April 24, 1962 J. T. IVY 3,030,723

FIRING MECHANISM FOR A GAS OPERATED REVOLVER

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Fig. 1

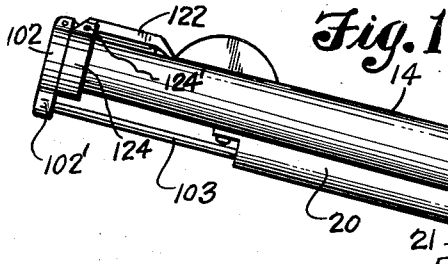



Fig. 1a

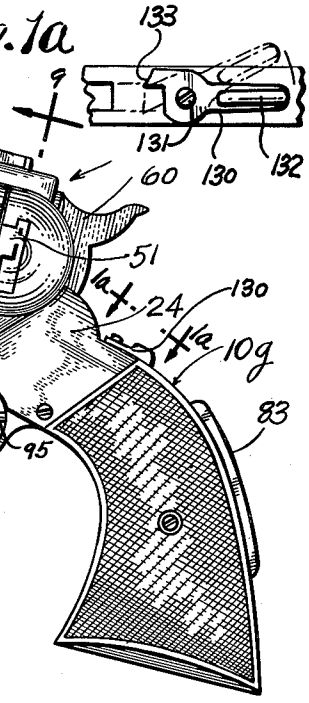



Fig. 3

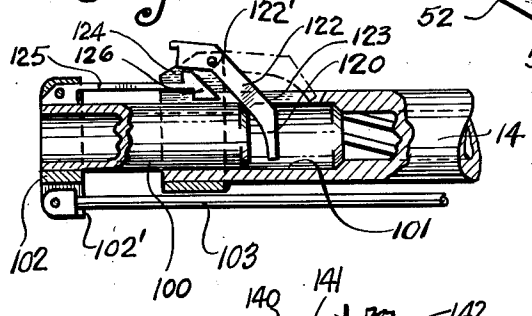



Fig. 2a

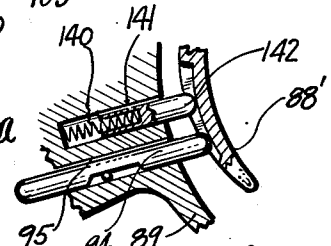



Fig. 2

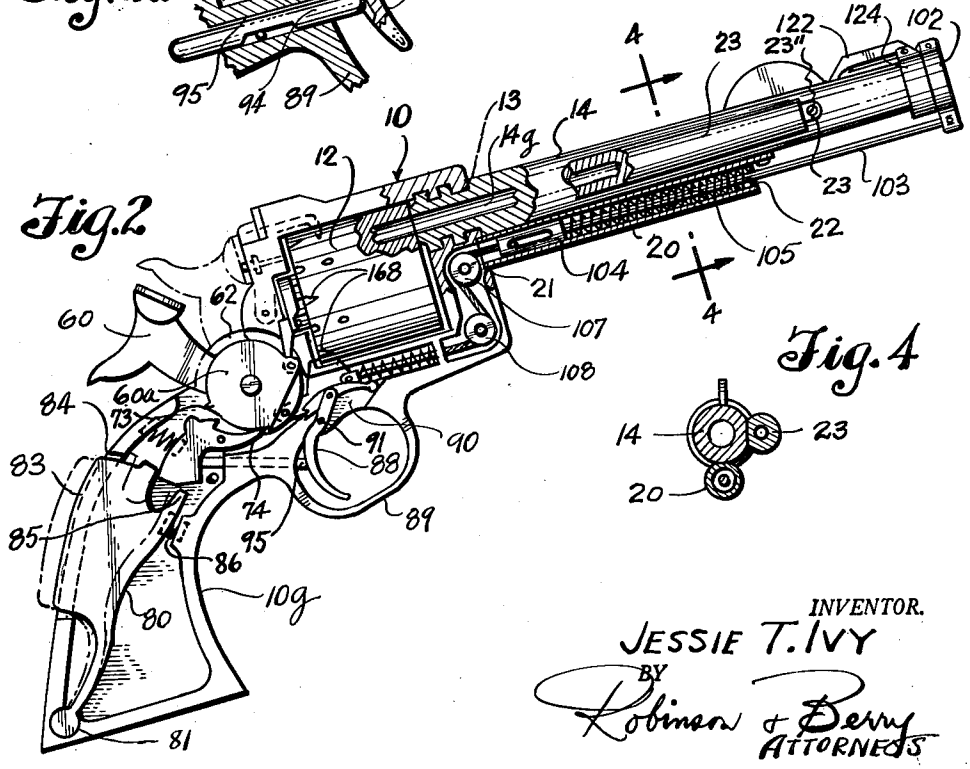



Fig. 4




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Fig. 5

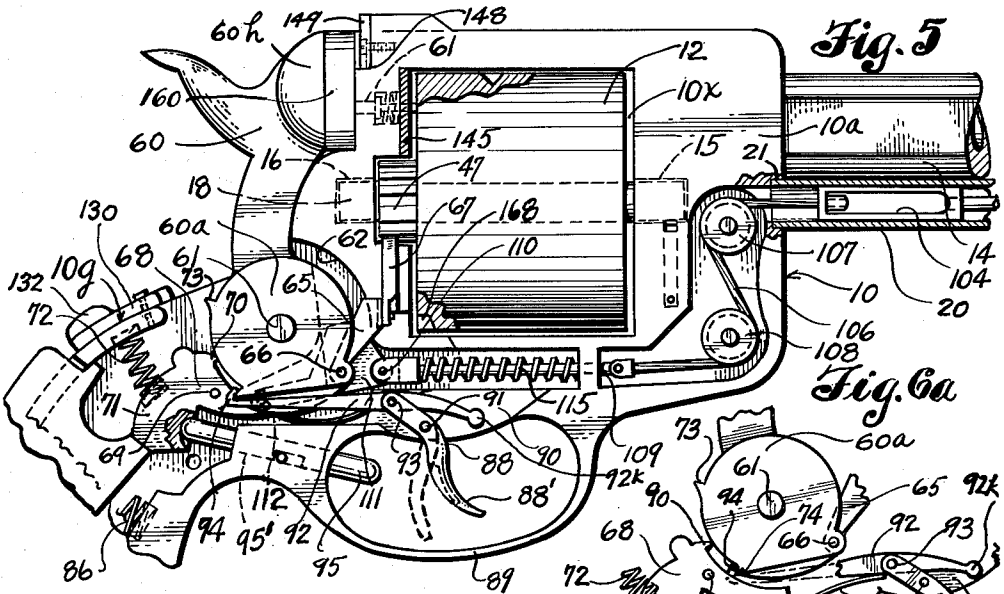
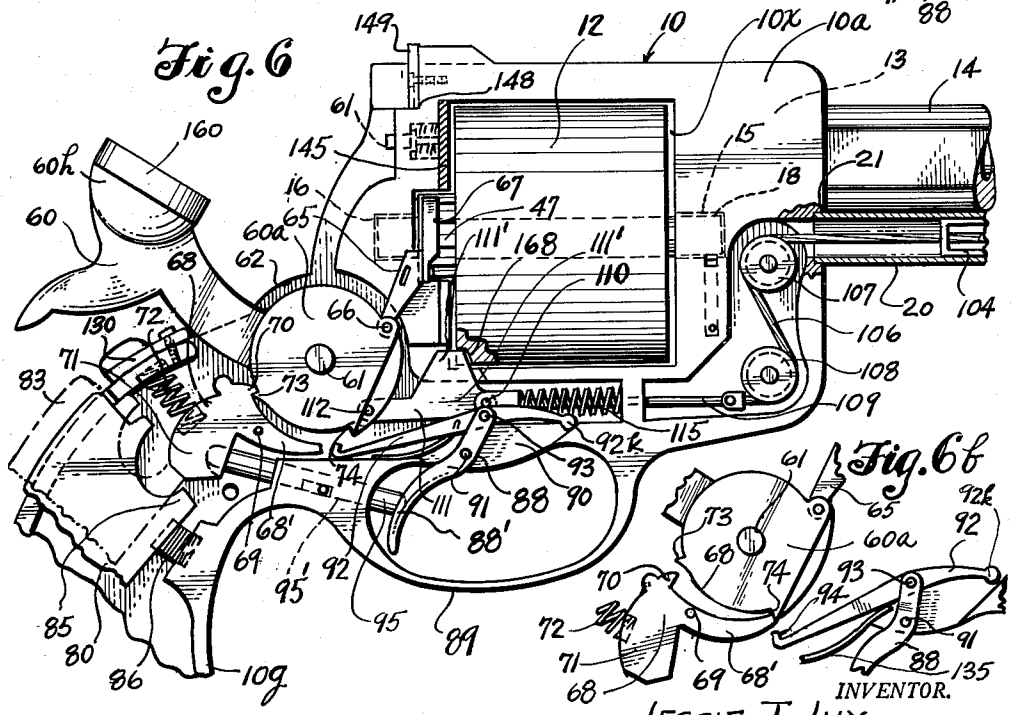



