No. 647,976. Patented Apr. 24, 1900.

G. LISPENARD.

MEANS FOR LOADING FIREWORKS BODIES.

(Application filed Aug. 23, 1898.)

(No Model.) 4 Sheets—Sheet 1.

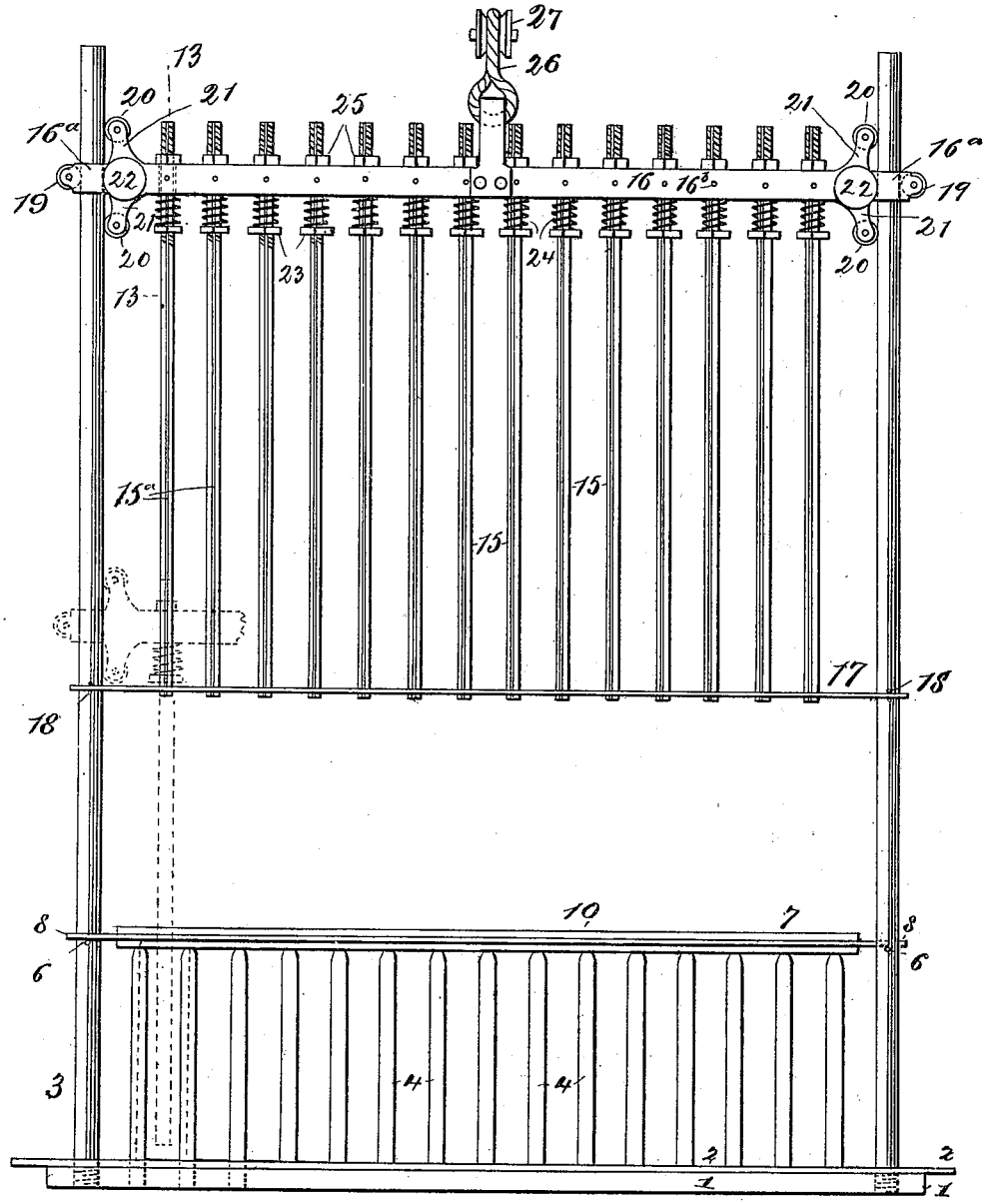

Fig 1

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(No Model.) 4 Sheets—Sheet 2.

