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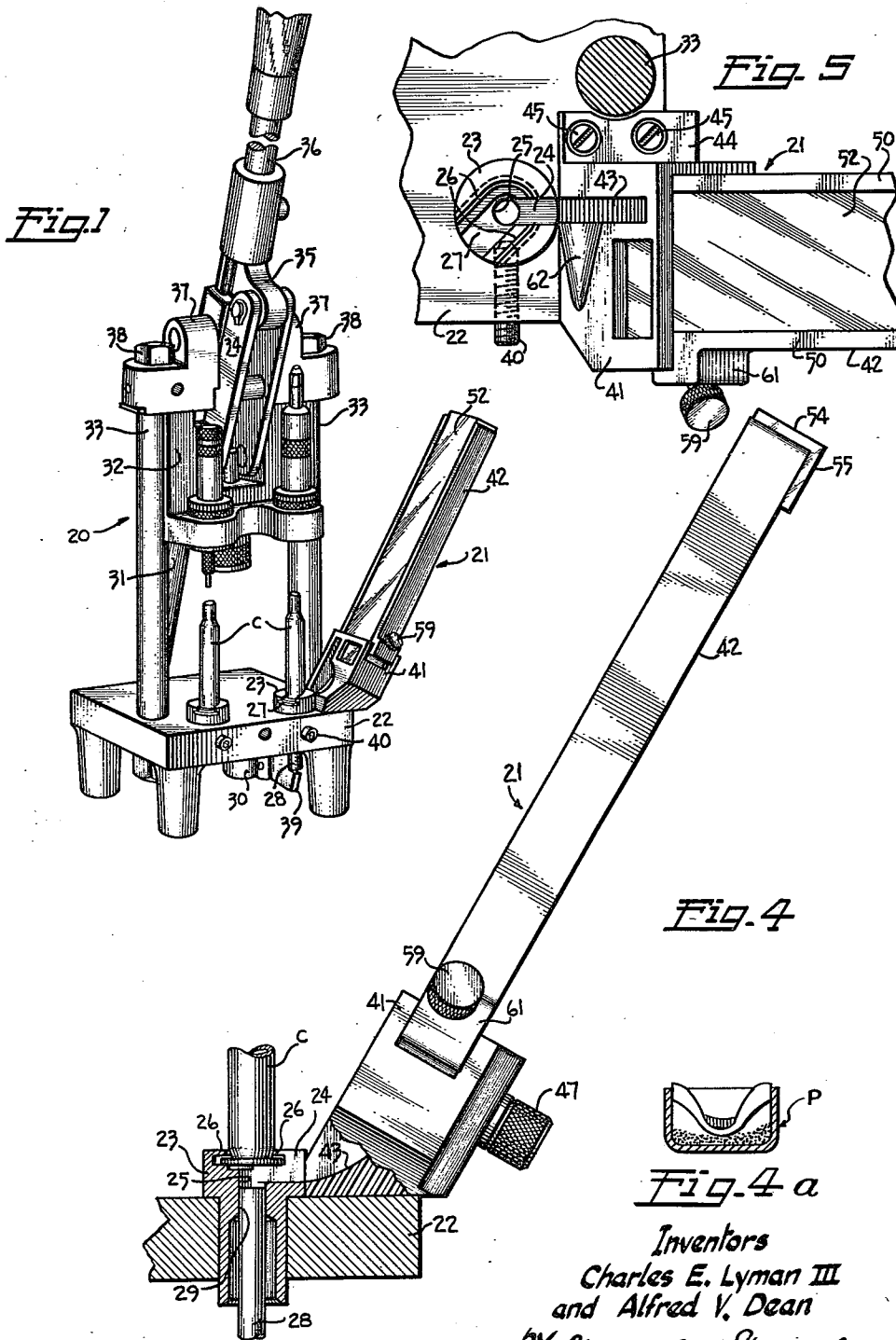
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Filed Sept. 22, 1953