Fig. 6




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Fig. 7

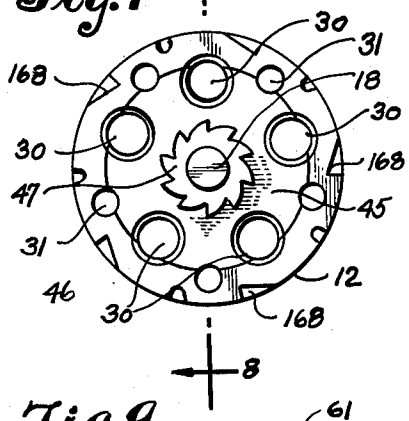



Fig. 8

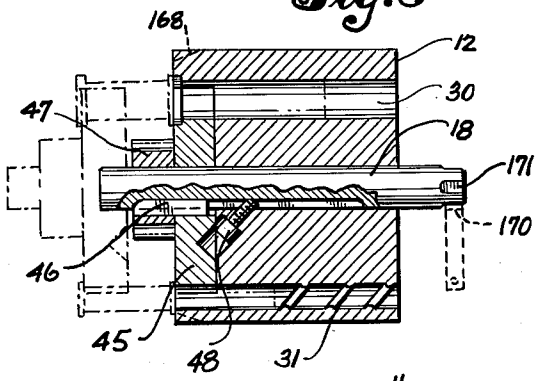



Fig. 9

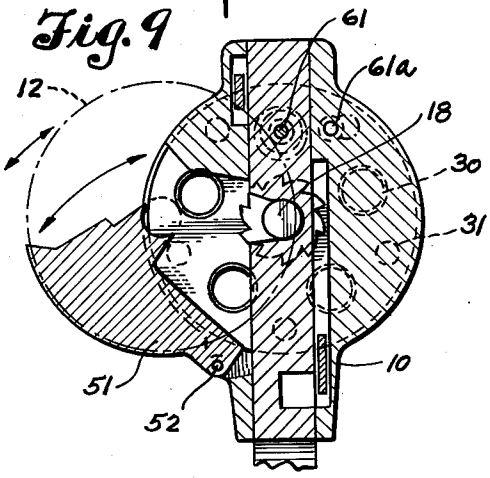



Fig. 10

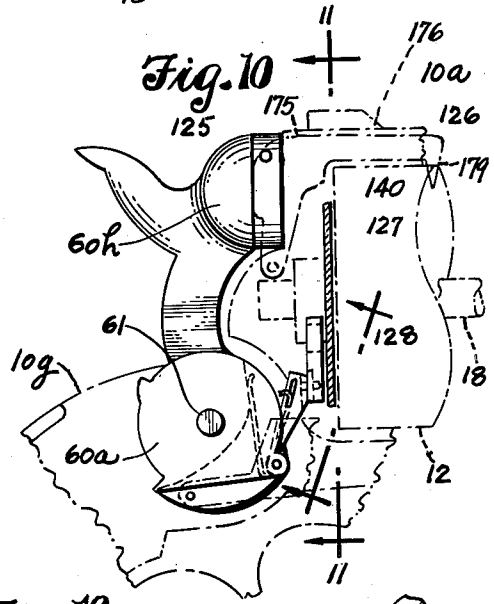



Fig. 11

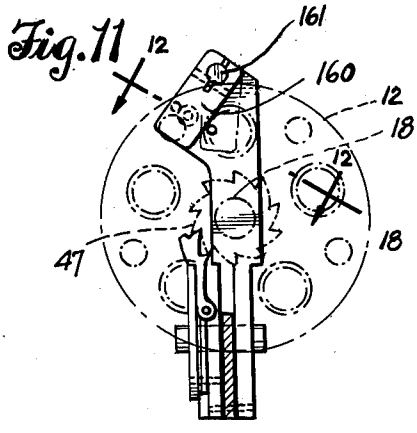



Fig. 12

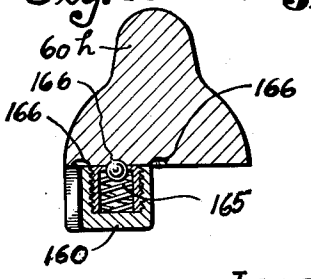
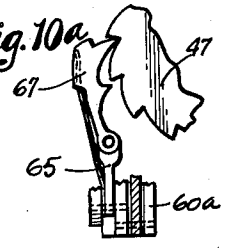



