United States Patent [19]

Hartmann

[11] **3,785,242**

[45] **Jan. 15, 1974**

[54] **BELT FEEDER FOR AUTOMATIC FIREARMS**

[75] Inventor: **Rolf Hartmann,** Dusseldorf, Germany

[73] Assignee: **Rheinmetall GmbH,** Dusseldorf, Germany

[22] Filed: **Mar. 17, 1972**

[21] Appl. No.: **235,542**

[30] **Foreign Application Priority Data**

Mar. 19, 1971 Germany.....P 21 13 319.7

[52] **U.S. Cl.**..... **89/33 CA**

[51] **Int. Cl.**..... **F41d 9/02**

[58] **Field of Search**..... 89/33 BB, 33 BL, 89/33 C, 33 CA, 35 A

[56] **References Cited**

UNITED STATES PATENTS

2,648,258 8/1953 Simpson..... 89/33 CA

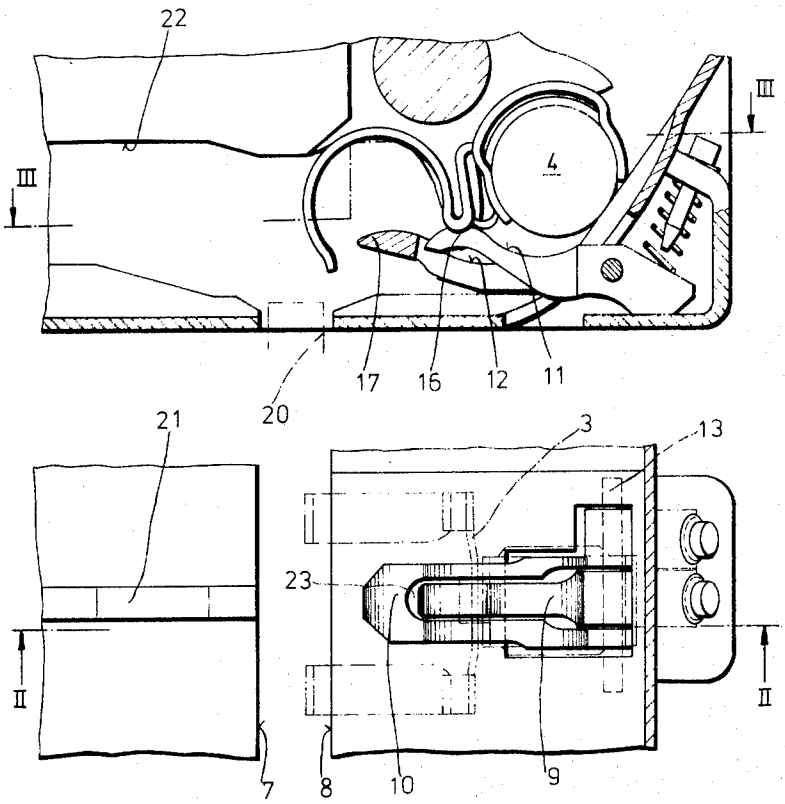
Primary Examiner—Stephen C. Bentley

Attorney—Paul M. Craig, Jr. et al.

[57] **ABSTRACT**

A belt feeder arrangement for automatic firearms with special spring and cam arrangements to prevent the jamming of the belt member in the ejector slot during changes in ammunition belts. Two spring biased pivotal lever members are mounted adjacent one another to engage the belt member and hold it up out of the ejector slot as it passes thereby. One lever is longer than the other so the levers engage the belt member in series. Alternative embodiments include leaf spring members in place of the pivotal lever members. Also, spacer members can be arranged at the mounting of the levers for adjusting to different size ammunition and belt members.