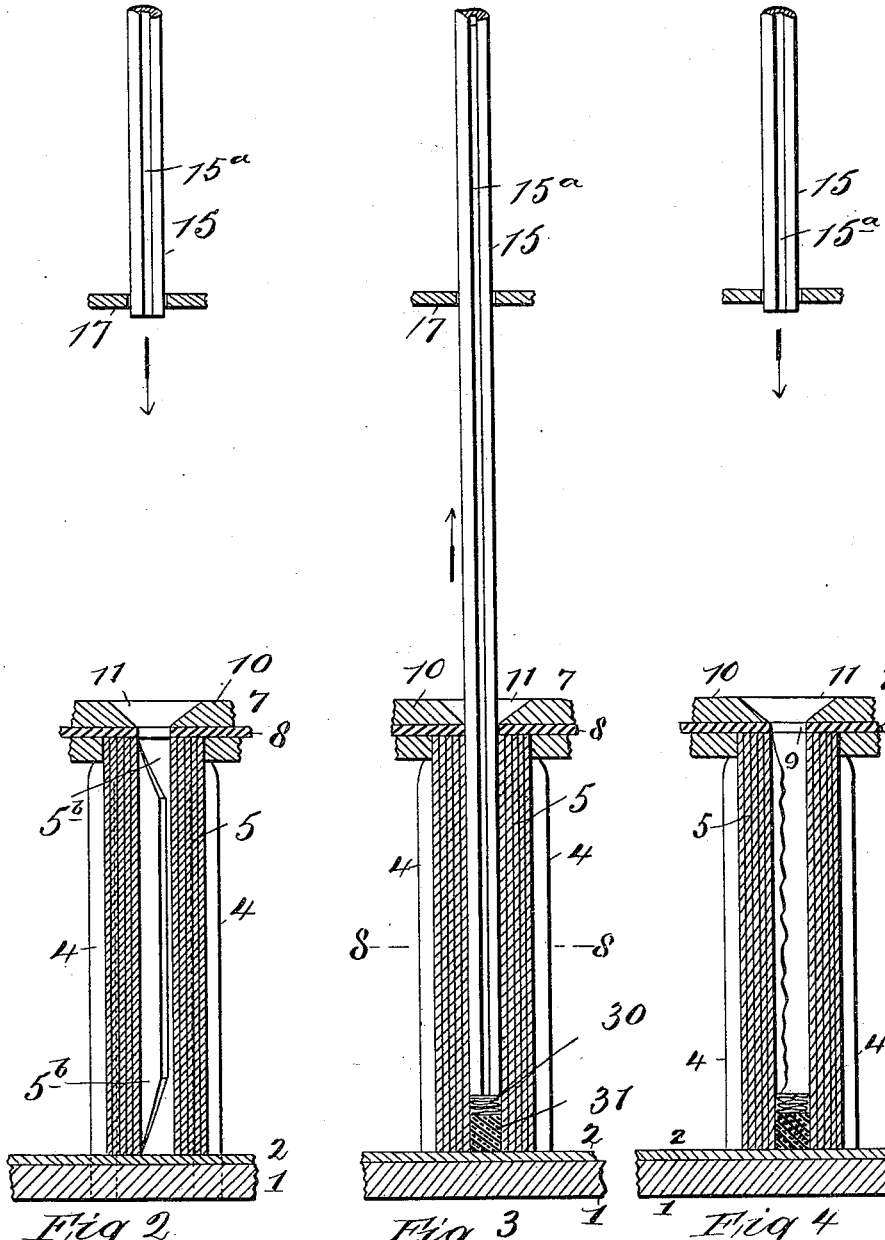

Fig 2. Fig 3. Fig 4.