Fig. 10a




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Fig. 13a

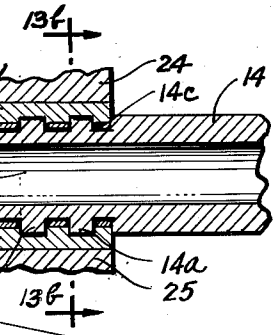



Fig. 13

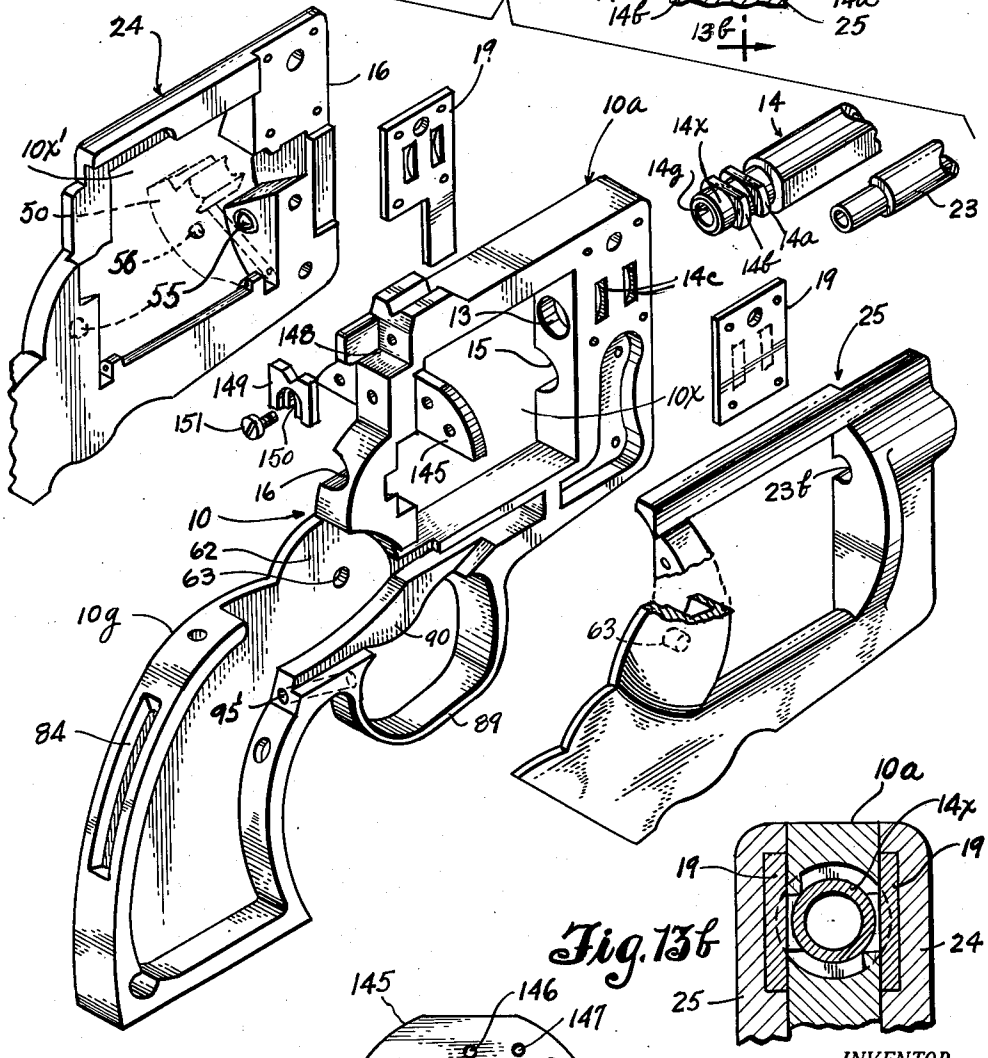






Fig. 13b



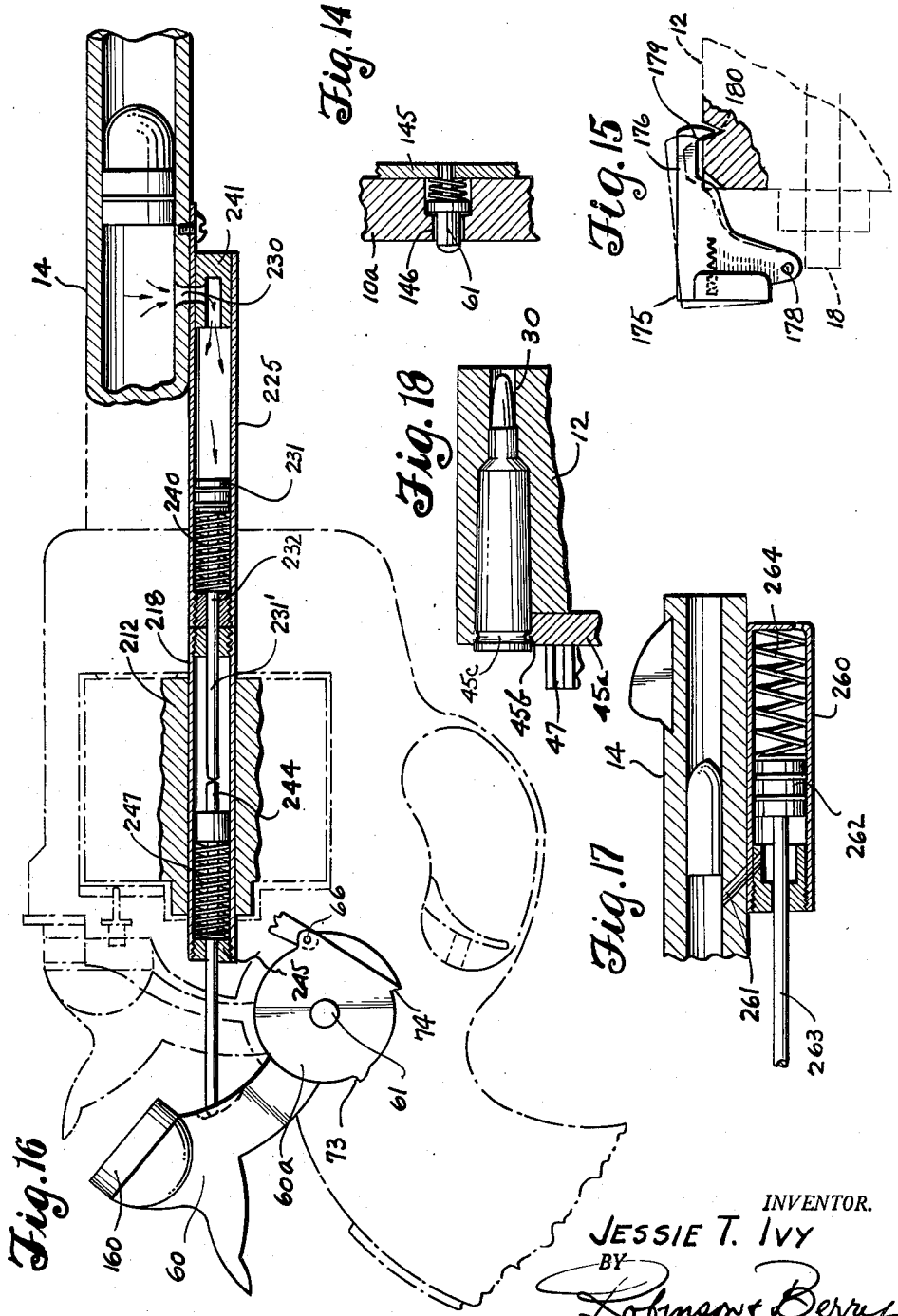

Fig. 13c

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United States Patent Office 3,030,723 Patented Apr. 24, 1962



3,030,723

# FIRING MECHANISM FOR A GAS OPERATED REVOLVER

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Filed Aug. 3, 1959, Ser. No. 831,288
4 Claims. (Cl. 42—65)

This invention relates to firearms and has reference more particularly to improvements in what are commonly known as "revolvers"; it being the principal object of this invention to provide certain improvements in revolvers pertaining to various safety devices; to a novel means whereby the cocking of the hammer may be effected by trigger pull; to the provision of certain novel features of design that better adapt the revolver for use with a holster; to provide a revolver that is characterized by its simplicity of construction; that can be easily and readily taken apart and re-assembled by an amateur and which is "failure proof" and practical in its mode of operation.