23 Claims, 8 Drawing Figures



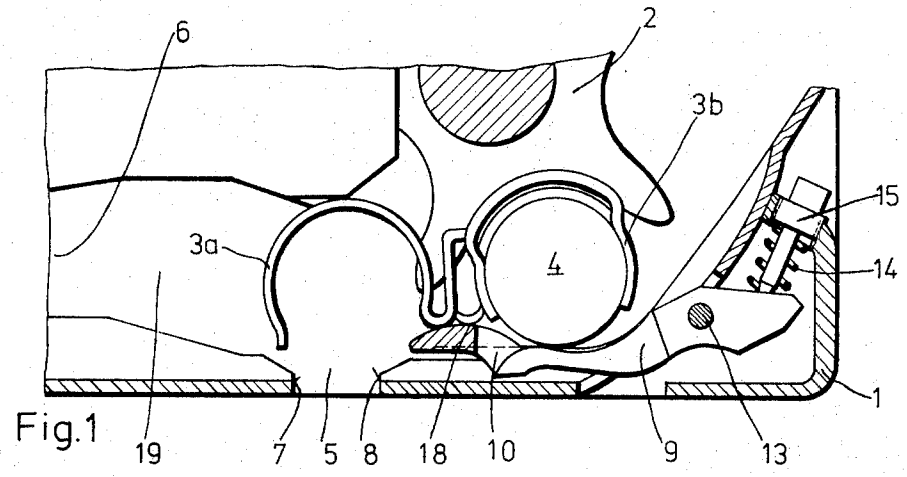


Fig.1

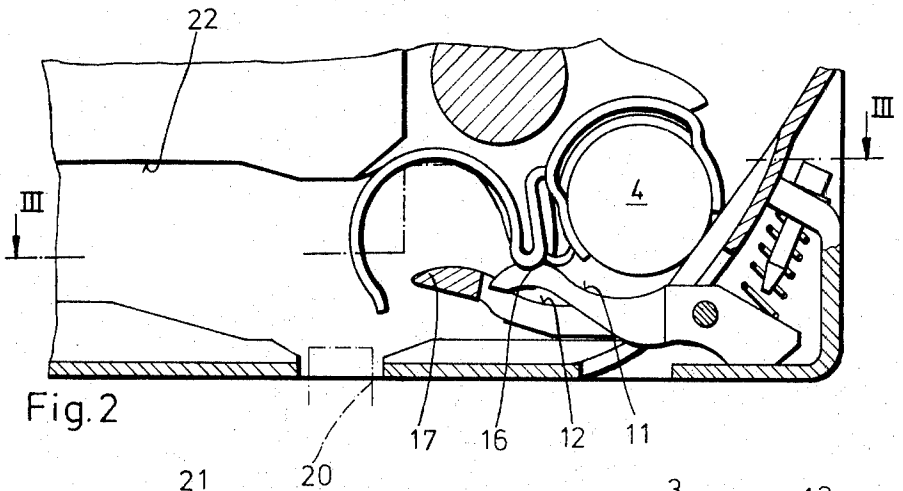


Fig.2

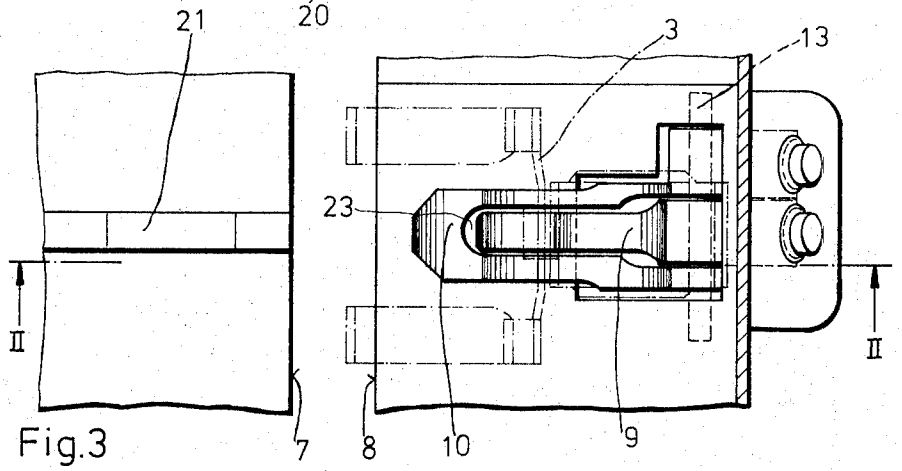


Fig.3

Fig. 4

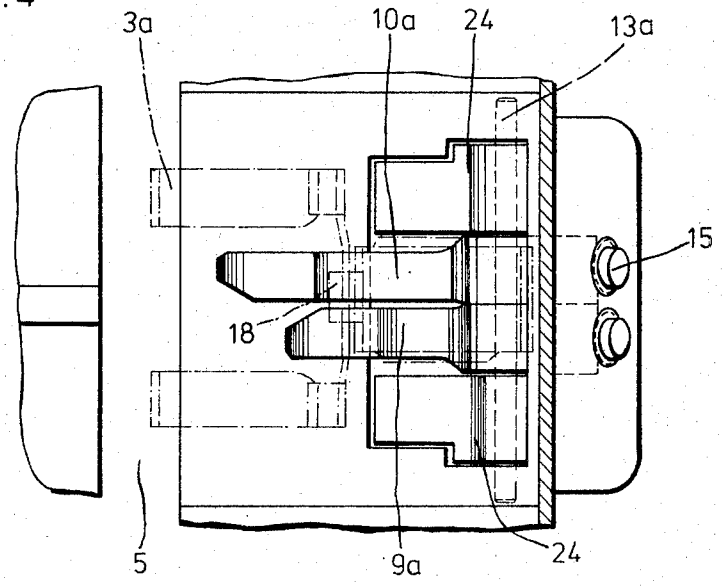


Fig. 5

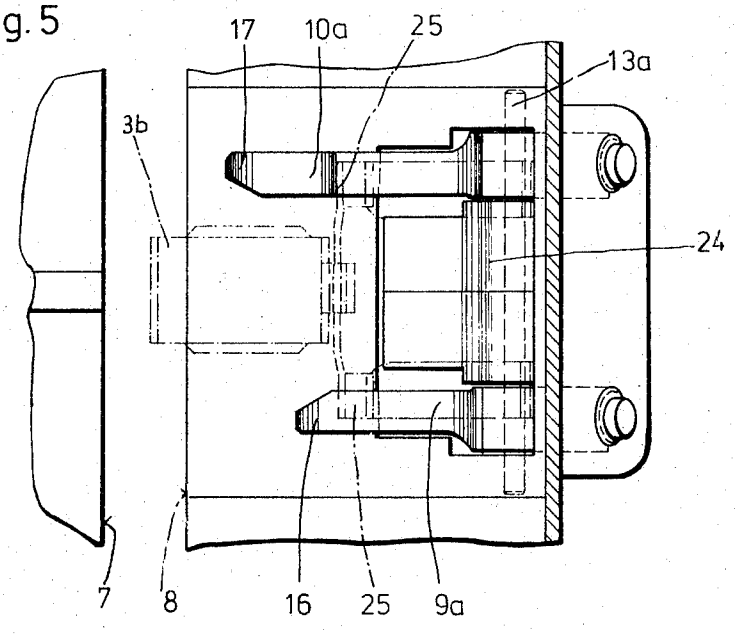


Fig.6

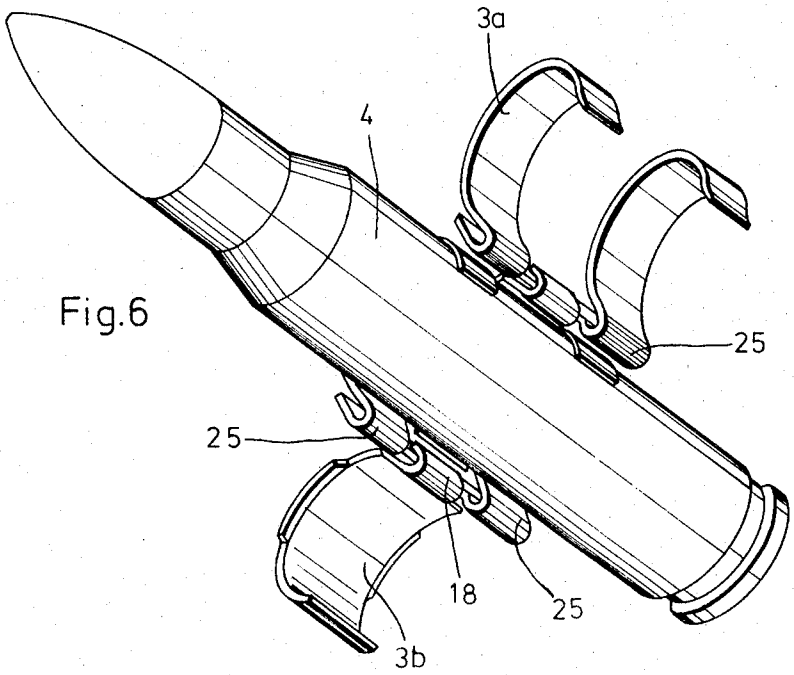


Fig.7

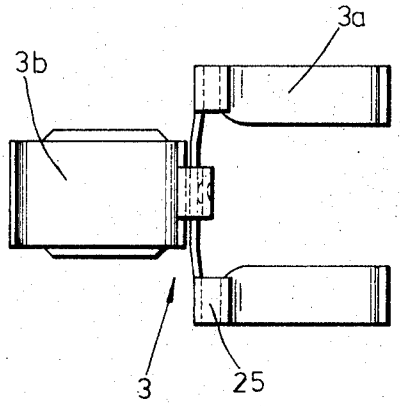
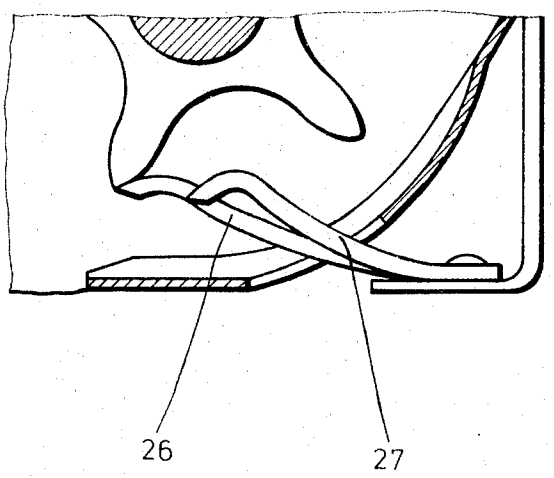


Fig. 8



BELT FEEDER FOR AUTOMATIC FIREARMS

BACKGROUND AND SUMMARY OF THE INVENTION

This invention generally relates to a belt feeder for automatic firearms with a star type feed wheel or rotor feeder for a disintegrating belt; where the belt members comprise a double clamp, housing respectively one cartridge, and a single clamp joined to the double clamp and loosely encompassing the subsequent cartridge, and where the cartridges are introduced into the chamber of the firearm by a breech section engaging into an ejector slot to remove the cartridges from the belt.

One of the essential requirements to be met by such belt feeders resides in that a troublefree and rapid change of ammunition is made possible, by withdrawing the belt present in the belt feeder — after disengaging the star feed wheel — and replacing same by another belt with a different type of ammunition.