2 Sheets-Sheet 1



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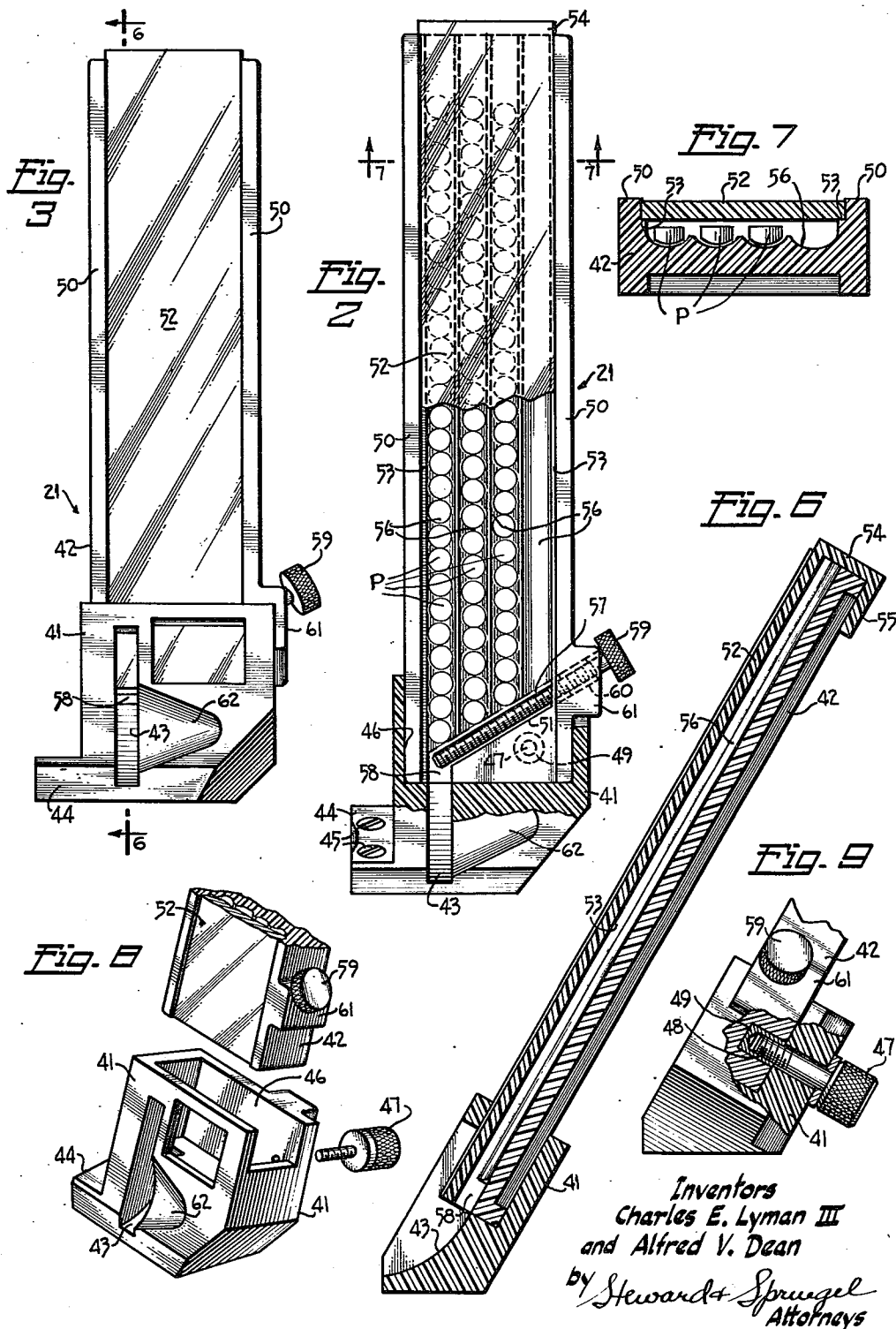
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AUTOMATIC PRIMER FEED DEVICE

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7 Claims. (Cl. 86—36)

This invention relates to a primer feed device for cartridge loading apparatus, and more particularly to a device for greatly facilitating the orientation of primer cups dumped at random into the device so that proper feeding is assured to an operating station at the loading press. It is especially pertinent to the loading of cartridges for sporting guns in which the primers are relatively small and consequently difficult to handle by hand.