Another object of this invention is to provide a revolver having a cylinder that is bored to provide for loading with cartridges of two different calibers in concentrically related rows and wherein adjustable striking means for two firing pins is associated with the hammer that permits, by its adjustment, the selective firing of the cartridges of either caliber or the firing of one of each caliber at the same time.

Yet another object of this invention is to provide a revolver having a cylinder that can be easily and quickly removed from the frame for loading or for replacement, as a loading expediency, and can be quickly and readily returned to its position of use without removal of any bolt, pin or similar element.

Another object is to provide a revolver having a cylinder of the above kind with the bores or chambers of two calibers arranged in circles of different diameters and in staggered relationship thus to accommodate a greater number of cartridges in the cylinder.

Still another object of the present invention is to provide a revolver having a semi-automatic and a full automatic operation, and means for their selective action.

Yet another object of the present invention is to provide a revolver having two easily removable and replacable barrels, for the cartridges of different calibers.

Still further objects and advantages of the invention reside in details of construction of various parts; in their combination and in the mode of operation of the revolver as will hereinafter be fully described.

Yet another object is to provide a revolver which will be actuated in semi-automatic operation or full automatic firing by gas pressure incident to firing a cartridge.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings wherein:

FIG. 1 is a left side view of a revolver embodying the improvements of the present invention therein.

FIG. 1*a* is a detail showing the fire control selection lever as seen on line **1***a*—**1***a* in FIG. 1.

FIG. 2 is a right side view of the revolver, with the right side cover plate removed and showing the parts of the two barrels, the frame and cylinder in sections, to thus better disclose some of the novel features of the revolver.

FIG. 2*a* is a sectional detail showing the trigger return or resetting spring, disclosed as an alternative trigger setting means.

FIG. 3 is a sectional detail of the outer end portion of the larger barrel, showing the gas actuated cylinder indexing and hammer cocking sleeve, and the flame diverter, as applied thereto; the sleeve being shown in its



forward position as actuated by the firing of a cartridge in the revolver.

FIG. 4 is a cross-section of the two barrels and spring housing taken on line **4**—**4** in FIG. 2.

FIG. 5 is an enlarged side view of parts of the frame and larger barrel, showing the cylinder as rotatably mounted in the frame; the adjacent side or cover plate being removed from the frame to better show the hammer cocking and cylinder indexing mechanism, in normal position.

FIG. 6 is a view similar to that of FIG. 5, but showing the hammer after being cocked and latched and the cylinder after being rotatably indexed by the hammer indexing pawl.

FIG. 6*a* and FIG. 6*b*, respectively, are fragmental views explanatory to successive operations of the hammer cocking and cylinder indexing operations.

FIG. 7 is a rear end view of the cartridge holding cylinder showing the indexing ratchet wheel, the cartridge extractor disk and the bores for containing cartridges of two different calibers.

FIG. 8 is a longitudinal section of the cartridge cylinder taken on line **8**—**8** in FIG. 7 showing the cylinder mounting pin and ratchet wheel as keyed thereto.

FIG. 9 is a rear end view of the cylinder containing portion of the revolver, indicating the manner of application of the cylinder to and its removal from the frame.

FIG. 10 is a right side view of the hammer and cylinder indexing pawl which is actuated by the hammer movement; parts of the frame and cylinder adjacent thereto being shown in broken lines.

FIG. 10*a* is a view of the cylinder indexing pawl as seen on line **10***a*—**10***a* in FIG. 10.

FIG. 11 is a cross-section, taken on line **11**—**11** in FIG. 10, showing the adjustably mounted striking block on the inner face of the hammer head.

FIG. 12 is an enlarged sectional detail taken on line **12**—**12** in FIG. 11, showing the spring pressed ball latch for yieldably holding the pin striking block at a set position.

FIG. 13 is an exploded view of the parts embodying the frame structure of the revolver and its side plates.

FIG. 13*a* is a sectional view, on a horizontal plane, showing the mounting end of the larger barrel as applied in the frame **10**.

FIG. 13*b* is a vertical section taken on line **13***b*—**13***b* in FIG. 13*a*.

FIG. 13*c* is a rear face view of the recoil plate.

FIG. 14 is a sectional detail showing the mounting of one of the firing pins.

FIG. 15 is detail showing one of the safety devices associated with the hammer and cylinder.

FIG. 16 is sectional detail of an alternative form of hammer cocking and cylinder indexing means.

FIG. 17 is a sectional detail of an alternative form of gas operated indexing means.

FIG. 18 is a sectional detail showing a modification of the cartridge extractor disk.

In the following descriptive matter, the term "semi-automatic" has reference to the firing action that requires manual trigger pull for firing each successive cartridge, as is ordinarily the case in use of a revolver. The term "fully" automatic has reference to the action where the firing action is instituted by manual trigger pull and continues rapidly as long as trigger pull is maintained until all cartridges have been fired or unless trigger pull is released.

When cartridges of the smaller caliber are to be fired, the action will always be semi-automatic and effected by trigger pull, for reasons later explained.

Referring more in detail to the drawings:

As well shown in FIG. 13, the present revolver com-

prises a frame, designated in its entirety by reference number **10**, comprising a forward or cylinder mounting portion **10***a* defining therein a rectangular opening **10***x* for containing the cylinder, this being designated, especially in FIGS. 1 and 2 by reference numeral **12**. The vertical, forward member of the frame portion **10***a* is formed with a horizontal bore **13**, later described more in detail, in which the rear end portion **14***x* of the revolver barrel **14** is removably fitted and locked. The forward and rearward vertical members of the cylinder containing portion **10***a* of the frame are formed, respectively, with axially aligned laterally opening seats, **15** and **16**, best shown in FIG. 13, for reception and seating for rotation of the opposite end portions of the cylinder mounting shaft or pin **18** that in FIG. 8, is well shown to extend axially through the cylinder **12**.

Cast integrally with the rear end of the cylinder mounting portion **10***a* of the frame **10** is a handle or grip forming portion **10***g*, which is well shown in FIG. 13, to be of open form to adapt it for containing therein various fire control and safety mechanisms, presently to be described.

Parallel with the barrel **14** and extending along its rearward end portion, as best shown in FIG. 2, is a tube **20** of small diameter which serves a purpose presently described. This has its inner end portion fitted and secured in a socket **21** formed in the forward end wall of the frame portion **10***a* directly below the barrel receiving bore **13**, to extend closely along the underside of the barrel, for about half its length, as seen in FIG. 2. At its forward end the tube **20** has a closing wall **22**.

It is also to be explained that a separate barrel **23**, which in the present case is used in firing of the cartridges of smaller diameter, is mounted by the frame and extends closely along the larger barrel **14**; being shown in part in FIG. 2. Its normal relationship to barrel **14** is as shown in FIG. 4.