In such an ammunition changing procedure, disturbances can occur during the withdrawal and/or introduction of a belt with a forwardly positioned empty clamp of a belt member, i.e., a clamp which does not contain a cartridge, due to the fact that the ends of the clamp may catch at the edges of the ejector slot.

This invention contemplates the provisions of means to avoid this disadvantage by improving a belt feeder of the aforedescribed type in such a manner that, during the introduction and/or removal of a belt, a catching of an empty belt member clamp is prevented.

The solution of this problem in accordance with the present invention contemplates the provision of resiliently mounted levers positioned in the belt feed path in front of the ejector slot for the cartridges, which levers engage into the zone of the belt members; during the introduction or removal of a belt. It is further contemplated by this invention that these levers are actuatable by the cartridge disposed foremost in the belt via cams disposed on the backs or ridges of the levers in such a manner that lugs arranged at the ends of the levers support an empty front belt member and lift same over the ejector slot.

It is further contemplated by the present invention to use only one such lever in conjunction with relatively narrow ejector slots. However, in a further embodiment of this invention two levers may advantageously be provided which are mounted independently of each other on a common axle outside of the feed path of the belt. With the two lever system, the arrangement is even more troublefree, especially for relatively wide ejector slots.

In a preferred embodiment of the two lever system, the levers suitably exhibit differing lengths as well as different cams. In this manner, thelevers become effective one after the other, so that an empty belt clamp may be lifted across even comparatively wide ejector slots. In this connection, the shorter lever is advantageously disposed in a recess of the longer lever. The levers can thereby be arranged in a particularly compact manner. In accordance with a further embodiment of the invention, the levers can also each consist of a leaf spring. These leaf springs are then bent in such a way that they form a corresponding cam.

