April 25, 1967 D. A. TURNER 3,315,511

DEBURRING DEVICE FOR SLIT STEEL STRIPS

Filed Sept. 10, 1964

3 Sheets-Sheet 1

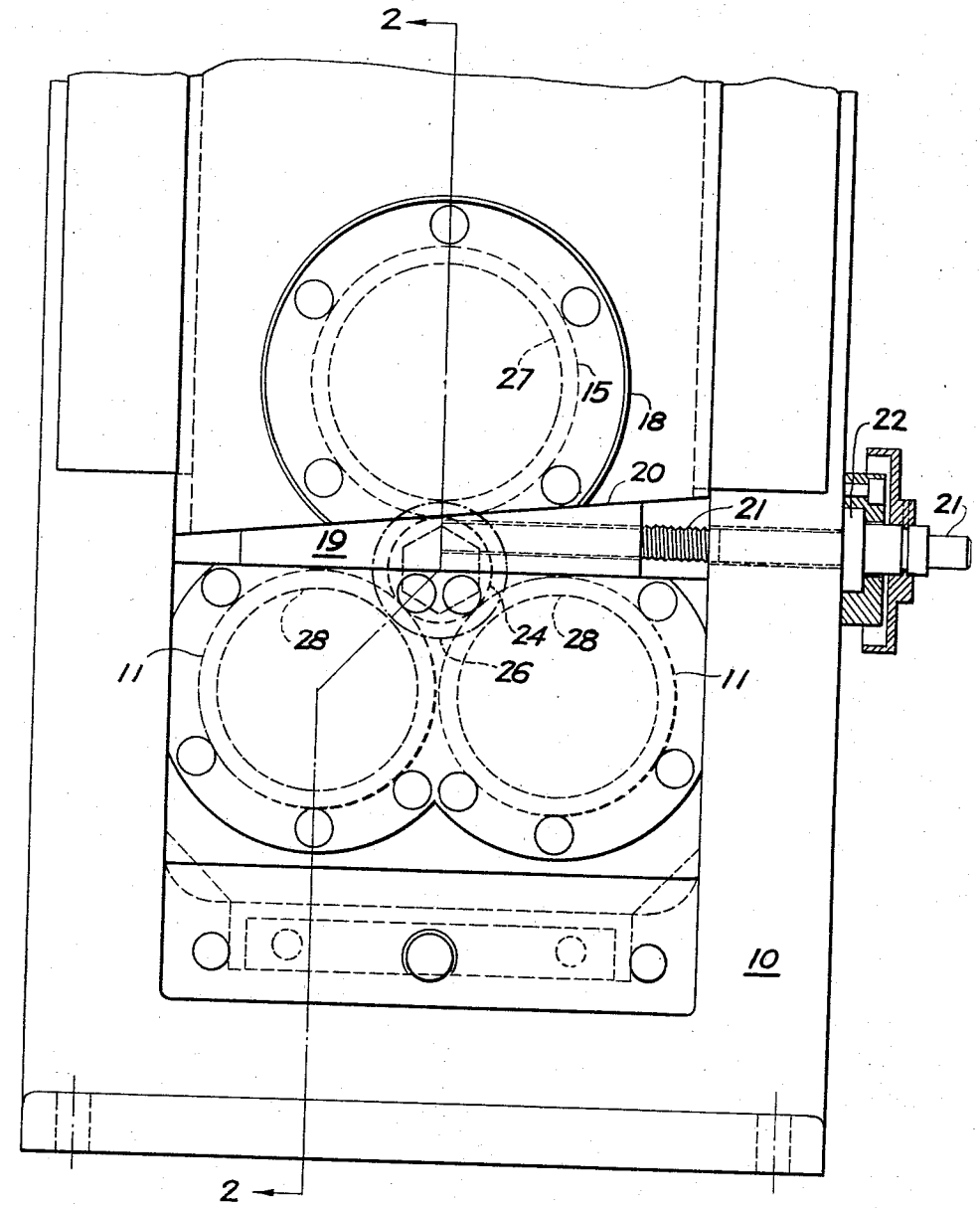

FIG. 1

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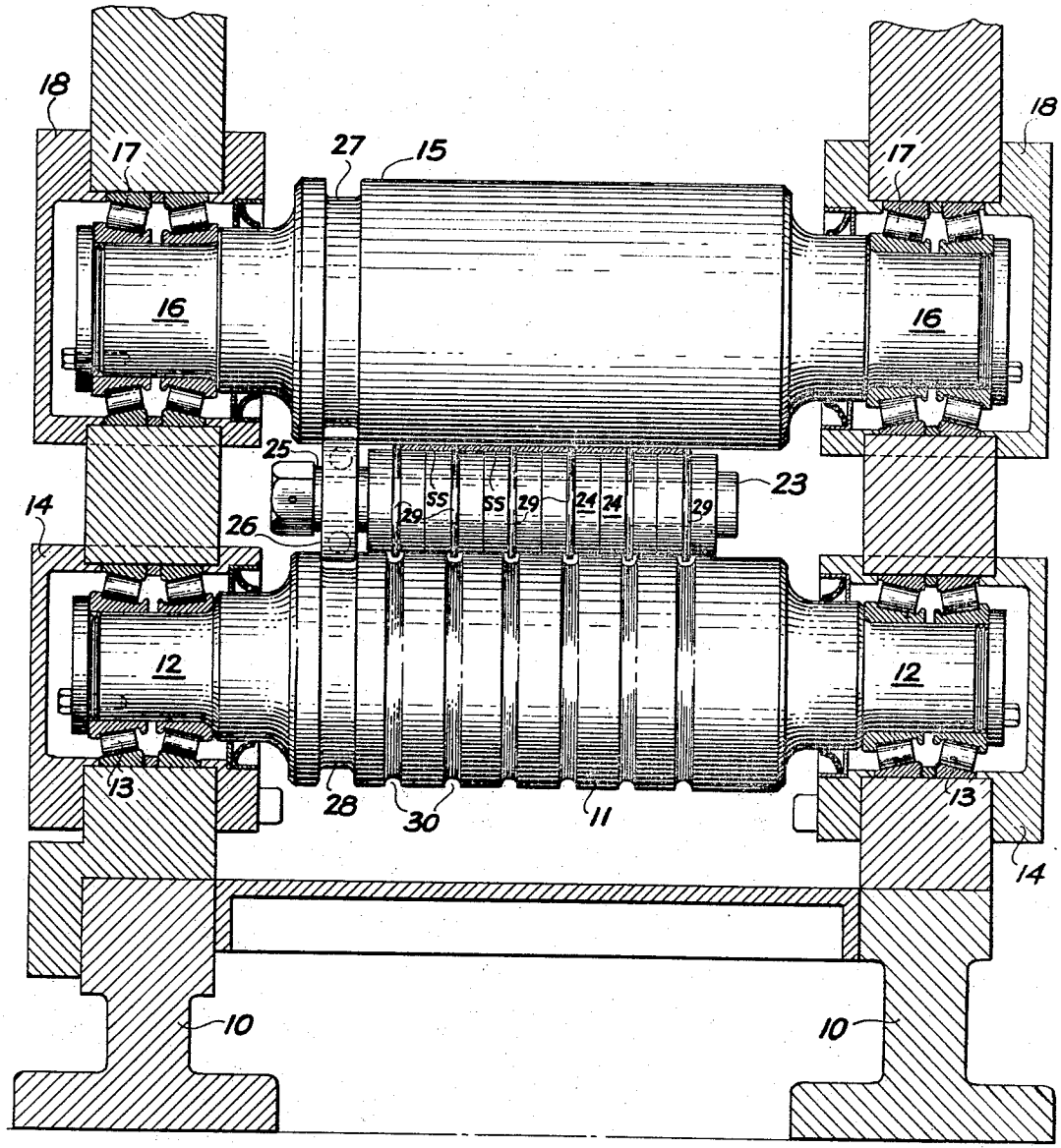