In the operation of loading cartridges cases, one of the steps comprises placing a primer cup containing the detonating charge into an aperture in the rear end or butt of the case prior to loading it with the propellant powder and crimping a projectile thereto. The primer cup is forced into a press fit in the case aperture by means of a reciprocable plunger of the loading press while the cartridge case is held securely on the press. One of the chief difficulties in the foregoing operation has been to make sure that the primer cups are properly oriented as they arrive at the loading station, i. e., that the closed, slightly convex end of each cup is faced in the proper direction with respect to the cartridge case into which it is to be inserted. Heretofore this has been achieved by first carefully orienting the primer cups in proper position when they are placed into a feed hopper at the loading station. Such hoppers have generally incorporated some provision for maintaining the cups in their proper orientation once that has been achieved, but it is obviously something of a tedious task to position each individual primer cup in the hopper if any large quantity is to be used, as they are quite small and consequently not easily picked up or turned over. The primers are then delivered from the hopper to the desired point for insertion into the cartridge cases by some form of feed chute.

It is an object of this invention to provide a magazine or hopper into which the primer cups can be poured at random from the packing or shipping container in which they are commonly supplied, and thereafter righted or oriented automatically within the hopper so that when they are fed to the loading press, each primer is in proper position for insertion into a cartridge case. In association with the magazine itself there is also a mounting support which is normally permanently secured to the loading press and is adapted to support the magazine so that it can be easily and quickly set in or removed from its operating position on the press. Such mounting support also serves as a part of the feed device, having a chute or other means for delivering primers from the magazine to the loading station of the press. In practice, the magazine is removed from the press while the primers are poured or dumped into it and it is then tapped or vibrated lightly a few times which, because of the construction of its floor, causes the primers to orient themselves into rows or files with the closed ends of the cups down. A cover or shield is then placed over the oriented primers in such closely spaced relation to their upper edges that they cannot thereafter become inverted although they are free to slide in upright position along the floor of the maga-

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zine or hopper. The latter is then secured in position in the mounting support at an angle above the horizontal sufficient to cause the primers to feed by gravity to the aforesaid feed chute for delivery to the loading station, all without any individual positioning of the primers being required.

In order to obtain the aforesaid uniform orientation of the primers from a jumbled condition in the magazine or hopper by simply tapping the latter, the floor of the magazine upon which the primers rest is formed to provide a longitudinal groove of semielliptical cross section slightly wider at its widest point than the diameter of the primer cups. Preferably the floor is composed of a series of such grooves in closely spaced parallel arrangement, all feeding to a common outlet point in the magazine so that the latter will have a reasonably large capacity for primers without undue length. Provision is also made in such case for controlling the feed of the primers from each of the several grooves successively so that jamming at the common outlet point is avoided.

It has been found possible, moreover, by adhering rather closely to certain design considerations presently to be pointed out regarding the construction and arrangement of the grooves in the magazine, to enable the feed device to be used for primers of either 0.210 inch or 0.172 inch diameter, the two sizes most commonly employed in sporting ammunition, thus making it unnecessary in most cases to change any part of the feed device or magazine when loading cartridges of different calibers.