A further advantageous embodiment of this invention contemplates an arrangement where the common axle of the levers is dimensioned to be longer than the width of the belt members, and that the mutual spacing

of the levers is made variable by mounting spacers on the axle. In this manner, it is possible — depending on the arrangement of the levers and spaces — to employ selectively cartridge belts with a right-handed or left-handed belting. That is, belts wherein, in the first case, the double clamp of a belt member is disposed in the front, and in the other case the single clamp is arranged at that point.

The invention will be explained below with reference to several embodiments illustrated in the drawing, to wit:

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1** and **2** are fragmentary cross-sectional views of a belt feeder, namely:

FIG. **1** showing the introduction of a belt, and

FIG. **2** showing the removal of the belt; (view II—II of FIG. **3**)

FIG. **3** is a partial view along line III—III of FIG. **2**;

FIGS. **4** and **5** show two adjustment positions in a similar view as shown in FIG. **3** for a different embodiment;

FIG. **6** is a perspective view showing two members of a belt with a cartridge;

FIG. **7** shows a belt member; and

FIG. **8** is a partial view showing another embodiment of the invention which utilizes leaf springs in place of pivotal levers.

DETAILED DESCRIPTION OF THE DRAWINGS

Numeral **1** denotes the housing of the belt feeder. A star feed wheel **2** is mounted in the housing **1** and is rotatably driven stepwise for feeding the cartridges **4** carried by the belt members **3.** Since specific arrangements for driving a star feed wheel are generally known, a detailed description of such structure is dispensed with to aid in clarifying the disclosure of the present invention. The belt members, together with the cartridges, form a disintegrating belt and exhibit respectively one double clamp **3***a* encompassing in each case one cartridge, and a single clamp **3***b* joined therewith and loosely extending around the subsequent cartridge. The belt members are hingedly connected with one another by the cartridges inserted in the clamps. After the withdrawal of respectively one cartridge, effected by a breech section **20** engaging into the ejector slot **5,** the empty belt members are ejected through an ejector aperture **6.**

FIG. **1** shows a belt to be introduced into the belt feeder with a forwardly disposed empty double clamp **3**a. Since the single clamp of the belt member is disposed loosely on the cartridge, the double clamp, during the further insertion of the belt, could fall with its clamp ends, into the ejector slot **5** and about the edge **7** of the slot. Then, during the withdrawal of the belt, the double clamp **3***a* would catch at the edge **8.** This catching of the clamp member **3***a* is prevented by two levers **9** and **10** of different lengths, exhibiting cams **11** and **12** on their backs. The levers are pivotably mounted on a common axle **13** against the force of a spring **14** outside of the belt feed path with the shorter lever being disposed in a recess **23** of the longer lever (FIG. **3**). The spring force can be adjusted by means of a screw **15.** Upon the introduction of the belt by rotating the star feed wheel **2,** the cartridge which is foremost in the belt slides along the cams **11** and **12** on the backs of levers **9** and **10,** which are pressed down-

wardly during this procedure. Lugs or projections **16** and **17** arranged at the front ends of the levers successively exert a supporting effect on the empty front double clamp *3a*, in that the central loop **18** of the belt member (FIGS. **6** and **7**) is first supported by the lug **16** of the shorter lever and lifted over the edge **8** of the ejector slot **5.** Upon the further rotation of the star feed wheel, the loop **18** slides over the lug **17** of the longer lever, whereby the empty double clamp is lifted over the edge **7** of the ejector slot and pushed into the ejector duct **19.** Then, the cartridge **4** passes directly across the ejector slot and can be inserted in a conventional manner in the firearm by means of a breech section **20** moving at right angles to the plane of the drawing through the ejector slot.

During the introduction of the belt member into the ejector duct **19,** the loop **18** glides along a guide strip **21** extending from the ejector slot **5** to the ejector opening **6.** The belt member cannot tilt backwardly into the ejector slot, since the back of the front clamp is guided along the upper wall **22** of the ejector duct **19.** When the belt is pulled out, the last belt member remains in the ejector duct **19** and is ejected, during the introduction of a new belt, through the ejector opening **6** by the foremost belt member of the new belt.