FIG. 2

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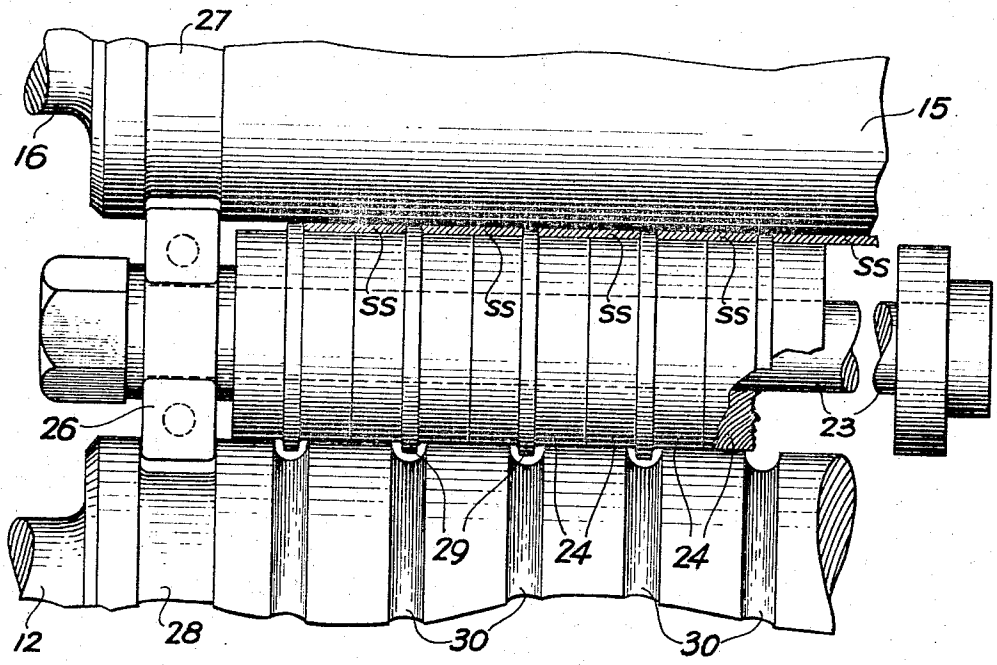

FIG. 3

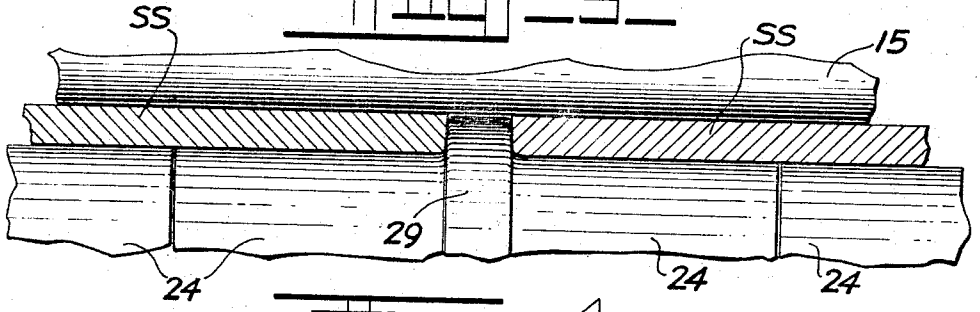

FIG. 4

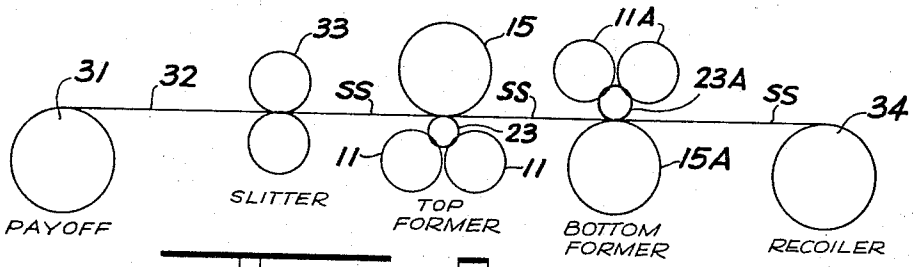

FIG. 5

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DEBURRING DEVICE FOR SLIT STEEL STRIPS

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6 Claims. (Cl. 72—221)

This invention relates to deburring devices which will effectively deburr the longitudinal edges of slit steel strips.

The principal object of the invention is the provision of a deburring device that will remove burrs formed on the longitudinal edges of slit strips.