While the invention here disclosed is readily adaptable for commercial loading of ammunition, a device embodying the inventive concept can be made of such simple, rugged and dependable construction at very low expense as to be particularly suitable for use by amateur sportsmen in reloading their own cartridges. These and various other features will be more readily apparent from the following detailed description of a particular form of the device illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is a front elevational view of a loading press for relatively small caliber ammunition incorporating the primer feed device of the present invention;

Fig. 2 is a plan view of the primer feed device itself, certain parts being cut away and shown in section for greater clarity;

Fig. 3 is a front elevational view of the device as it appears in mounted position upon the bed plate of the loading press;

Fig. 4 is a side elevational view of the device as mounted on the press, parts of the press and adjacent portions of the primer feed device being shown in cross section to show the delivery of primers to the loading station;

Fig. 4a is an enlarged, cross-sectional view of a conventional primer;

Fig. 5 is a broken view in plan of the feed device in mounted position on the press;

Fig. 6 is a longitudinal view in section taken on line 6—6 of Fig. 3;

Fig. 7 is a transverse view in section on line 7—7 of Fig. 2;

Fig. 8 is an exploded view of separable parts of the primer feed device including, in perspective, a mounting support and a portion of the magazine or hopper supported thereby; and

Fig. 9 is a detailed side elevational view, partly in section, of the means by which the separable magazine is secured in its mounting bracket.

In order for a clearer understanding to be had of the operation of the primer feed device itself, a brief description of the loading press with which it is adapted to cooperate will be given. Referring to Fig. 1, a hand operated

press 20 is shown for purposes of illustration. Obviously however the press could be power-driven should that be desirable. The primer feed device 21 to which this invention is more particularly directed is, as shown in Fig. 1, secured to the bed plate or base 22 of the press. As will be explained in greater detail presently, the primer feed device 21 delivers cartridge primers in uniformly oriented position to a primer loading station of the press 20 where a cartridge holder 23 is secured for the reception of the cartridge cases or shells C to be re-primed. Primers P are delivered by the feed device 21 to a deep channel or slot 24 milled in the head of the cartridge holder 23, as best shown in Figs. 4 and 5. The magazine of the feed device 21 is set at a relatively steep incline to cause primers P to feed by gravity into the channel 24 in single file and to come to rest against the rear wall 25 of the slot 24 in which position the end primer is positioned directly below the recess in the butt of a shell C into which it is to be pressed. The shell C is restrained against vertical displacement in the holder 23 by engagement of the overhanging lips 26 of a second shallower passageway 27 with the head of the shell. This latter passageway is likewise milled laterally into the head of the cartridge holder 23 and intersects the deeper slot 24 at substantially the center of the holder. The primer P is forced upwardly into the recess in the butt or head of cartridge case C by a plunger 28 which is vertically reciprocable within a central bore 29 in cartridge holder 23. Plunger 28 is actuated by a rocker arm 30 which is mounted upon a horizontally disposed pivot shaft (not shown) on the under side of bed 22, the opposite end of the rocker arm being linked through a connecting rod 31 to a vertically reciprocable slide 32 of the press. Slide 32 has semicylindrical ways cut into its opposite sides, which ways engage the side posts 33 of the press to permit the aforesaid vertical reciprocating motion. This motion is imparted to slide 32 through a linkage arm indicated generally at 34 which is pivotally connected at its lower end to the slide and at its upper end to a boss 35 on the operating handle or lever 36 of the press. Lever 36 is pivotally mounted in trunnions 37 secured to the upper ends of posts 33 by nuts 38 threaded on the upper ends of the posts. Thus, as the operating lever 36 of the press is lowered, the slide 32 is depressed through the action of linkage 34 and at the same time connecting rod 31 at the rear of the press is forced downwardly pushing down on the rear end of rocker arm 30. This causes its nose 39 to contact and raise plunger 28, by which the primer P is forced into the aperture of the shell case. In order to prevent the cartridge holder itself from being lifted out of the bed 22 of the press by this action, it is restrained in its socket by means of a suitable set screw 40.