FIGS. **4** and **5** show a modified embodiment of the invention wherein the levers, with the use of spacers **24** which can be attached to the common axle **13***a*, can either be disposed side-by-side, with the spacers **24** being arranged on the outside (FI. **4**), or at a mutual spacing, with the spacers being arranged therebetween (FIG. **5**). the levers **9***a* and **10***a* are fashioned on their backs in the same manner as the levers **9** and **10,** i.e., they exhibit the same cams **11** and **12** passing over into the lugs **16** and **17** at the front ends of the levers.

The levers in the arrangement of FIG. **4** operate in the same manner as described above; in other words, this construction is also intended for the feeding of a belt with a preceding empty double clamp *3a*.

The lever arrangement according to FIG. **5** is used for the introduction of a belt with a preceding empty single clamp *3b*. Here, the levers are actuated in the same manner by the cartridge positioned foremost in the belt, wherein the lugs **16** and **17** support the two loops **25** of the double clamp and lift the single clamp over the edges **8** and **7** of the ejector slot.

In place of the levers **9** and **10,** as well as *9a* and *10a*, respectively, it is also possible to provide correspondingly shaped leaf springs **26** and **27.** The springs **14** with their setscrews **15** can then be omitted.

While I have shown and described only several embodiments in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to those skilled in the art, and I therefore do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

I claim:

1. A belt feeder arrangement for automatic firearms of the type which use an ammunition cartridge belt formed by a plurality of belt members interconnected to one another which carry the cartridges into communication with a breech section engaging in an ejector slot for separating the cartridges from the belt and introducing the cartridge into the chamber of the firearm, and wherein the belt members are of the type comprising a first clamp portion accommodating one cartridge and a second clamp portion joined to the first clamp portion and loosely encompassing the subsequent cartridge; said arrangement comprising: feed means for feeding the belt along a belt feed path through the firearm structure, said belt feed path running adjacent an ejector slot at which position the cartridges are removed from the belt and then out a belt ejector duct where the empty belt members are removed from the firearm, and belt member supporting means arranged in the belt feed path ahead of the ejector slot for supporting an empty belt member such that the empty first clamp portion of said empty belt member will not engage edges of said ejector slot when the clamp portion is passing adjacent said edges toward the ejector duct, said belt member supporting means being spaced from said feed means and including means movable with respect to said feed means.

2. A belt feeder arrangement for automatic firearms of the type which use an ammunition cartridge belt formed by a plurality of belt members interconnected to one another which carry the cartridges into communication with a breech section engaging in an ejector slot for separating the cartridges from the belt and introducing the cartridge into the chamber of the firearm, and wherein the belt members are of the type comprising a first clamp portion accommodating one cartridge and a second clamp portion joined to the first clamp portion and loosely encompassing the subsequent cartridge; said arrangement comprising: feed means for feeding the belt along a belt feed path through the firearm structure, said belt feed path running adjacent an ejector slot at which position the cartridges are removed from the belt and then out a belt ejector duct where the empty belt members are removed from the firearm, and belt member supporting means arranged in the belt feed path ahead of the ejector slot for supporting an empty belt member such that the empty first clamp portion of said empty belt member will not engage edges of said ejector slot when the clamp portion is passing adjacent said edges toward the ejector duct, wherein said belt member supporting means includes resilient means.

3. An arrangement according to claim **1,** wherein said belt member supporting means includes means engagable with a cartridge in a clamp portion immediately preceeding the ejector slot for preventing engaging of the belt member with edges of said ejector slot when the clamp portion immediately preceeding the ejector slot contains a cartridge.