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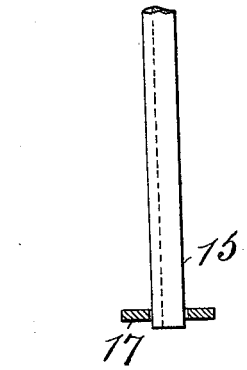
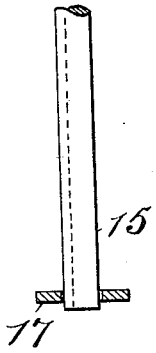
MEANS FOR LOADING FIREWORKS BODIES.

(Application filed Aug. 23, 1898.)

(No Model.) 4 Sheets—Sheet 3.





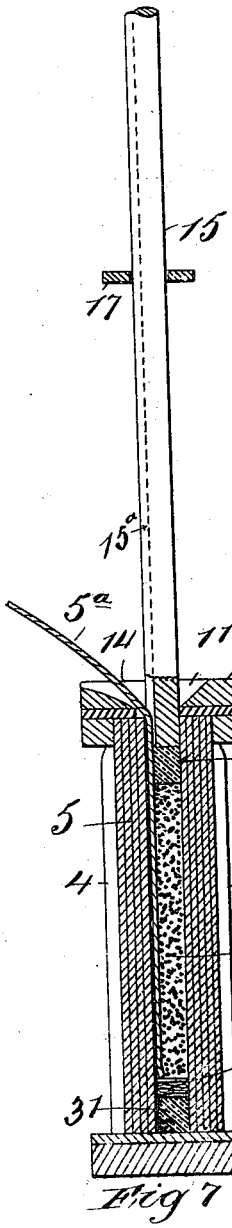


Fig 7

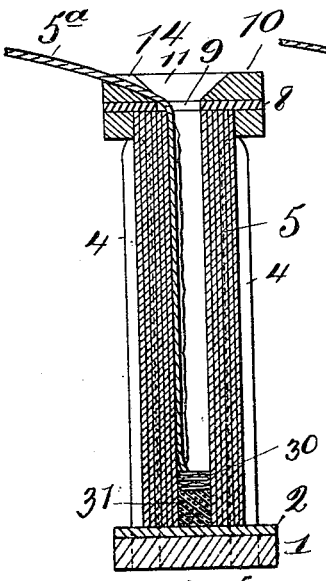


Fig 5

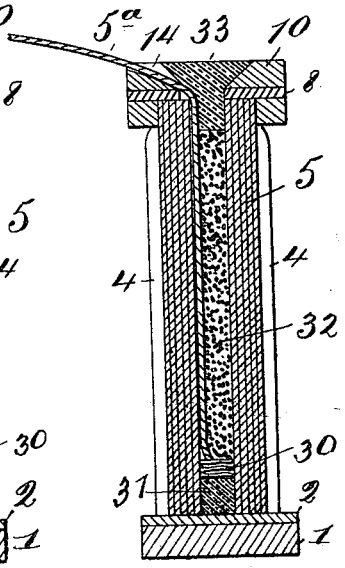


Fig 6

WITNESSES

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MEANS FOR LOADING FIREWORKS BODIES.

(Application filed Aug. 23, 1898.)

(No Model.) 4 Sheets—Sheet 4.