The primer feed device 21 comprises in general two principal components, namely, a mounting support or socket 41 and the hopper or magazine 42 in which the primers are carried. As shown more particularly in Figs. 4 and 5, the feed device 21 is mounted on the press bed 22 to dispose a feed chute 43 in alignment with channel 24 of the cartridge holder 23, the floor of chute 43 being curved to terminate flush with the floor of groove 24 and thus provide a smooth, continuous path for the primers. The mounting support 41 has a flange 44 (Figs. 2, 3 and 5) through which machine screws 45 pass to threadedly engage the bed 22 of the press and thus secure the feed device to it. Magazine 42 is removably retained in a socket 46 of the mounting bracket 41 by means of a knurled thumb screw 47 which passes through the back wall of the bracket 41 to engage the threaded socket 48 at the under side of the magazine at its lower end, as shown best in Figs. 8 and 9. Where the latter is formed of a molded plastic, socket 48 is preferably formed in an insert 49 of metal, such as brass or steel, imbedded

in the hopper, as illustrated in the specific example here shown.

The magazine portion of the feed device is of generally rectangular box-like construction, having upstanding side walls 50 and an end wall 51 at the end which fits into the socket 46 of the bracket 41, this normally being referred to as the lower end of the magazine. A cover member 52 closes off the upper, open face of the magazine 42, resting upon shoulders 53 of side walls 50 to space the cover a predetermined distance above the floor of the magazine, as shown best in Fig. 7, for reasons hereinafter further explained. An end wall 54 of the cover closes off the upper end of hopper 42, and an underturned lip 55 contiguous with end wall 54 is engaged beneath the under surface of the magazine when the cover is placed thereon and slid downwardly. It is of advantage to use some form of transparent material for the cover such as the plastic here shown so that the contents of the magazine can be readily observed at all times.

The floor of the magazine upon which the primers P are adapted to be supported is provided with a series of coextending longitudinal grooves 56 each of which extends from its upper end downwardly toward end wall 51, as seen best in Fig. 2, and there intersects a transverse passage 57 which leads to the outlet 58 in the end wall 51 of the magazine. Outlet 58 coincides with passageway 43 of the support 41 when the magazine 42 is assembled therewith. The primers P, as will be pointed out more clearly presently, sit in grooves 56 and are fed by gravity downwardly toward the transverse passage 57 and outlet 58 of the magazine. In order to prevent undesired feeding of the primers from the magazine and jamming at the outlet, a feed control screw 59 is carried in a threaded metal insert 60 embedded in a boss 61 projecting laterally of the magazine adjacent its lower end. By turning the feed control screw 59, it can be withdrawn axially to move its inner end from blocking position across grooves 56 so that primers in the grooves will feed downwardly into passage 57 and through the outlet 58 for delivery by the feed chute 43 to the operating position previously described. Normally, to prevent jamming at the outlet 58, feed screw 59 is unscrewed only sufficiently to allow primers to feed from successive grooves one at a time so that, as seen in Fig. 2, the primers are fed from successive grooves starting at the left and proceeding to the right in the illustration. In initiating the feed of primers from the magazine 42, unscrewing the feed control screw 59 may cause such a sudden outrush from the first groove as to cause the primers to tumble or jump out of line and spill over at the point of delivery. To prevent this, a thumb notch 62 is provided in the support 41 so that the operator's thumb may be temporarily held across the feed chute 43 to retard the feed during withdrawal of the feed control screw 59. Once the flow of primers to the operating position has been established, and so long as no gaps in this flow occur, the alignment of the primers in the delivery chute will be maintained and there will be no tendency to jump out of the chute.

As mentioned previously, one of the primary objects of the present invention is to facilitate the uniform orientation of primers in the magazine or hopper 42 so that they may be fed thereby in proper position to the loading station. In the present device, the magazine 42 is removed from its support 41 when the primers are to be placed therein. The cover 52 is withdrawn or removed and the primers are then dumped at random into the magazine. In this condition some of the primers will be sitting in the grooves with their closed ends directed downwardly, that is in contact with the bottom of grooves 56 which is the desired position, while many will be inverted and quite a few will also be sitting on their sides in the grooves. The magazine 42 is then tapped or gently bumped to vibrate it and thereby the primer cups resting in the grooves. Owing to the semielliptical curva-