A further object of the invention is the provision of a deburring device that will maintain the gauge or thickness of the slit strip along the longitudinal edges thereof while deburring the same.

A further object of the invention is the provision of a deburring device that will maintain the gauge or thickness of slit strip passed therethrough and simultaneously deburr the longitudinal edges thereof and simultaneously maintain tension thereon so that the slit strip may be uniformly recoiled.

A still further object of the invention is the provision of a deburring device for a slit steel strip which may be operated continuously and automatically when located, for example, between a slitter and a recoiler.

A still further object of the invention is the provision of a deburring device that may be easily disassembled and the deburring elements changed to conform to the width of the slit strips to be deburred thereby.

A still further object of the invention is the provision of a deburring device for treating the longitudinal edges of slit steel strip and the like so as to maintain a desired configuration thereof and remove longitudinally extending burrs therefrom, and which will simultaneously maintain the desired gauge of the slit strip being deburred, by imparting a rolling mill action thereto simultaneously with its deburring action.

The deburring device disclosed herein is particularly useful in connection with processing steel strip of mill width into commercially desirable slit strips. Such slit strip steel is commonly supplied to users who then feed the coils of slit strip directly into processing machines, such as automatic blanking and stamping dies in suitable press arragements to fabricate desirable objects directly therefrom.

In the past, the slit steel strip has commonly had longitudinally extending burrs on the edges thereof where the strips were slit from the original mill width of rolled steel. Devices heretofore proposed in the art for deburring the edges of slit steel strip have approached the problem by attempting to engage the opposite longitudinal edges of the slit strips in annular rotary dies having peripheral grooves therein engaged upon the longitudinal edges of the strip to be deburred. Such devices, while effecting a deburring operation, actually deform the edges of the strip and in many cases reduce it to a dog bone shape wherein the longitudinal edges of the slit strip are thicker than the remainder thereof. This complicates the recoiling of the slit strip, and, more importantly, renders it difficult in handling and feeding the strip to suitable automatic equipment for blanking and shaping articles therefrom.

It is, therefore, one of the principal objects of this invention to produce a deburring device which will actually and completely deburr the longitudinal edges of the slit steel strip passed therethrough and at the same time maintain the gauge of the slit strip uniformly thereacross and including the edge portions thereof.

A further disadvantage in the deburring devices heretofore known in the art has comprised the inability of the devices to maintain tension on the strip being deburred

with the result that the strips fed to a recoiler would not be recoiled in uniform tension and an unwieldy and loosely coiled product results. The deburring device disclosed herein overcomes all of these objections heretofore found in connection with deburring the longitudinal edges of slit strip steel and at the same time facilitates the recoiling by maintaining uniform tension on the slit steel strips being passed therethrough and deburred thereby and the same are therefore capable of uniformly tensioned recoiling, which is highly desired.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention is illustrated in the accompanying drawing, wherein:

FIGURE 1 is a side elevation of a deburring device formed in accordance with the invention.

FIGURE 2 is section on line 2—2 of FIGURE 1.

FIGURE 3 is an enlarged detail of a portion of the deburring device seen in FIGURE 2, with parts broken away and parts in cross section.

FIGURE 4 is an enlarged detail of a portion of the deburring device seen in FIGURES 2 and 3 of the drawings and illustrating portions of slit strip therein.

FIGURE 5 is a symbolic diagram illustrating the positioning of the top and bottom forming stands of the deburring device in a steel strip slitting line.

By referring to the drawings and FIGURES 1 and 2 in particular, it will be seen that a stand comprising a pair of spaced vertical supports **10**, **10** is disclosed and wherein a pair of horizontally positioned rolls **11**, **11** having necks **12**, **12** are journalled in anti-friction bearings **13**, **13** which in turn are located in the spaced vertical supports **10**, **10** of the stand.

The bearings assemblies **13**, **13** are mounted in support members **14**, **14** which in turn are secured to the spaced vertical support members **10**, **10** of the stand as will be understood by those skilled in the art. The arrangement and mounting of the horizontally positioned rolls **11**, **11** is such that they may be readily removed and replaced when desired.

