₈ are attached to a rod 41₁, 41₂, . . . 41₄ parallel to the axes of the loading chamber. The rods 41 are rotatably mounted between a front wall 37 and the back wall 38 of the housing 36. In this way the pair of loading chamber tubes 20₁ and 20₅, . . . 20₄ and 20₈ are supported at their centers of gravity. To the rear ends of the rods 41 are attached parallel cranks 42 linked by a bar 43. Each crank 42 is also of equal length. A handle 44 is connected to one of the cranks 42.

Two hollow threaded spindles 45, 46 are rotatably mounted and so that they are not longitudinally displaceable on the two rods 41₁ and 41₄. The spindles 45, 46 are connected to sprocket gears 47, 48 over which passes a chain 49. The spindle 45 is driven by a worm gear 50 mounted on the rod 41. The worm gear 50 meshes with a gear 51 attached to a shaft 52 perpendicular to the rod 41.

A plate 53 parallel to the front wall 37 of the housing 36 has threaded bores which engage with the spindles 45, 46. The rods 41 enter the plate 53 through bores 54. The plate 53 carries adjustment devices 22 whose axes are parallel to the axes of the firing tubes 21. The adjusting organs 22 are arranged in two rows 22₁, . . . 22₄ and 22₅, . . . 22₈ which are parallel to the two rows of loading chamber tubes 20 and lie between these. Each row has the same number of adjustment devices 22 as the row next to it has numbers of firing tubes 21. The axes of the pairs of adjusting organs 22₁, 22₅, . . . 22₄, 22₈ lie in planes which are parallel and contain the rods 41₁, . . . 41₄. The distances of these adjusting organs 22₁, 22₅, . . . 22₄, 22₈ from axes 41₁, . . . 41₄ are the same as the distances of loading chamber tubes 20₁, 20₅, . . . 20₄, 20₈ from the rods 41₁, . . . 41₄.

Shafts of the adjustment devices 22 support worm gears 55. The wormgears 55 mesh with gear wheels 56 connected to shafts 57, 58. The shafts 57, 58 are drivably connected with each other through spurgears 59, 60. On the rods 41 are rotatably mounted sleeve shafts 61 which have a wormgear crown 62 and a spurwheel crown 63. The sleeve shafts 61 are arranged between two shafts 64 which are mounted on the rear wall 58 and likewise have a wormgear crown 62 and a spurwheel crown 63. The wormgear crowns 62 of sleeve shafts 61 and of shafts 64 mesh with gears 65 which are supported on a drive shaft 66. The adjusting rings 32 of the rockets 29 have spur toothed crowns 67.

The operation of the rocket projector magazine illustrated in FIGS. 2, 3 and 4 is as follows:

As FIG. 3 shows, the loading chamber tubes 20 in their rest position are coaxial with the firing tubes 21. The rockets 29 are pushed through openings 40 in the housing back wall 38 into the loading chamber tubes 20. The rockets 29 are then secured so they cannot rotate. The spurwheel crowns of the adjusting rings 32 are in contact with the indentations 28 of loading chamber tubes 20. By simultaneously turning the crank handles 42 the axes 41 are rotated and consequently the spokes 39 with the pairs 20₁, 20₅, . . . 20₄, 20₈ of loading chamber tubes are moved into the position shown in FIG. 4. In this position the loading chamber tubes 20 are coaxially with respect to the adjustment devices 22. The spurwheel crowns 67 of the adjusting rings 32 of the rockets 29, contained in loading chamber tubes 20₁, 20₂, 20₃, 20₈, now engage the toothed crowns 63 of the two sleeve shafts 61₂, 61₃. The adjusting rings 32 of the rockets 29 lying in loading chamber tubes 20₃, 20₆ mesh with the toothed crowns 63 of the sleeve shafts 61₁, 61₄ and the adjusting rings 32 of the rockets 29 lying inside the loading chamber tubes 20₃, 20₆ mesh with the teeth of shafts 64. By rotating shaft 66 the sleeve shafts 61 and the shafts 64 are moved and the adjusting rings 32 of all the rockets 29 are rotated to displace the braking flights (not shown.)

The time fuses 30 of the rockets 29 are set as follows.

The sprocket wheel 47 which is attached to the spindle 45 is driven by the shaft 52 through the pair of meshing gear wheels 50, 51 and sprocket wheel 48 with spindle 46 by a chain 59. The plate 53 is moved backwards by the rotating spindles 45, 46 so that the adjustment devices 22 connected to it enter the front ends of loading chamber tubes 20. The adjustment devices 22 have reached their operational position when the adjusting elements (not shown) engage the setting rings 31 of the fuses 30. Shaft 58 is driven by gear wheels 59 and 60. The gear wheels 56 rotating with shafts 57, 58 drive through gear wheels 55 the shafts of adjustment devices 22 causing a simultaneous rotation of all the setting rings 31.

Upon termination of the setting of the fuses 30, the plate 53 with the adjustment devices 22 is moved back into its initial position by the spindles 45, 46. Next the loading chamber tube pairs 20₁, 20₅, . . . 20₄, 20₈ are turned back, through rotating of the cranks 42 and the rods 41, so that the loading chamber tubes 20 are coaxially with the firing tubes 21. The rocket projector is then ready for firing.