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ture of the bottom of the grooves, and the fact that the center of gravity of each primer is nearer its closed end (see Fig. 4a), the primers are caused to right themselves uniformly so that after a short period of tapping or vibration all of them will orient themselves in a position in which the closed end of each primer rests in the bottom of the grooves 56. When this occurs, the cover 52 is applied to the magazine. As best seen in Fig. 7, the spacing of the inner surface of the cover above the upper edges of primers P by means of shoulders 53 of the magazine is sufficient to permit the primers to slide freely along in their respective grooves 56, but is close enough to the upper ends of the cups to prevent them from turning over or otherwise becoming inverted or misaligned in the grooves. Feed screw 59, is, of course, fully screwed in at this time to prevent the escape of the primers at the lower end of the magazine 42, and the latter is then ready for assembly with its mounting support 41 in the manner described hereinabove. The feed control screw 59 is then unscrewed sufficiently to unblock the lower end of the most left hand groove 56, as viewed in Fig. 2, while an operator holds his thumb in the thumb notch 62 to prevent too sudden a flow of the primers and a consequent spilling of them out of the delivery chute 43. As the primers are used up in loading successive cartridge shells C, the feed control screw 59 is withdrawn further to unblock the lower end of the next groove 56 and if this is done while there are still primers remaining in the passageway 43 and outlet 58, there will be no need of the operator to place his thumb in the thumb notch 62 as the primers do not develop sufficient momentum to cause them to jump out of the passageway 43 in that event.

In achieving the foregoing objects, certain design considerations in the construction of the feed device just described have been found to be significant in obtaining optimum operation of the device. For example, in order to provide a constant positive feed of primers from the magazine to the primer loading station, the particular angle at which the magazine is disposed has been found to be important. Naturally, the more nearly vertical the magazine is disposed the greater will be the gravitational effect upon the primers and consequently the more positive will be the feed. At the same time, however, this gives rise to excessive jumping of the primers out of the delivery chute, whereas lowering the angle of inclination of the magazine with respect to the bed 22 of the press reduces the positiveness of the feed. It has been found in commercial production of the device here disclosed that disposing the magazine 42 at an angle approximating 60° from the horizontal produces the best results. A tolerance of about 5° on either side of this recommended optimum will normally be satisfactory. A further point is the angle at which the transverse passage 57 intersects the axes of the longitudinal grooves 56. This has an important bearing upon the proper feed of the primers from the successive grooves to the outlet passage 58, while preventing jamming of the primers at this point. Here again it has been found by actual experience that the angle between the axis of the transverse passage 57 and a line drawn perpendicular to side wall 50 where the feed screw enters the magazine should be on the order of about 30°, or in other words on the order of about 60° as measured with respect to the longitudinal axis of grooves 56. In this instance again, a tolerance of about 5° on either side of the suggested optimum will give reasonably satisfactory results. A third point, and one which is of primary importance, is the contouring of the grooves 56. As will be noted from the drawings, particularly Fig. 7, the grooves in cross section are semielliptical in curvature. Such an arrangement has been found to be highly important in order that fully effective orientation of the primer cups be accomplished by the tapping or vibration of the magazine. In the case of primers of either of the two most commonly used sizes for sporting ammunition, namely those having diameters of 0.210" and 0.172",

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the grooves can be formed by a milling operation in which a one-quarter inch end mill is set at an angle of 50° to the longitudinal axis of the groove to be formed while the hopper is advanced axially of the groove, thus imparting the elliptical cross section to it. Of course if the hopper is formed of plastic by a molding operation, suitable dies must first be prepared from a master sample prepared in this manner. In the foregoing specific example it has likewise been found that the depth of the groove itself is preferably about 0.078", while the height of shoulders 53 above the bottom of the groove is approximately 0.151".

It is to be understood of course that the foregoing specific dimensions are by way of illustration only, having been found in practice to provide optimum operation for primers of the specific sizes mentioned hereinabove. Obviously, where primers of different sizes are employed, such dimensional limitations will be subject to revision accordingly, and any such revisions or equivalent structural modifications of the device here described as properly fall within the scope of the invention are accordingly intended to be covered by the appended claims.