Referring now to the larger barrel **14**, and the manner in which it is removably mounted in the frame **10**; attention being directed more particularly to FIG. 13: It is therein shown that the forward, vertical end member of the frame is formed with the bore **13** for reception of the rear end portion **14***x* of this barrel as in FIG. 2, and that the rear end portion of the barrel is slightly diametrically reduced, and is formed with two encircling and spaced lands **14***a* and **14***b*. These lands are greater in their outside diameter than the thickness of the mounting frame piece as shown in FIG. 13*b*. The opposite side portions of the two lands are cut away to the transverse thickness of the frame member in which the bore **13** is formed, and this member is also formed with cutouts, as at **14***c* in FIG. 13 to receive the lands after insertion of the mounting end portion of the barrel into the bore **13** and upon axially rotating the barrel through an arc of 90 degrees in either direction. The opposite side faces of the frame, at the cut-outs, are covered by hardened inserts **19—19** of plate form that are grooved to receive the lands, and these plates in turn are covered by the removable opposite side plates **24** and **25** which are normally fixed in the usual way to the frame **10** as in FIGS. 1 and 2. With the lands so formed on the barrel end, the reduced end portion of the barrel end, the reduced end portion of the barrel may be turned to one position for insertion in bore **13** and then, after insertion, given a 90 degree axial rotative adjustment to cause the lands to be releasably interlocked in the cut-outs of frame and plates to retain barrel **14** in firing position. As so secured in the frame. the inner end of the barrel **14** is flush with the end of the cartridge cylinder as shown in FIG. 2. Release of the barrel for removal from the frame will be further explained later.

The rectangular open space **10***x* of the frame **10** is of such dimension as to properly accommodate the cylinder **12** endwise therein. When the cylinder **12** as thus mounted by the pin **18**, its forward end surface is disposed closely adjacent the rear end surface of the barrel **14**, as shown in FIG. 2. The cylinder **12** is here shown to be formed with five bore **30** in the usual circular arrangement for cartridges of the same large caliber, and intermediate these bores **30**, it is formed with a like number of bores **31**, in circular arrangement, of smaller diameter, for cartridges of lesser diameter. For example, the larger bores **30** may be for .44 caliber cartridges and the smaller ones for .22 caliber cartridges. The arrangement of bores **30—31** in the cylinder is preferably as shown in FIG. 7; bores of the same caliber being equally angularly spaced, at equal distances from the cylinder axis but in staggered relationship with the larger caliber bores.

Bores **30** of the cylinder are adapted to be successively registered with the inner end of the bore **14***g* in barrel **14** by rotation of the cylinder. Likewise, by rotative, indexing adjustment of the cylinder, the bores **31** for cartridges of lesser diameter may be registered with the inner end of the bore of the barrel **23**; this barrel also having a diametrically reduced inner end portion fitted in a bore **23***b* in the side plate **25** at one side of the bore **13**. The two barrels have flattened side surfaces fitted flatly together, as in FIG. 4, and at its outer end the barrel **23** has an ear **23'** through which a screw **23''** is applied to removably fix barrel **23** to barrel **14**. When the barrel **23** is attached to barrel **14**, neither can be removed from the frame.

It is shown also in FIGS. 7 and 8 that an extractor plate **45** of disk form is seated in a recess formed therefor coaxially in the rear end of cylinder **12**. This disk is of such diameter and is so peripherally notched as to receive therein rim portions of the cartridges of both calibers, as applied to their respective bores. This disk **45** is fixed to the pin **18** by a key **46** which also keys a small indexing ratchet wheel **47** to the pin and holds it firmly against the extractor disk. The pin **18** is slidably keyed in the cylinder **12** by a screw **48**, as shown in FIG. 8 for endwise movement. The rearward endwise movement or adjustment of the pin **18** and disk **45**, as required for the simultaneous extraction of cartridges from the cylinder will presently be described. Normally, that is, when the revolver is loaded and ready for firing, the frame **10**, cylinder **12** and its supporting pin **18** are in the relationship in which they are shown in FIG. 5 and the end portions of the pin **18**, as extended beyond the opposite ends of the cylinder **12**, are seated in the previously mentioned laterally opening seats **15** and **16** provided therefore in the frame section **10***a*. Here they are removably held for the firing of the revolver by means of a pair of swingingly mounted, retaining arms **50—51** which are shown in FIG. 1 to be pivoted at their lower ends, as at **52**, on the side plate **24**. When swung inwardly, they seat against the pin ends and hold the cylinder in place. When swung outwardly, they free the pin ends, for the lateral removal of the cylinder from the frame.

Assuming that the two arms **50—51** have been swung outwardly and downwardly, as in FIG. 9, the cylinder **12** may then be easily lifted out of the frame for the extraction of shells therefrom and for reloading. Empty or full cartridges will be readily extracted from the cylinder bores upon pushing the pin **18** rearwardly, thus to shift the extracting disk **45** rearwardly from the cylinder and cause it, by reason of this movement, to extract the cartridges or shells from the cylinder. This extracting action of disk **45** is as illustrated in dash lines in FIG. 8 wherein it is shown that the disk **45** has been shifted to the left. Extraction can be most effectively done by striking the pin **18** on its forward end, to drive it rearwardly. After extraction, the disk **45** is pressed back into place for reloading and the proper cartridges then placed in its bores **30** and **31**.

After the loaded cylinder **12** has been replaced properly in position in the frame, with the ends of pin **18** seated in the seats **15** and **16**, the two arms **50** and **51** are then

swung back to their retaining positions, as in FIG. 1. Each arm is there yieldingly held against release by a spring pressed ball latch means, as at 55 in FIG. 13; these being mounted in the outside surfaces of the swinging ends of the arms and adapted to snap into sockets 56, see FIG. 13, in the end wall surfaces of the cylinder receiving opening 10*x'* of the side plate 24.

The cartridges, that are loaded into the cylinder, are adapted to be fired in the revolver, successively, by the striking block of a hammer 60 acting against the usual firing pins 61 and 61*a*, see FIG. 9, which are mounted in proper positions in the rear end member of the cylinder mounting frame, as presently more fully explained. The hammer 60 is as shown in FIGS. 5 and 6. It comprises an inner end mounting portion 60*a* substantially of disk-like form, and at its outer end, has a head 60*h*. Centrally of the part 60*a* a tranverse pivot shaft 61 extends therethrough which mounts the hammer in the frame for its required swinging action. This disk-like part 60*a* is contained in a recess 62 formed in the rear portion of the frame 10, as shown in FIGS. 6 and 13. The end portions of the pivot shaft 61 are rotatably contained in sockets 63 bored in the inside surface of side plate 25 and sidewall of recess 62.