Fig 12

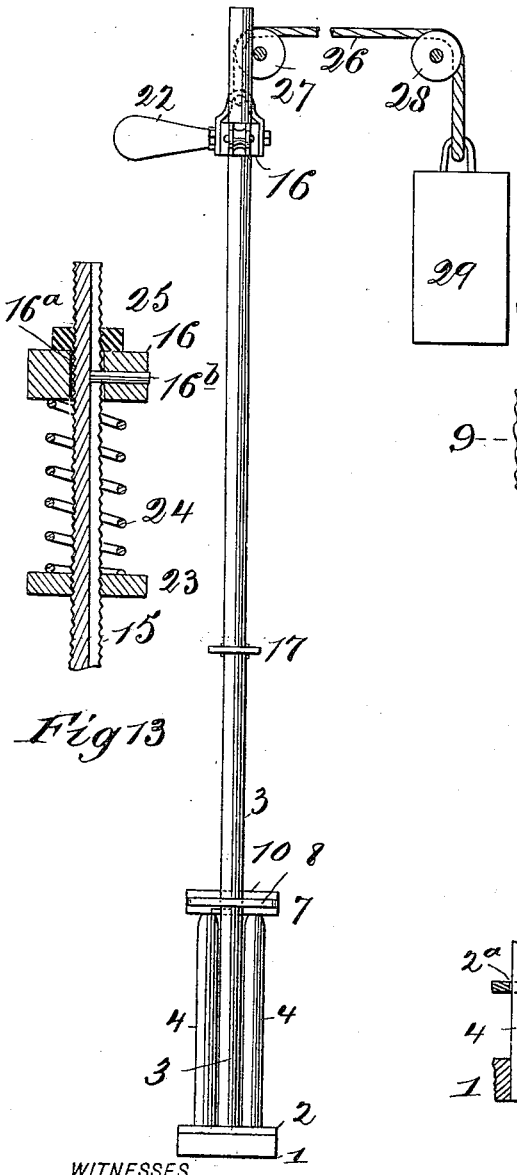


Fig 13

Fig 8

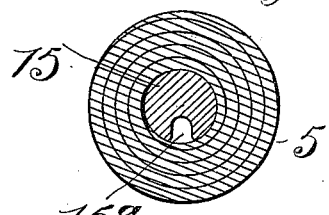


Fig 9

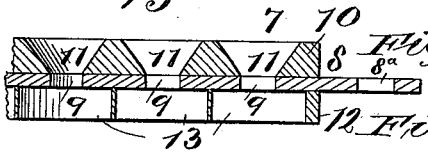
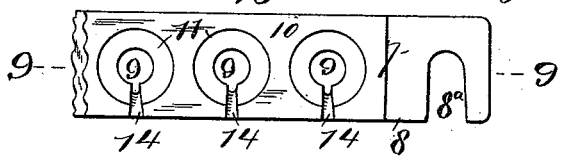


Fig 10



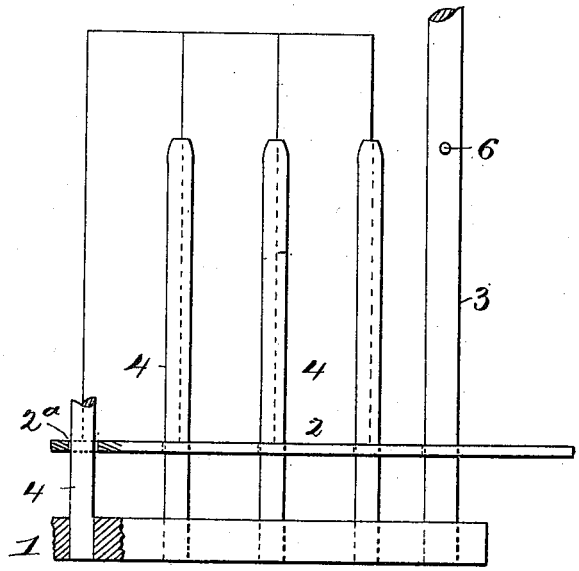


Fig 11

WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE LISPENARD, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NORDLINGER-CHARLTON FIREWORKS COMPANY, OF SAME PLACE.

MEANS FOR LOADING FIREWORKS-BODIES.

SPECIFICATION forming part of Letters Patent No. 647,976, dated April 24, 1900.

Application filed August 23, 1898. Serial No. 689,333. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LISPENARD, a citizen of the United States, residing at New York, (Brooklyn,) county of Kings, and State of New York, have invented an Improved Means for Loading Fireworks-Bodies, of which the following is a specification.

The prior practice, so far as I am at present informed, relative to the choking and loading of firework and other light bodies has been first to choke one end and then to reverse the body or shell and submit it to a number of independent and unconnected operations.

In carrying out my invention the body or shell of the body is retained in one place or position during all the operations of choking and filling and which, together with improved means which I consider generically new in this relation, not only cheapens the cost of labor, but enables the resultant firework to be more expeditiously turned out in large quantities and produces a more effective detonating device.