What is claimed is:

1. In a primer feed device for a cartridge loading press, a magazine having a grooved floor for orienting primers dumped therein at random into uniform position by temporarily applied vibration of said magazine, a removable cover for said magazine which fits in close spaced relation above the uniformly oriented primers to prevent their turning over within said magazine but which does not impede their normal passage therealong in said oriented position, an outlet in said magazine towards which said primers may be fed, attachment means for securing said magazine to a loading press to dispose said magazine floor at an incline to cause said primers to feed toward said outlet, and feed control means associated with said outlet to control the feed of primers to said outlet.

2. In a primer feed device for a cartridge loading press, a magazine having a plurality of semielliptical closely spaced grooves extending longitudinally, the width of said grooves being slightly greater than the diameter of the primers, a removable cover for said magazine which fits in close spaced relation above said primers to prevent their turning over within said grooves but which does not impede their normal passage in upright position therealong, an outlet in said magazine with which said grooves communicate to allow said primers to feed by gravity thereto, attachment means for securing said magazine to a loading press to dispose said primers in an inclined plane to cause the gravitational feed of said primers to said outlet point, and feed control means associated with said outlet to prevent the feed of primers from more than one groove at a time to said outlet.

3. In a primer feed device for a cartridge loading press, a primer magazine and a mounting member therefor, attachment means on said mounting member for normally securing it permanently to said press and other means thereon for detachably engaging said magazine to support the latter in inclined position, a feed chute in said mounting member for delivering primers from said magazine to an operating station of said loading press, a feed outlet in said magazine communicating with said feed chute, said magazine having a plurality of co-extending semielliptical grooves communicating with said outlet, said grooves being slightly wider than the diameter of said primers but shallower than their height, feed control means in said magazine for controlling the flow of primers to said outlet from successive grooves, and a removable cover member for said magazine, said cover adapted and arranged to overlie said grooves in such closely spaced relation as to permit free passage of properly oriented primers therein but to interfere with the passage of misaligned primers therein.

4. A primer feed device as defined in claim 3, wherein said grooves in said magazine feed into a transversely

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inclined groove leading to said outlet, and said feed control means comprises a reciprocable member shiftable along said inclined groove to unblock the openings of said other grooves successively.

5. A primer feed device as defined in claim 4, wherein said transverse groove is disposed at an angle of approximately 60° to the other grooves in said magazine.

6. A primer feed device as defined in claim 4, wherein said magazine is disposed by said mounting member at an angle of approximately 60° from the horizontal.

7. In a primer feed device for a cartridge loading press, a primer magazine and a mounting member for detachably securing said magazine to said press, said magazine having a substantially rectangular box-like shape and being open at the top, a removable cover for said magazine, an outlet at one end of said magazine wide enough to pass but one primer at a time, said magazine having semi-elliptical grooves extending longitudinally in its floor toward said outlet, said grooves being slightly wider than the diameter of a primer but somewhat shallower than the height thereof so that primers placed therein, owing to their low center of gravity, tend to orient themselves upon tapping or vibration of said magazine to assume a position in which the convex closed end of each primer rests in the bottom of a groove and the upper open end of the primer projects slightly above the edge of the

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groove, said cover when applied being spaced above the upper ends of said oriented primers sufficiently to allow said primers to slide longitudinally in oriented position along said grooves but preventing a primer from tumbling within a groove, feed control means in said magazine adjacent said outlet passage and shiftable transversely of said grooves to restrict the flow of primers therefrom to one groove at a time, attachment means on said mounting member for securing said magazine temporarily to said press at an angle of approximately 60° to the horizontal to cause primers in said magazine to feed toward said outlet passage, and a delivery chute in said mounting member which communicates with said outlet passage of said magazine when the latter is secured to said mounting member, said chute having upstanding sidewalls spaced slightly wider than the diameter of a primer to maintain primers delivered thereto in upright, oriented position as they are delivered to the operating station of said loading press.

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