With reference to FIGS. 5 to 7 twelve parallel firing tubes 69 and loading chamber tubes 70 are coaxial and arranged inside a box-shaped frame 68 of a rocket projector. The axes of the tubes are parallel to the sides of the frame. The corners of the frame are parallel to the longitudinal axes of three tubes 70₁, 70₂, 70₃ . . . 70₁₀, 70₁₁, 70₁₂. Between the front ends of the loading chamber tubes 70 and the back ends of the firing tubes 69 of all these sets of three are arranged rotatable slides 71. The rotatable slides 71 consist of four tube pieces 72₁, 72₂ . . . 72₄, spaced at regular angular distances with respect to each other, which are connected by arms 73 to a hub 74.

A motor 75 is attached to a flange on a housing 76 which is connected to the frame 68. Two bevel gears 77, 78 are rotatably mounted on a shaft 79 driven by the motor 75. The gears 77, 78 mesh with a bevel gear 80 mounted in a housing. Through a coupling 81 each of the two gears 77 and 78 can drive the shaft 79. Four shafts 82 are situated parallel to the axes of the firing and loading chamber 69, 70 and are equidistant from the sides of the tubes. The shafts 82 have a spur toothed crown 83. On the shafts 82 are rotatably mounted longitudinally displaceable tubes 84.

A spindle 85 is in mesh with the bevel gear 78. The spindle 85 is rotatably mounted on the shaft 79 and engages a threaded nut 86 having four spokes 87. The spokes 87 engage grooves 89 of rings 88 at the front ends of tubes 84.

The hubs 74 of the rotatable slides 71 are mounted on the tubes 84. Each of two supports 90 is directed radially at tubes 84 and connected thereto. The pairs of supports 90 protrude through an opening 91 into the interior of one of the tube pieces 72 of a slide 71. Two meshing spurgears 92, 93 are mounted on the supports 90. The gears 92 engage teeth 83 on the shafts 82. The housings of the adjusting devices 22 are fastened to the supports 90 and protrude rearwardly from them. The gears 93 are fixed to shafts 94 which drive the elements (not shown) of the adjusting devices 22. The distance of the axes of the adjusting devices 22 and of the firing and loading chamber tubes 69, 70 from the axes of the hubs 74 of rotary slides 71 are equal.

A spur gear 95 is rotatably mounted on the shaft 79 and can be driven by the shaft through a coupling 97 and a sleeve shaft 96. A brake 100 is associated with the gear 95. Spur gears 98 engage the gear 95 and also a fixed crown 99 having a toothed interior. Gears 98 are mounted in bridges 101 connected to a bevel gear 102 and a spur gear 103. The spur gear 103 is mounted on the sleeve shaft 96. Spur gears 104 are fixed to the hubs 74 of the rotatable slides 71 and are in drive with the gear 103 through two meshing gears 105.

The bevel gear 102 is mounted on the shaft 79 and engages bevel gears 106. The gears 106 are fixed to rods 107 mounted on a ring 108 which is rotatable around the shaft 79. The rods 107 are also mounted on a crown 109 which surrounds the gears 106. Crown 109 has a spur toothed exterior. The gears 106 engage with a bevel gear 110 which can rotate about the shaft 79. The bevel gears 110 can be driven by the shaft 79 through a coupling 111 and can be halted by a brake 112. Four spur gears 113 engage the toothed crown 109 and are mounted on shafts 114 which can drive the shafts 82 through cardan shafts 115.

The operation of the projector magazine is as follows:

Prior to the adjustment of the time fuses 30 of the rockets 29 contained in the loading chamber tubes 70, those tube pieces 72 of the rotatable slides 71 which do not contain adjusting devices 22 lie coaxially in front of the loading chamber tubes 70. The brake 112 is released and the coupling 111 loosened. The coupling 81 is in a position such that no driving connection exists between the shaft 79 and the gear 77 or 78. When the brake 100 is released, the movement of the shaft 79 is transmitted, after engagement of the coupling 97, to the spur gear 95 and the gears 98. The gears 98 mesh with the toothed crown 99 so that the bridge 101 is rotated and the gear 103 driven. Gear 103 drives the rotatable slides 71 through the gears 105 and 104. Due to movement of the rotatable slides 71 the supports 90 and adjusting devices 22 and the tubes 84 rotate about the shafts 82. In order that the gears 92 shall not mesh with the toothed crowns 83 of the shafts 82 and that the adjusting devices 22 shall not be shifted prematurely from their initial position, a balancing movement is provided for the shafts 82, as follows: Gear 102 drives gears 106 which mesh with stationary gear 110 and consequently rotate jointly with the toothed crown 109 about the shaft 79. Toothed crown 109 drives the shafts 82 through gears 113 and shafts 114 and 115 so that there is no relative movement between the latter and the gears 92.