The improvements are marked over the old methods of clay-plugging a firework-body, and they present a distinct advance over the previous methods of choking, which embraced an upsetting or dislodgment of the paper, the latter being most marked by reason of absence of strain on the shell during choking and the utilization of a greater portion of the bore for the explosive and their adaptation to any form of shell or body.

In utilizing my improvements I prefer to employ a body or shell composed of a band or strip of paper or the like disposed in convolute folds, the interior end of the band being reduced in diameter to allow of its being readily gripped by a slotted mandrel, (shown in Figure 2,) although this may be dispensed with, if desired, especially when any other form of shell is used.

In practicing my invention in its preferred form I first place the empty shell or body in a suitable frame and plug the lower end with clay or other suitable material, at the same time combining a wad with the clay plug at this end.

To accomplish the loading of the firework according to my invention, the same is placed in a suitable frame or holder upon a base or plate, a suitable quantity of clay is passed into the bore of the firework, so as to rest upon said plate, a plunger is then passed into the bore of the body, compressing the clay into a solid plug, the plunger is then withdrawn, a fuse is then inserted into the bore of the body, powder is then filled into the bore of the body, clay is then filled into said bore on top of the powder, and the plunger is again brought down to compact the last-mentioned clay and to confine the powder and fuse within the body, all without fitting the fuse into the plunger or removing the shell from the frame or holder.

One of the main objects of my invention is to provide improved means for enabling a number of firework-bodies to be filled simultaneously in accordance with the method above specified; and to this end the invention embraces the novel details of improvement and the combination of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Fig. 1 is a front elevation of a machine embodying my invention. Fig. 2 is an enlarged detail section showing the firework-body in position ready to receive the charge and the plunger. Fig. 3 is a similar view showing the plunger as having formed the wad and in the act of compressing the same upon a clay plug. Fig. 4 is a similar view showing the plunger withdrawn and the firework-body ready to receive the charge of powder. Fig. 5 is a view similar to Fig. 4, taken at right angles thereto, showing the fuse in position in the firework. Fig. 6 is a view similar to Fig. 5, showing the powder in the bore and the clay at the outer end of the bore ready to be rammed. Fig. 7 is a similar view showing the plunger in the act of ramming the charge and forming the outer plug of clay. Fig. 8 is a section on the line 8 8 in Fig. 3. Fig. 9 is a detail section on the line 9 9 of Fig. 10 of the clay and powder feeder or guide for directing the same into the firework-bodies. Fig. 10 is a plan view of Fig. 9. Fig. 11 is a detail view, partly broken, of the supports for the firework-bodies. Fig. 12 is a side elevation of the ma-

chine shown in Fig. 1; and Fig. 13 is an enlarged detail vertical section on the line 13 13 in Fig. 1, showing the connection of the plunger with its operating-support.

Similar numerals of reference indicate corresponding parts in the several views.

In the accompanying drawings, 1 indicates a base, which may be in the form of a bar or block, and upon the same is a plate 2.

3 represents posts secured to and extending vertically from the base 1, and the plate 2 has apertures to receive the posts 3, whereby said plate may be raised and lowered along said posts.

4 4 are a series of pins secured to and projecting vertically from the base 1 and arranged in pairs, so as to receive between them the firework-bodies 5, whereby said bodies may be supported in a vertical operative position. The plate 2 is provided with a series of holes 2^a to receive the pins 4, so that the plate 2 may travel up and down along said pins.

6 represents pins or stops carried by the posts 3, against which the plate 2 may abut when it is raised, so as to limit the upward movement of said plate.