4. A belt feeder arrangement for automatic firearms of the type which use an ammunition cartridge belt formed by a plurality of belt members interconnected to one another which carry the cartridges into communication with a breech section engaging in an ejector slot for separating the cartridges from the belt and introducing the cartridge into the chamber of the firearm, and wherein the belt members are of the type comprising a first clamp portion accommodating one cartridge and a second clamp portion joined to the first clamp portion and loosely encompassing the subsequent cartridge; said arrangement comprising: feed means for feeding the belt along a belt feed path through the firearm structure, said belt feed path running adjacent an ejector slot at which position the cartridges are removed from the belt and then out a belt

ejector duct where the empty belt members are removed from the firearm, and belt member supporting means arranged in the belt feed path ahead of the ejector slot for supporting an empty belt member such that the empty first clamp portion of said empty belt member will not engage edges of said ejector slot when the clamp portion is passing adjacent said edges toward the ejector duct, wherein said belt member supporting means comprises: resiliently mounted lever means arranged in the belt feed path in front of the ejector slot, lug means on said lever means for engaging with portions of an empty front belt member approaching the ejector slot, and cam means on said lever means for engaging with a cartridge disposed in the belt member immediately preceding the first empty portion of said front belt member in such a manner that the lug means supports said first empty portion of the front belt member out of engagement with the edges of the ejector slot, whereby the cartridge belts can be changed without jamming the forward most empty portion of the front belt member against the ejector slot edges.

5. An arrangement according to claim **4,** wherein said lever means includes two separate levers, each lever having a lug portion forming part of the lug means.

6. An arrangement according to claim **5,** wherein the respective lug means are positioned so as to successively engage the front belt member, whereby the front belt member can be supported for movement by a relatively wide ejector slot.

7. An arrangement according to claim **6,** wherein the levers are mounted independently of each other on a common axle arranged outside of the belt feed path, and wherein said lug portions are positioned adjacent the end of the levers opposite the common axle mounting.

8. An arrangement according to claim **6,** wherein the cam means include separate cam surfaces on each of the levers, said cam surfaces being formed differently for giving different pivotal motion to the respective levers.

9. An arrangement according to claim **7,** wherein the cam means include separate cam surfaces on each of the levers, said cam surfaces being formed differently for giving different pivotal motion to the respective levers.

10. An arrangement according to claim **8,** wherein said levers exhibit different length from one another.

11. An arrangement according to claim **10,** wherein the shorter lever is disposed in a recess of the longer lever.

12. An arrangement according to claim **4,** wherein the lever means comprise leaf springs fixed at one end with respect to the belt feed path.

13. An arrangement according to claim **6,** wherein the lever means comprise leaf springs fixed at one end with respect to the belt feed path.

14. An arrangement according to claim **10,** wherein the lever means comprise leaf springs fixed at one end with respect to the belt feed path.

15. An arrangement according to claim **7,** wherein the common axle is dimensioned to be longer than the width of the belt members, and wherein spacers are provided for selectively varying the position of said levers on the axle.

16. An arrangement according to claim **4,** wherein said belt members are of the type with the first clamp portion formed as a double clamp with two spaced curved clamp members for engaging the cartridge and with the second clamp portion formed as a single clamp with one curved clamp member for loosely encompassing the adjacent cartridge, and wherein the lug means are arranged to contact a curved connecting part between said first and second change portions.

17. An arrangement according to claim **15,** wherein said belt members are of the type with the first clamp portion formed as a double clamp with two spaced curved clamp members for engaging the cartridge and with the second clamp portion formed as a single clamp with one curved clamp member for loosely encompassing the adjacent cartridge, and wherein the lug means are arranged to contact a curved connection part between said first and second change portions whereby the spacers can be adjusted to accommodate movement of the cartridge belt with the first clamp portion in the most forward position as well as movement of the cartridge belt with the second clamp portion in the most forward position.

18. An arrangement according to claim **1,** wherein said feed means include a star feed wheel for engaging the surface of said cartridges when the cartridges are in the vicinity of the ejector slot.

19. An arrangement according to claim **17,** wherein said feed means include a star feed wheel for engaging the surface of said cartridges when the cartridges are in the vicinity of the ejector slot.

20. An arrangement according to claim **2,** wherein said belt member supporting means includes a resiliently biased lever means engagable with said empty belt member.

21. An arrangement according to claim **2,** wherein said belt member supporting means includes two resiliently biased lever means engagable with said empty belt member.

22. An arrangement according to claim **21,** wherein the respective lever means are positioned so as to successively engage said empty belt member whereby the empty belt member can be supported for movement by a relatively wide ejector slot.

23. An arrangement according to claim **22,** wherein said lever means are mounted on a common pivot axle.

* * * * *