When the sleeve shaft 96 has performed a complete revolution and the rotatable slides 71 have been turned through 90°, the coupling 97 is loosened and brake 100 released. The four adjusting devices 22 are now situated coaxially in front of the loading chamber tubes 70₁, 70₄, 70₇ and 70₁₀. The spur 78 and the spindle 85 is driven through the coupling 81. The nut 86 is consequently screwed backwards whereby through the spokes 87 the tubes 84 with the adjusting devices 22 are moved. When the adjusting elements of the devices 22 engage the setting rings 31 of the fuses 30, the coupling 81 is uncoupled and the drive connection between the shaft 79 and the spindle 85 is interrupted. The brake 112 is released and the coupling 111 coupled. This causes bevel gears 110 and 106 to be driven. The gears 106 mesh with the gear 102 so that they rotate with the toothed crown 109 about the shaft 79. The movement of the toothed crown 109 is transmitted through the gears 113, shafts 114, 115 and 82 and wheels 92, 93 drive the shafts 94 of the adjusting devices 22.

When the setting rings 31 of the fuses 30 have been rotated for the desired amount through the adjusting elements of the devices 22, the brake 112 is released and the coupling 111 uncoupled. A drive connection between the shaft 79 and the gear 77 is now provided through coupling 81. Gear 77, through the intermediary of gears 80, 78, drives the spindle 85, causing the nut 86 and thereby the tubes 84 with adjusting devices 22 to be moved forwards. When the adjusting devices 22 have reached their initial positions again the coupling 81 is uncoupled and the brake 100 loosened.

In the manner described above the rotatable slides 71 are now twice more, step by step, turned through 90° each time and the fuses 30 of the rockets 29 contained in loading chamber tubes 70₂, 70₅, 70₈, 70₁₁ and 70₃,

70₆, 70₉, 70₁₂ adjusted by the devices 22. When all fuses 30 are adjusted those tube pieces 72 which do not contain adjusting devices 22 are in a position after further rotation through 90° of the rotary slides 71, coaxial with respect to the firing and loading chamber tubes 69, 70. The rocket projector is then ready for firing.

I claim:

1. A rocket projector magazine comprising a frame, a plurality of loading chamber tubes in said frame having a rocket in each tube, a plurality of firing tubes mounted on said frame which firing tubes are aligned with said loading chamber tubes when said rockets are fired, an adjustable time fuse on the nose of each rocket, a plurality of fuse setting means mounted on said frame for the adjustment of said time fuses, said fuse setting means and said loading chamber tubes being movably mounted in said frame transversely and parallel to the axes of said firing tubes.

2. A rocket projector magazine according to claim 1 wherein a support receives said loading chamber tubes, said support being mounted vertically and horizontally movable in said frame, said loading chamber tubes being arranged in a unitary plane in said support, the axes of said loading chamber tubes together with the axes of the associated fuse setting means being situated in a vertical plane, and threaded spindles mounted on said support producing a relative displacement between said fuse setting means and said loading chamber tubes.

3. A rocket projector magazine according to claim 2 having a first support member, a second support member, said first support member being spaced from said second support member, said support members being mounted on said frame parallel to one another, a bar on which said support members are guided at one of their ends, a first threaded spindle engaging said support members at the other ends thereof, support pieces in said frame, in which said threaded spindle and said bar are mounted and additional threaded spindles engaging said support pieces mounted in said frame and are joined to each other in a driving connection, so that said loading chamber tubes are movable perpendicular to their axes through said additional threaded spindles and in parallel to their axes through said first threaded

spindle.

4. A rocket projector magazine according to claim 2 wherein said frame has a front wall and two side walls and said fuse setting means are mounted on a shaft rotatably mounted in the side walls adjacent said front wall.

5. A rocket projector magazine according to claim 2 wherein said loading chamber tubes are arranged in two planes, a member rigidly connecting adjacent pairs of tubes, said pairs being pivotally mounted about their centers of gravity, said fuse setting means being arranged in two planes parallel to those of said tubes with their axes separated by a distance equal to that between the tube axes, and in which said means for producing a relative movement comprises a crank drive connected to said tubes and a threaded spindle for axial displacement of said fuse setting means.

6. A rocket projector magazine according to claim 1 in which said fuse setting means are arranged on rotatable slides and are movable to a position in front of said loading tubes and into said loading tubes.

7. A rocket projector magazine according to claim 6 in which said plurality of loading chamber tubes has a rotary slide and a fuse setting means associated with it.

8. A rocket projector magazine according to claim 7 including common driving means for all rotatable slides which provides axial rotation and displacement from their axes.

9. A rocket projector magazine according to claim 7 wherein said frame is square in cross-section enclosing said loading chamber tubes in which four tubes are arranged adjacent each wall of said frame, fuse setting means for each group of three tubes at a corner of said frame, a rotatable arm displaceable axially is associated with each group of three tubes situated outside the firing trajectory of the rockets parallel to the tube axes so that during a complete rotation of the arm said fuse setting means describes a circle containing the axes of each of the three tubes.

10. A rocket projector magazine according to claim 2 in which said fuse setting means are cylindrical and the outer diameter of said fuse setting means is smaller than the inner diameter of said loading chamber tubes.

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