From the foregoing it will be understood that the firework-bodies 5 are to be arranged in the desired number with their bores extending upwardly and their lower ends resting upon the plate 2. When in this position, the firework-bodies are to be filled with the charges of powder, the fuses, and the plugs that act to retain the powder in position, and in order to easily and conveniently fill the proper amount of powder and clay into the firework-bodies I have provided a feeder or guide 7, that is adapted to pass over the tops of the firework-bodies. (See Fig. 1.) The feeder or guide 7 is shown in the form of a plate 8, that is provided with an aperture at one end to receive one of the posts 3, whereby said plate may be swung horizontally about said post as an axis, and the opposite end of the plate 8 is provided with a recess 8^a to receive the opposite post 3, (see Figs. 9 and 10,) so that said feeder or guide can be moved over the firework-bodies and away therefrom. The plate 8 is provided with a plurality of apertures 9, that are adapted to aline with the bores in the firework-bodies. (See Fig. 9.) On top of the plate 8 is a plate 10, that has apertures 11 alined with the apertures 9; but the apertures 11 are beveled inwardly in cone-like form or in the nature of a funnel, so as to direct the material through the apertures 9 in the plate 8. On the under side of the plate 8 is a plate 12, having recesses 13 cut into one side, so as to receive the upper ends of the firework-bodies when the guide or feeder is swung around over the latter. (See Fig. 9.) The guide or feeder 7 is also provided on its upper surface with grooves 14, that lead to the openings 11 and 9, being cut in the side walls thereof, (see Fig. 10,) which grooves serve to receive the fuses for the fireworks, as hereinafter explained. When the feeder or guide 7 is placed over the firework-bodies, it rests upon the pins 6 or upon said bodies and enables the clay and powder to be fed into each firework-body, and when the firework-bodies are loaded the feeder or guide 7 is to be swung away so as to permit of the ready removal of the firework-bodies from between the pins 4. It will be understood, however, that the feeder or guide 7 can be otherwise supported and manipulated than by the means shown; also, that the firework-bodies can be supported otherwise than by the guiding-pins 4, the object being to enable a plurality of firework-bodies to be placed side by side and upright and to enable the charge and material for the plugs to be readily fed to the same.

15 15 are plungers that are adapted to pass into the bores of the firework-bodies when the latter are placed in position upon the base 1 between the pins 4. These plungers are adapted to be reciprocated, and for this purpose they are shown carried by a bar 16, that is guided by the posts 3 3, and the lower ends of the plungers 15 are guided in apertures in a plate or bar 17, that is supported by the posts 3. The plate 17, as shown, is provided with apertures that receive the posts 3, and pins 18, carried by said posts, serve to support the plate or bar 17 and hold it in position. Suitable means are provided for enabling the bar 16 to travel up and down the posts 3. I have shown the bar 16 as provided with sockets or apertures 16^a, that receive the posts 3, and 19 are rollers carried by the bar 16 and adapted to bear against the outer sides of the respective posts 3, and 20 are rollers carried by arms 21, that project upwardly and downwardly from the bar 16 at opposite ends thereof, whereby the bar 16 is held on a substantially-horizontal plane, and yet has free up-and-down movements along the posts 3.

22 represents handles at the ends of the bar 16, by which the latter and the plungers 15 may be raised and lowered. The plungers 15 have a longitudinal groove 15^a, that is adapted to receive the fuse 5^a of the firework when the plunger descends to compress a charge of powder. (See Fig. 7.) By preference the plungers 15 are resiliently connected with the bar 16, so that if the plungers are rammed with too great a pressure a cushioned effect will take place. For this purpose the plungers 15 at their upper ends are screw-threaded and pass freely through apertures 16^a in the bar 16, (see Fig. 13,) and upon the threads of said plungers below the bars 16 are placed nuts 23, upon which rest springs 24, that bear against the under side of the bar 16, thereby tending to force the plungers downwardly and to resist upward movement thereof.

25 represents nuts upon the plungers 15, which are adapted to rest upon the top of the bar 16 to limit the downward movement that the plungers may have under the influence of the springs 24. By adjusting the nuts 23 up

or down the tension of the springs 24 can be altered. The plungers 15 are held in proper alinement and kept from rotating by means of pins 16^b, that pass through the bar 16 and enter the grooves 15^a in the plungers, these pins and grooves also allowing the plungers to have longitudinal movement independently of the bar 16. (See Fig. 13.) The bar 16 and the plungers 15 are to be held normally in the position shown in Fig. 1—that is to say, in position to be depressed. I have shown a flexible connection 26 as attached to the bar 16 and passing over pulleys 27 and 28, and 29 is a weight attached to said connection and tending to elevate the bar 16 and the plungers. It is evident, however, that the bar 16 and the plungers may be raised and held in an elevated position otherwise than by the weight and pulley.