The cooking of the hammer may be effected manually in the usual way by thumbing the head portion 60*h* rearwardly from its down position or it may be effected by trigger pull. The cocking of the hammer in either way automatically effects an indexing of the cylinder 12 through action of a pawl and ratchet mechanism shown in FIGS. 5, 6, and 10*a*, wherein it is seen that a pawl mounting link 65 is pivotally fixed, as at 66, to the lower, forward edge portion of the mounting end 60*a* of the hammer, to extend upwardly and forwardly therefrom and at its upper end has a spring pressed pawl 67 pivoted thereto and extended into ratcheting contact with the ratchet wheel 47 fixed to pin 18, as shown in both FIGS. 5 and 6. This relationship of parts provides that when the hammer is swung rearwardly, the pawl 67 is actuated against the ratchet wheel and thus advances the cylinder 12 one interval. Also, as shown in these views, a sear 68 is provided for latching the hammer 60 when moved to cocked position. This sear is shown to be located in the upper part of the hollow grip portion 10*g* of the frame, at the rearward lower edge of the mounting end part 60*a* of the hammer. It comprises a slightly curved forwardly extending lever-arm portion 68' that is pivoted in the frame between its ends, by a pin 69 and provided at its rear end with an upwardly directed, forwardly facing latch tooth 70 and a downwardly directed wing 71 against which wing a coil spring 72 bears to urge the forward end of this sear level arm into or toward engagement with the lower periphery of the mounting end portion 60*a* of the hammer. The mounting portion 60*a* of said hammer is also formed on its lower peripheral surface with two latch engaging shoulders, 73 and 74 at about 90 degree intervals. When the hammer is down, as in FIG. 5, the relationship of the sear to the part 60*a* is as shown in FIG. 6*a*. Thus, with the cocking operation, the part 60*a* rotates counter clockwise, and the shoulder 74 moves slightly past the end of sear lever arm 68' and the latter snaps inwardly to position its end to holdingly engage this shoulder 74 to hold the hammer, as in FIG. 6*b*, against firing. However, in the present instance, a safety latch operates in conjunction with the hammer and sear and the sear cannot be released for latching except by a preliminary manual actuation of this safety device which has been shown in FIGS. 2 which will now be described. This is seen to be contained in the grip portion of the revolver and to comprise a lever member 80 that is pivoted at its lower end in a seat 81 in the bottom member of the frame portion of the grip. The upper end portion of lever 80 is widened to provide a sort of fin 83 that projects outwardly through a slot 84 formed in the back edge of the frame member. The upper end portion of the lever 80 is normally positioned in such manner that a stop portion 85 thereof, at is upper end, will engage against the lower edge of the wing 71 of the sear to hold the sear arm 68' against releasing action from the hammer shoulder 74. However, when the revolver user tightly grasps the handle preparatory to firing, he automatically presses the fin 83 and lever 80 inwardly against the yielding pressure of a coiled spring 86 contained in the handle and thus displaces the stop portion 85 of the lever 80 from the sear so that the sear can be released from the hammer.

The trigger which controls firing is designated by numeral 88 and it is shown to be of the usual form with a finger pull portion 88' disposed in the usual trigger guard 89 of the frame. The trigger extends upwardly from the guard through a frame slot 90 and is pivoted in the slot at 91. At its upper end the trigger has a pivotal connection at 93 with a horizontally disposed lever 92. Lever 92 extends substantially horizontally and rearwardly in the frame and at its rear end is formed with an upturned hook 94 that is adapted to be engaged with the shoulder 74 of the hammer mounting portion 60*a* when the hammer is down. At its forward end it has a rounded knob 92*k* adapted for sliding movement on the upwardly inclined forward end surface of slot 90. Normally, the hammer 60, if "down," is in the position of FIG. 5, and the hook 94 on lever 92 is engaged with the shoulder 74 of the part 60*a*; when the trigger is pulled rearwardly from position of FIG. 5 for the cocking of the hammer, the lever 92 is pulled forwardly and in this action it actuates the hammer counter clockwise to its cocked position, as in FIG. 6. The safety latch stop 85 has previously been released from the sear by the user tightly grasping the revolver handle and the sear lever is moved by spring 72 into the hammer latching position as in FIG. 6*b*. With the rearward swinging of the hammer toward latching position as in FIG. 6*b* by initial trigger pull, moving it from its normal dash line position as in FIG. 5, the trigger finally engages the exposed forward end of a sear actuating pin 95 that is mounted for endwise sliding action in a bore 95' of the frame with its rear end positioned to engage the lower end of the wing portion of the sear. Thus, when the trigger is pulled to its limit, the sear lever 68' will be rocked to displace its forward end from holding engagement with the stop shoulder 74 of the hammer mounting portion 60*a*, thus to release the hammer for firing.

After loading the cylinder and placing it in the frame, cocking of the hammer can be done either by thumbing the hammer rearwardly or by trigger pull. However, when it is to be done by trigger pull the user first pushes the trigger forwardly from its normal dash line position of FIG. 5 to the full line position in which it is shown. This causes the hook 94 on lever 92 to be engaged with the shoulder 74. Then, with the continuing trigger pull, the hammer is caused to swing rearwardly to its cocked position for latching the sear lever 68 with shoulder 74 as in FIG. 6*b*.

Cocking of the hammer and forward indexing of the cylinder after each firing is adapted to be done automatically by the gas operated means shown best in FIGS. 1, 2, and 3 comprising a sleeve 100 that is slidable contained in a counter bored outer end portion 101 of barrel 14. This sleeve has an inside diameter just slightly greater than that of the barrel bore and at its outer end, has a collar 102 formed with depending ears 102' to which the forward end of a pull rod 103 is attached. Rod 103 extends into the previously mentioned and identified spring housing or tube 20 where it is attached to a slide 104. A coiled spring 105 is contained under compression in this tube between the slide and the closing end wall 22 to actuate the sleeve 100 from its extended position back into the barrel after firing. A cable 106 extends from the slide 104 rearwardly over guide pulleys 107 and 108 mounted in the frame, then rearwardly where it is connected with a pull rod 109 which, at its rear end, is pivotally connected as at 110 to a vertically disposed latch bar 111 which, at its rear end, has pivotal connection at

112 with the lower peripheral edge of the hammer mounting portion 60*a*. When a cartridge is fired, and the bullet enters the sleeve 100, closing its bore temporarily, the gas of the detonation acts to force sleeve 100 forwardly, and this, through rod 103, cable 106, rod 109, and plate 111 cocks and latches the hammer, as previously explained in manual operation. However, if trigger pull is retained and the pin 95 retains its pressure against the sear 68, the sear tooth 70 will snap over the hammer shoulder 73, as in FIG. 6 and it then becomes necessary that the trigger pressure be momentarily released to allow the sear, under pressure of spring 72 to resume its position of FIG. 6*b* and then whenever the user is ready he can release the sear by means of trigger pull to fire the next shot. Upon release of trigger pull, spring 72, acting through sear 68 and pin 95, moves the trigger back to normal position or setting. It will here be mentioned that the hammer is powered for firing each cartridge by a coiled spring 115 that is applied about the pull rod 109 and is held under compression by bearing against the yoke whereby the rear end of this rod is attached to plate 111, as shown in FIGS. 5 and 6.

Now, assuming that the sear 68 has been released and the cartridge fired, the cylinder indexing and hammer cocking operation is effected through pull on the cable 106 in accordance with the actuation of sleeve 100 as previously explained. This causes the hammer to again be latched as in FIG. 6, and requires a momentary release of trigger pressure and another application of trigger pull to effect the firing; it being understood that for this action, the grip of the user's hand on the revolver handle must be such as to retain the latch lever 80 depressed so that sear 68 will be free for pivotal action. When released, the sear will be automatically locked in hammer latching position as in FIG. 6*b* by the force of spring 72.