Positioned in vertically spaced relation above the rolls **11**, **11** and centered vertically thereabove, there is a smooth surfaced roll **15**, which smooth surfaced roll **15** is provided with necks **16**, **16** which are journalled in anti-friction bearings **17**, **17** and these are in turn supported by support members **18**, **18** which are arranged for vertical movement relative to the spaced vertical supports **10**, **10** of the stand in which the several rolls are mounted.

Means (not shown) is provided for moving the support members **18**, **18** and the smooth surfaced roll **15** vertically and means may be seen in FIGURE 1 of the drawings for holding the support members **18**, **18** in desired position. The holding means comprises wedge-shaped elements **19**, **19** engaged against angular lower surfaces **20**, **20** of the oppositely disposed support members **18**, **18**. The wedge-shaped members **19**, **19** are arranged to be moved longitudinally by means of screws **21**, **21** threadably engaged therein and held against longitundinal motion by a mounting bracket **22**. It will thus be seen that the smooth-surfaced roll **15** may be elevated relative to the rolls **11**, **11** heretofore referred to so as to permit an idler roll **23** to be positioned therebetween and then repositioned in desirable relation thereto. The

idler roll, which is best illustrated in FIGURES 2 and 3 of the drawings, comprises an elongated cylindrical member **23** having a plurality of individual annular roll segments **24, 24** disposed thereon and held in side-by-side relation. The annular roll segments **24, 24** are preferably formed of a metal carbide so that they will be relatively harder than the rolls **11, 11** on which they rest and relatively harder than the smooth surfaced roll **15** which is in contact therewith. The idler roll **23** has an elongated neck section **25** with an annular guide ring **26** thereabout which is adapted to run in registry with guide channels **27** and **28** formed, respectively, in the smooth surfaced roll **15** and the horizontally positioned rolls **11, 11** heretofore referred to.

Each of the annular roll segments **24** has a centrally disposed rib **29**, and the space between adjacents ribs **29** on adjacent annular roll segments **24** equals the width of the slit strip passed through the device for deburring the longitudinal edges thereof.

It will also be seen that the horizontall positioned rolls **11, 11** are provided with a plurality of annular grooves **30, 30** which are positioned to match the ribs **29, 29** of the annular roll segments **24** so that the ribs do not actually engage the horizontally positioned rolls **11, 11.** The idler roll **23** with its annular roll segments **24** therefore rests on the horizontally positioned rolls **11, 11.** The smooth surfaced roll **15** engages the periphery of the ribs **29, 29** thereof. The ribs **29, 29** are of a height equal to the gauge or thickness of the slit strip being deburred and with the roll **15** work the burred edges of the slit strip.

Still referring to FIGURE 2 of the drawings, it will be seen that in the form of the invention chosen for illustration, six of the annular roll segments **24** are illustrated in position on the elongated cylindrical member comprising the idler roll **23** and that each of the six annular roll segments has an annular rib **29** thereon so that there are five spaces between the respective annular ribs **29, 29** through which slit strip may be passed. It will further be seen, by referring to FIGURE 3 of the drawings, which is an enlarged detail, that the sides of the annular ribs **29, 29** are shaped in a desirable manner so that sections of the slit strip SS running through the deburring device on the pass line thereof will be firmly engaged between the lower portion of the smooth surfaced roll **15** and the upper surfaces of the annular roll segments **24, 24.**

By referring to FIGURE 4 of the drawings wherein a greatly enlarged detail of portions of adjacent annular roll segments **24, 24** are illustrated, it will be observed that the annular rib **29** on the centrally disposed annular segment **24** is shown in deburring relation to the longitudinal edges of the strips SS being passed between the annular segment **24** and the smooth surfaced roll **15** and that the longitudinal edges of the slit strip SS are being deburred by the desirably shaped sides of the rib **29.**