The operation is as follows: The plungers being elevated and the feeder or guide 7 swung away from the pins 4, the firework-bodies 5 that are to be loaded are placed in position between the pins 4, and then the feeder or guide 7 is swung above the same. The clay for the plugs at the bottom of the fireworks is then placed upon the feeder and allowed to pass through the apertures 9 11 into the bores in the bodies, so as to rest upon the plate 2. The plungers are then brought down, passed through the apertures 9 11 in the feeder or guide 7, and the plungers engage the projecting ends of the material of the firework-bodies, tearing the material loose and carrying it down in the form of wads 30 upon the clay plugs 31, and a continued pressure of the plungers upon these wads and clay compresses the same into a solid and firm mass. The plungers are then raised. The fuses 5^a for the firework-body are then passed through the apertures 9 11 in the feeder 7, into the bores of the firework-bodies, and laid to rest in the grooves 14. The powder 32 for the charges is next filled into the bores of the fireworks through the apertures 9 11 in the feeder 7, and clay 33 to form the plugs at the upper ends of the fireworks is also filled through said apertures upon said powder. The plungers are next brought down, passing through said apertures, and force the clay 33 down upon the powder, thus compacting the same and forming a solid plug at the end of the firework from which the fuse projects. The plungers are next raised, and then the plate 2 is lifted, which raises the fireworks from between the pins 4, and by giving the plate 2 a sudden movement against the pins 6 its motion will be arrested, and thus cause the fireworks to fall away, whereupon the plate 2 will be lowered to rest upon the base and the same operation can be continued.

From the foregoing it will be understood that when the firework-bodies are once placed in position upon the plate 2 there is no further manipulation of them required until the loading is completed and they are removed from the machine, the steps of the loading process being continuous while the firework-bodies remain in one position.

I do not limit my invention to the precise details of construction shown and described, as they may be varied without departing from the spirit thereof.

Having now described my invention, what I claim is—

1. The combination of a base, a plate above said base adapted to support firework-bodies and to elevate the same, means for supporting a plurality of firework-bodies upon said plate, a feeder or guide having apertures to aline with the bores in the firework-bodies, plungers to pass through said feeder or guide into said bodies, and means for supporting and operating said plungers, substantially as described.

2. The combination of a base, posts extending therefrom, a plate above said base adapted to support firework-bodies and to elevate the same, means for supporting a plurality of firework-bodies upon said plate, a feeder or guide comprising a plate having guiding-apertures adapted to be held in position by said posts, plungers to pass through said feeder or guide, and means for supporting and operating said plungers, substantially as described.

3. The combination of a base, posts extending therefrom, pins also extending therefrom adapted to receive firework-bodies between them, a feeder or guide comprising a plate or bar hinged on one of the posts and having apertures to aline with the bores in the firework-bodies, plungers to pass through said apertures, and means for supporting and operating said plungers, substantially as described.

4. The combination of a base, posts extending therefrom, a plate above said base and having apertures to receive said posts, pins extending from said base and through apertures in said plate and adapted to receive firework-bodies between them, a feeder or guide comprising a plate having apertures, a plate upon the same also having apertures, means for supporting said feeder or guide upon said post, plungers adapted to pass through said apertures, and means for supporting and operating said plungers, substantially as described.

5. The combination of a base, a plate above said base adapted to support firework-bodies and to elevate the same, means for supporting firework-bodies thereon, a feeder or guide comprising a plate having apertures to aline with the bores of the firework-bodies, a plate resting upon the second-mentioned plate and having apertures, a plate beneath the second-mentioned plate having sockets to receive the firework-bodies, plungers to enter the bores of said bodies through said apertures, and means for supporting and operating said plungers, substantially as described.