In connection with the sleeve 100 employed in the outer end of the barrel 14, as shown in FIG. 3, I employ a flame diverter plate 120, that is normally located out of the counter bore in the end of the barrel as shown in dotted lines. This plate is mounted by an arm 122 that extends through and forwardly along a slot 123 that is formed lengthwise in the barrel wall and is pivoted at 122′ to a collar 124 on the outside of the barrel. Fixed to the forward end of the sleeve 100 and extending rearwardly is a bar 125 formed with a camming head 126. Normally, when the sleeve 100 is retracted, the head 126 engages the underside of the lever 122, and holds the plate 120 out of the counterbore, but when the sleeve is forced forwardly, as in FIG. 3, it rocks the lever and swings the deflector plate 120 into the counterbore, and thus causes the plate to deflect flame upwardly from the top of the barrel. This pressure helps hold the end of the barrel down, reducing the jumping of the barrel. The deflector 120 also scatters the flame and it has less visability in darkness.

It has been shown in FIGS. 5 and 6, that the rearward extent of hammer travel can be selectively limited at predetermined points to provide for semi-automatic operation or full automatic operation, respectively, by the adjustment of a stop latch plate 130 that is pivotally mounted on the top of the frame, immediately back of the hammer position. This latch, as shown in top view in FIG. 1*a*, is pivoted on the frame by a screw 131 and has a thumb flange 132 at its rear end for manually adjusting the stop between its two positions. In one position a shoulder 133 at its forward end acts as a stop for limiting rearward swing of the hammer at a position short of that at which the sear tooth 70 can engage the hammer shoulder 73, for example, as in FIG. 6*b*. In its other position, the stop permits a farther rearward swing of the hammer, and the latching of the sear tooth 70 over the hammer tooth shoulder 73 takes place as shown in FIG. 6 when trigger is held rearwardly.

In connection with the trigger 88 and hammer operation, as previously described, attention is again directed to FIGS. 6*a* and 6*b*, wherein it is shown that the lever 92 is equipped at its hooked end, on its underside, with a leaf spring 135 that presses against the base of the slot 90 in which the lever operates in such manner as to urge the hooked end 94 of the lever upwardly. Also, it is shown therein that the forward end of the lever 92 is equipped with the knob 92*k* that rides on the upwardly sloping forward end surface of the slot 90. Thus, with the rearward shifting of the lever 92 incident to trigger return the hooked end is urged upwardly and positioned for positive engagement with the hammer shoulder 74 and, likewise, with the forward travel of the lever 92, the movement of its forward end knob 92*k* on the upwardly sloping end surface of the slot causes the downward movement of the hooked end to a position at which it will be released from 74 as shown in FIG. 6*b* for firing, and not interfere with hammer striking action for firing a cartridge as effected by gas pressure.

While the forward pushing of the trigger 88′ from dash line position to the full line position of FIG. 5 is normally accomplished by the trigger finger when the user grasps the revolver in getting ready to fire the first shot, this trigger positioning may be automatically done by the alternative spring means shown in FIG. 2*a* which shows a coiled spring 140 set in a socket 141 of the frame to press forwardly against a sleeve 142 slidably contained in the socket and which, in turn, presses forwardly against the trigger. This is an alternative mechanism whereby the trigger is automatically positioned for double-action firing, which could be used with small caliber.

In FIGS. 5, 6, and 13, it is shown that a recoil plate 145 is fixed transversely of that rear end member of the frame 10*a* that defines the rear end of the cylinder containing opening 10*x*. This plate is shown to be set in a recess formed just above the position of the indexing ratchet 47. It has holes bored through its opposite end portions to receive screws for attachment of the opposite side plates 24 and 25, and also is bored as at 146 and 147 in FIG. 13*c*, for the mounting of the two firing pins presently to be described.

Immediately, above the recoil plate 145 the frame is recessed, as at 148 in FIG. 13 for the mounting of a sight in the form of a notched plate 149 formed with a vertical slot 150 through which its attaching screw 151 is passed. The position of this sight is shown in FIGS. 5 and 6 also.

The two firing pins 61 and 61*a*, as used respectively, for the firing of cartridges in the bores 30 and 31 of different diameter, are of the usual form; each being mounted in the proper frame bore 146 or 147 in alignment with the corresponding barrel and bore registration point. Their positions are shown best in FIGS. 9 and 11. Each has a projecting head end portion adapted to be struck by the hammer head block 160 and an extended pin portion. The hammer head 60*h* is equipped on the inner face of its head portion with an adjustable block 160 which is shown in FIG. 11 to be pivoted on the hammer head at 161 for adjustment of its lower end portion into any one of three striking portions. The first position is as shown in FIG. 11 where it will, upon release of the cocked hammer, strike the firing pin 61*a* to fire one of the cartridges of smaller caliber. At its other limit of adjustment, it will strike the firing pin 61 for the cartridges of larger caliber. At an intermediate position it will engage both firing pins 61—61*a*. The positioning of the head block is manually effected by pressure directly applied thereto, and it will be yieldingly held at any set position of adjustment by a spring pressed ball latch, as shown in FIG. 12, at 165. The ball latch is here shown to be mounted in the striking block and the ball portion is adapted to seat in any one of a series of three notches 166 formed in the inner face of the hammer head 60*h* on which the block is pivoted.

In order to insure proper and exact indexing of the cylinder 12, it is shown, in FIG. 6, that the latch plate 111 attached to the hammer is formed on its top edge

with an upwardly extending flange or fin **111'** and the rear peripheral edge of the cylinder **12** is formed in accordance with the degree of angular spacing of cartridges with indexing notches **168**. With each forward action of plate **111** for hammer cocking, the flange **111'** enters one of the notches **168** thus to accurately register cylinder bores **30—31**, containing the cartridge to be next fired, with the barrels, **14** and **23** and firing pins, **61—61*a***.

To supplement this above described cylinder registration means, I also employ a leaf spring **170** that is mounted in the frame **10** to press yieldingly against the forward end portion of the cylinder mounting pin **18** as contained in seat **15**. This spring is flattened and presses yieldingly against flattened faces accurately formed on and about the pin **18** to assist in turning the cylinder to the exact registration or indexing point. Its location in the frame is shown best in FIGS. 5, 6, and 8.

As a safety means to prevent firing in the event that the cylinder is not in proper registration, I employ a latch of bell-crank or angular lever form, designated at **175** in FIGS. 10 and 15. This lever, has a horizontal arm **176** that overlies the rear top surface of the cylinder **12** and a vertical arm **167** at the rear end of the cylinder. Arm **167** is pivoted in the frame **10** at its lower end as at **178**. The arm **176** is formed at its forward end with a downwardly projecting, pointed boss **179** adapted to enter sockets **180** formed at points in the cylinder when the cylinder is in exact registration with the barrels. If the cylinder is not exactly indexed, then the angular lever **175** which is located in the line of striking travel of the hammer head **60*h*** will act as a stop to prevent the hammer head block from striking the firing pins, as shown by broken line of **175** in FIG. 15.