By referring now to FIGURE 5 of the drawings, the deburring device disclosed herein may be seen in a symbolic diagram illustrating a conventional slitter operation to which the deburring devices have been added. In FIGURE 5 of the drawings, a coil of strip steel is positioned on a pay-off roll and is generally indicated by the numeral **31.** The strip steel extends from the pay-off roll **31** on a horizontal pass line **32** and moves through a slitter **33** whereupon a plurality of slit strip sections are formed from the same. The slit strip sections SS then move through a first deburring stand carrying the legend "Top Former" wherein the deburring idler roll is positioned as heretofore described and illustrated in FIGURES 1, 2 and 3 of the drawings, the same being indicated by the reference numeral **23,** and wherein the smooth surfaced roll **15** is shown above the slit strip sections SS and the grooved horizontally positioned rolls **11, 11** are shown positioned below and in supporting relation to the idler roll **23.**

The slit strip sections SS passing through the top former stand of the deburring device will have their lower longitudinal edges deburred as hereinbefore described and illustrated and particularly with respect to FIGURE 4 of the drawings. These partially deburred slit strip sections SS now move to a second stand which bears the legend "Bottom Former" and wherein the idler roll **23** is positioned above the slit strip sections and carries the reference numeral 23A. The smooth surfaced roll **15A** is positioned below the slit strip sections SS and the two horizontally positioned grooved rolls which back up the idler roll 23A are positioned thereabove.

It will be observed that the continuous tension on each of the slit strip sections SS is thereby maintained throughout the two stands of the deburring device and that as the completely deburred slit strip sections SS move from the bottom former stand with their upper longitudinal edges deburred thereby, they will be held under proper tension so that they may be compactly and tightly recoiled by a recoiler generally indicated by the numeral **34.**

It will occur to those skilled in the art that the novel deburring action thus performed on the longitudinal edges of the slit strip sections SS is efficiently done and that there is no deformation or thickening of the longitudinal edges of the slit strip sections SS as would be expected to occur with deburring devices heretofore known in the art.

The problem of recoiling the slit strip sections SS is also facilitated by the device which maintains constant full surface engagement and tension on the slit strip sections SS at all times, and thereby avoids looseness or slack in anyone of the slit strip sections so that they are evenly and tightly recoiled in a highly desirable manner.

It will thus be seen that a novel and efficient deburring device for deburring the longitudinal edges of slit strip steel sections has been disclosed which meets the several objects of the invention, and having thus described my invention, what I claim is:

1. A deburring device for slit strips comprising an idler roll having a plurality of longitudinally spaced annular ribs thereabout, a plurality of supporting rolls for said idler roll, at least one of said plurality of supporting rolls having a smooth surface in engagement with the periphery of said ribs on said idler roll and at least another one of said supporting rolls having annular grooves therein for receiving said annular ribs on said idler roll and arranged to provide engagement of the areas of said grooved supporting roll between said grooves thereon directly with the areas of said idler roll between the annular ribs thereof, means positioning said supporting rolls in spaced relation and journalling the same for rotation, said device arranged to receive and engage slit strip sections to be deburred between said smooth surface supporting roll and the areas of said idler roll between said annular ribs thereon with the longitudinal edges of said slit strip sections in engagement with the sides of said annular ribs.

2. The deburring device set forth in claim **1** and wherein the supporting rolls and the idler roll are parallel.

3. The deburring device set forth in claim **1** and wherein the idler roll is formed of a plurality of annular segments each of which has one of the plurality of annular ribs thereon.

4. The deburring device set forth in claim **1** and wherein the height of the annular ribs is equal to the gauge of the slit strip being deburred.

5. The deburring device set forth in claim **1** and wherein the idler roll is formed of a harder material than the supporting rolls and the slit strip.

6. The deburring device set forth in claim **1** and wherein there are two supporting rolls having annular grooves therein and positioned horizontally to support said idler roll thereon directly beneath said smooth surfaced roll.

(References on following page)

References Cited by the Examiner

UNITED STATES PATENTS

390,203	10/1888	Clark	72—223
442,550	12/1890	Searle	72—221
602,864	4/1898	Matthews	72—244
897,256	8/1908	Fraser et al.	72—203
2,193,231	3/1940	Gibbons	72—179
2,201,214	5/1940	Yoder	72—221
2,335,334	11/1943	Yoder	72—129
2,635,493	4/1953	Schumacher	72—226
2,775,151	12/1956	Schumacher	72—226
2,868,047	1/1959	Zublin	72—226

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