6. The combination of a base, means for supporting firework-bodies thereon, a feeder

or guide to pass over said firework-bodies and having apertures to aline with the bores in the latter, said feeder or guide having grooves in the side walls of said apertures to receive firework-fuses, plungers to enter said apertures and the bores in the firework-bodies, and means for supporting and operating said plungers, substantially as described.

7. The combination of a base, means for supporting firework-bodies thereon, a feeder or guide to pass over said firework-bodies and having apertures to aline with the bores in the latter, said feeder or guide having grooves in the side walls of said apertures to receive firework-fuses, plungers to enter said apertures and the bores in the firework-bodies, said plungers having longitudinal grooves to receive the fuses of the fireworks, and means for supporting and operating said plungers, substantially as described.

8. The combination of a base, a plate above said base adapted to support firework-bodies and to elevate the same, means for supporting said bodies thereon, a feeder or guide having apertures to aline with the bores of said bodies, plungers to enter said apertures and said bores, and means for resiliently supporting said plungers and for operating the same, substantially as described.

9. The combination of a base, means for supporting firework-bodies thereon, means to elevate said bodies from said base, a feeder or guide having apertures to aline with the bores of said bodies, plungers to enter said apertures and said bores, means for operating the same, means for resiliently supporting said plungers in the operating means, and means for guiding the lower ends of said plungers, substantially as described.

10. The combination of a base, a plate above said base adapted to support firework-bodies, and to elevate the same, means for supporting said bodies thereon, a feeder or guide having apertures adapted to aline with the bores of said bodies, plungers to enter said apertures and bores, a bar to support said plungers, and springs to coact with said plungers and said bar, substantially as described.

11. The combination of a base, posts extending therefrom, a plate above said base adapted to support firework-bodies and to elevate the same, means to support said bodies on said plate, a feeder or guide having apertures to aline with the bores in said bodies, plungers to pass into said apertures and said bores, a bar to support said plungers, and means for guiding said bar along said posts, substantially as described.

12. The combination of a base, posts extending therefrom, a plate above said base adapted to support firework-bodies and to elevate the same, means for supporting said bodies upon said plate, a feeder or guide having apertures to aline with the bores in the bodies, plungers to enter said apertures and bores, a bar to operate said plungers, means for guiding said bar on said posts, and springs interposed between said plungers and said bar, substantially as described.

13. The combination of a base, posts extending therefrom, means for supporting firework-bodies thereon, means to elevate said bodies from said base, a feeder or guide having apertures to aline with the bores in said bodies, plungers to enter said apertures and said bores, a bar having apertures to receive said plungers, nuts carried by said plungers, springs interposed between said nuts and said bar, means to limit the movement of said plungers by said springs, and means for guiding said bar upon said posts, substantially as described.

14. The combination of a base, posts extending therefrom, means to support firework-bodies thereon, a feeder or guide having apertures to aline with the bores in said bodies, plungers to enter said apertures and bores, a bar to carry said plungers, said bar having sockets to receive said posts, arms extending from said bar, and rollers carried by said arms to bear against said posts, substantially as described.

15. The combination of a base, posts extending therefrom, a plate above said base adapted to support firework-bodies and to elevate the same, means to support said bodies thereon, a feeder or guide having apertures to aline with the bores in said bodies, plungers to enter said apertures and bores, a bar guided by said posts and carrying said plungers, and means for holding said bar and plungers in an elevated position while permitting the same to be depressed, substantially as described.

16. The combination of a base, posts extending therefrom, a plate above said base adapted to support firework-bodies and to elevate the same, means to support said bodies thereon, a feeder or guide having apertures to aline with the bores in said bodies, plungers to enter said apertures and bores, a bar guided by said posts and carrying said plungers, a flexible connection extending from said bar, pulleys, and a weight attached to said connection for holding said bar in an elevated position, substantially as described.

Signed at the city, county, and State of New York this 22d day of August, 1898.

GEORGE LISPENARD.

Witnesses:

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SERENA BEATRICE KUHN.