Assuming that the various parts of the revolver have been constructed and assembled as described, the normal mode of use and operation is as follows:

First, the cylinder **12** is removed and loaded with cartridges of one or both calibers and then properly replaced in the frame and the securing arms **50** and **51** snapped into cylinder retaining position. The desired setting of the firing pin striking block **160** and the adjustment of stop latch **130** having been made, the user prepares to fire by first pushing the trigger **88** to the forward position, of FIG. 5, and by doing this causes the hook **94** at the rear end of lever **92** to be engaged, as in FIG. 5, with the shoulder **74** of the mounting end portion **60*a*** of the hammer. When ready to fire he tightly grasps the handle portion to release the sear safety latch lever **80** and pulls the trigger rearwardly and this swings the hammer **60** back toward cocked position. During the initial travel of the hammer toward cocked position, the end of the sear lever **68'** is being pressed by spring **72** against the lower periphery of the disk-like mounting portion **60*a*** of the hammer and with the passing of the hammer shoulder **74** counter clockwise past the end of this lever, the lever snaps into latching position, as seen in FIG. 6*b*. Then, just prior to the hammer reaching its fully cocked position, the hook **94** is caused to be swung free of the hammer shoulder **74** and substantially coincident with this or immediately thereafter, the trigger engages pin **95** and by the final pull on the trigger, this pin rocks the sear from its position of FIG. 6*b* and the hammer is driven downwardly by the expanding force of spring **115** acting through latch plate **111** to strike the firing pin.

With the firing of a cartridge of large caliber, assuming that the stop latch **130** has been properly set for such operation, the gas operated means shown in FIGS. 2 and 3, swings the hammer back to cocked position and it becomes latched as in FIG. 6, provided however, that trigger pull is being continued as in that view. If trigger pull has been released, the hammer will be latched against firing by the sear lever **68'** seen as in FIG. 6*b*. The next cartridge is then fired by manual pull in the trigger that causes the pin **95** to be engaged and pushed rearwardly for release of the sear from the hammer.

In the event that continuous firing is desired, the stop latch **130** is so adjusted that it will prevent the hammer swinging rearwardly a distance sufficient to cause the sear latch tooth **70** to be hooked over the hammer shoulder **73**. When this latching cannot take place, the sear latch lever **68'** takes effect and firing is placed under trigger control.

Various parts of the revolver are subject to modification without departure from the spirit of the invention disclosed. For example in FIG. 16 I have illustrated an alternative mounting for the cylinder as well as an alternative mode of use of gas pressure for cylinder indexing and hammer cocking. In this view the cylinder **212** is rotatably mounted by a tubular shaft **218** which serves as the shaft **18** of FIGS. 5 and 6, when the cylinder is in proper position in the frame, this tubular shaft axially aligns with a tube of like character, designated at **225** which is fixably mounted in the revolver frame along the under side of the barrel and which near its forward end has a port **230** opening therefrom into the revolver barrel. Fitted in this tube **225** is a piston **231** which has a rod **231'** extended rearwardly therefrom through a bushing **232** and continues into abutment with rod **244** of tube **218**. A coiled spring **240** is retained under compression in the tube **225** to urge the piston to its forward limit of travel against a plug **241** that closes the forward end of the tube.

Reciprocally mounted in the rearward end portion of tube **218** is a small diameter rod **244** which is mounted for endwise movement in bushings **245**, that closes the rear end of tube **218** and rod **218** engages at its forward end with the rear end of rod **231'** and at its rear end extends slightly beyond the bushing **245** into contact with the hammer **60**. A coiled spring **247** contained in tube **218** acts against a shoulder **248** fixed on rod **244**, to urge it forwardly. When a cartridge is fired, gas pressure back of the bullet, passes through port **230** and drives the piston **231** portion rearwardly. This acts through rods **231'** and **244** to swing the hammer **60** to its latched and cocked position. Its control and operation, otherwise may be as in the revolver previously described. Tube and rod lengths are so established that when no gas pressure is being exerted against the piston **231**, the cylinder **212** can be readily lifted out of the frame, as has previously been explained.

It is further to be explained that the staggering arrangement of bores in the cylinder **212**, for cartridges of different diameters will also apply. Furthermore, where two barrels are necessary, they could be made in one piece, as a double barreled unit, and the gas pressure-actuated sleeves, as of FIG. 3, applied to the ends of both barrels to coact on the hammer cocking and cylinder indexing operation through a single push rod or pull rod.

In FIG. 17 I have shown an alternative arrangement for application of gas pressure for hammer cocking that may require a forward pull on the operating mechanism. In this, a gas cylinder **260** is fixed to the barrel **14** and connected to the barrel by a passage **261** that enters the rear of the cylinder **260**. The cylinder contains a piston **262** with rod **263**. The piston is actuated forwardly upon firing the revolver and its rearward movement is effected by a coiled spring **264**. This alternative is described further in my co-pending application.

In FIG. 18 I have illustrated in sectional detail a modification in the extractor disk to better adapt it to cartridges designated as of "automatic type."

In this, the extractor disk **45*a*** is formed with a peripheral ridge **45*b*** that is designed to fit in the groove **45*c*** in the rim of the cartridges as illustrated.

In the event that the cylinder **12** is designed to accommodate cartridges of substantial lengths in its larger bores, the small bores **31** could be formed with riflings as shown

at 31 or in FIG. 8, thus making it unnecessary to employ the small barrel 23 for the cartridges fired in them.

It has been the intent, in the designing of this revolver and its component parts, to so form them that it is possible to cast them in the greater portion, of plastic and to reinforce them where necessary with metal inserts or overlays. In this way the weight may be reduced, and the manufacturing cost lessened without impairing the utility and value of the revolver.

What I claim as new is:

1. A revolver comprising a frame, a barrel fixed in the frame, a multi-chambered cylinder rotatably supported in the frame, a firing hammer pivoted in the frame, a trigger, a lever pivotally connected to the trigger and operated by the trigger to swing the hammer from down position through and slightly beyond its cocked position, said hammer having a mounting end with a latching shoulder thereon and said lever including an end hook that is engageable with the latching shoulder of the hammer for that cocking movement of the hammer that is incident to the trigger pull, means for causing release of the end hook of the lever from the latching shoulder upon completion of the cocking movement of the hammer and a spring loaded sear pivoted in the frame, including a lever arm adapted to move into position for engaging the latching shoulder of the hammer upon release of the hook therefrom to hold the hammer in cocked position and a sear releasing pin mounted in the frame and operatively engageable by the trigger when the latter is pulled to the limit in its travel.

2. The combination recited in claim 1 wherein said hammer is formed with a second latching shoulder and the sear is formed with a hammer latching tooth positioned to coact with said second latching shoulder for retaining the hammer in a cocked position, and a hammer stop is mounted on the frame for manual adjustment to and from a position that allows the hammer to move to a position for the latching therewith of the lever arm of said sear or to a position for the latching with said second latching shoulder of the hammer latching tooth of the sear.



3. The combination recited in claim 1 including a trigger mechanism operable for the initial cocking and latching of the firing hammer and for releasing of the sear to initiate firing and effect automatic firing.

4. The combination recited in claim 3 including a means whereby continued trigger pull, to effect continuous firing, retains the sear in a non-latching position.

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