Oct. 15, 1968 A. SCHMID 3,405,940

CENTERING APPARATUS FOR THE BOWLING PINS OF AN AUTOMATIC PIN SPOTTING MACHINE

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Fig. 1

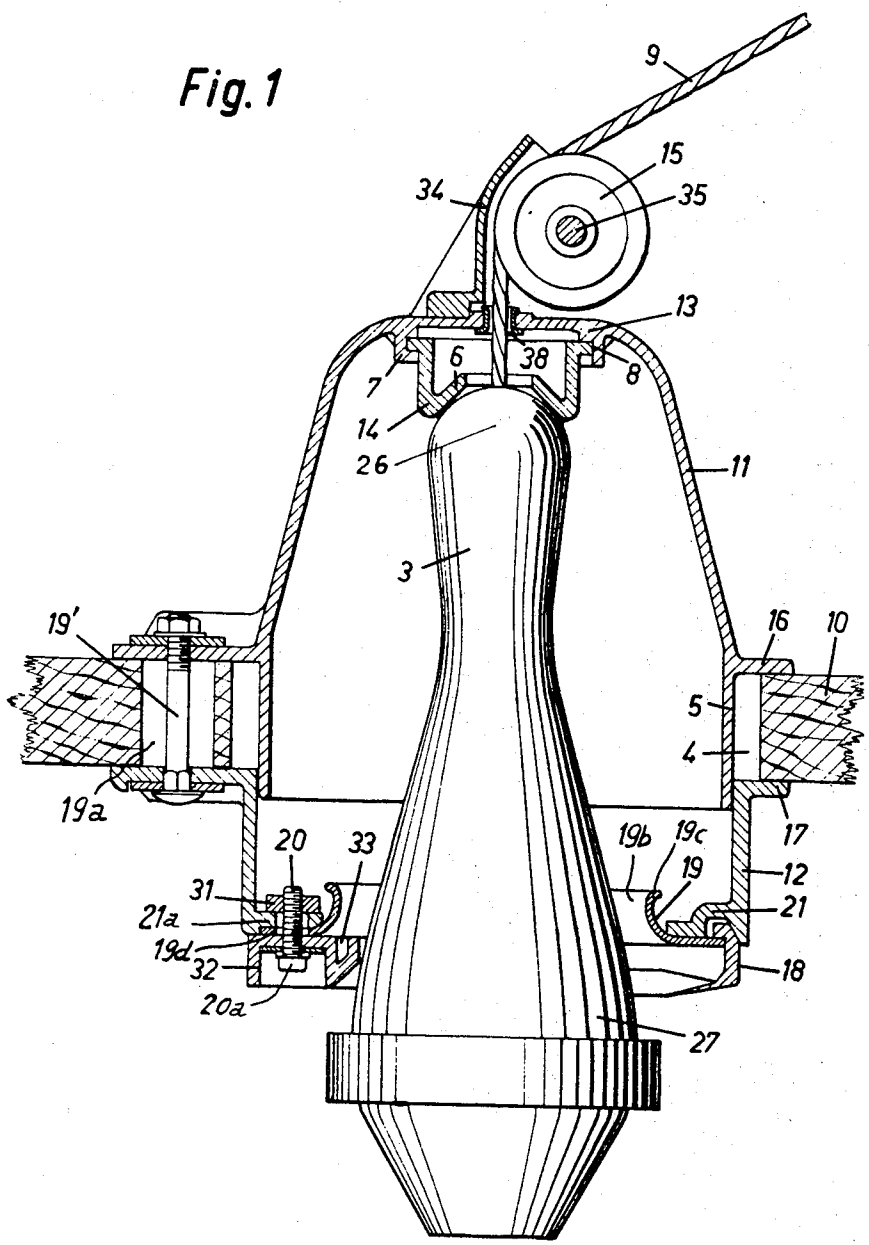


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Fig.2

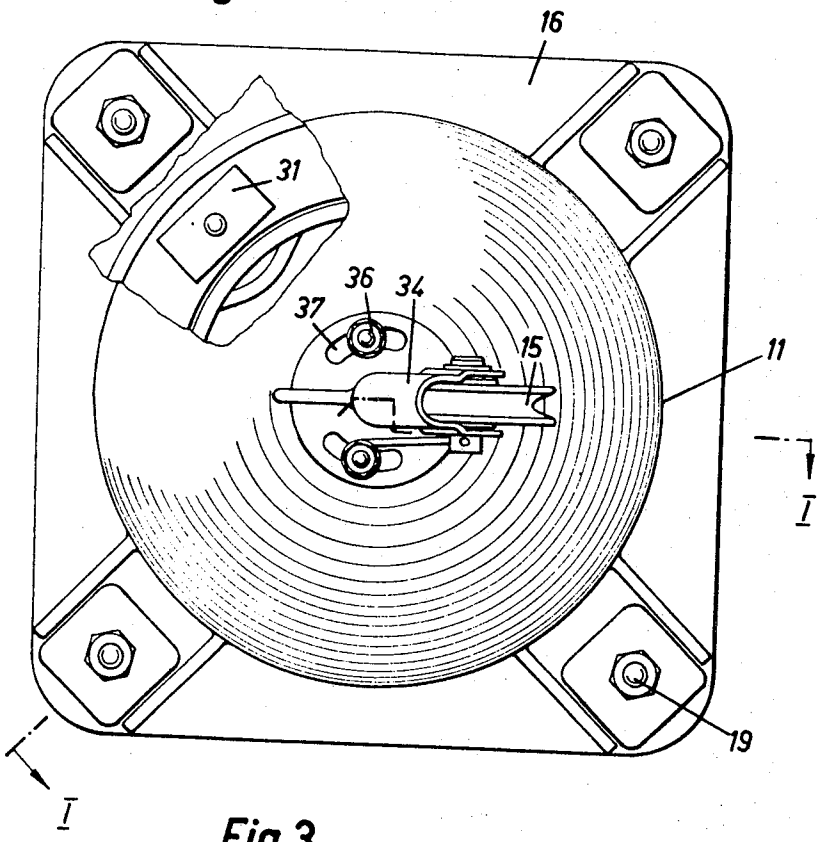
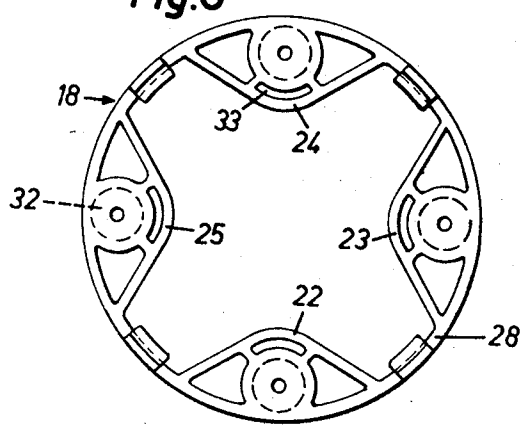



Fig.3

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# CENTERING APPARATUS FOR THE BOWLING PINS OF AN AUTOMATIC PIN SPOTTING MACHINE

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11 Claims. (Cl. 273—44)

## ABSTRACT OF THE DISCLOSURE

A centering apparatus for the bowling pins of a bowling pin spotting machine wherein each bowling pin is secured to a pulling rope. A support member carries a hollow member which is provided for each bowling pin to be spotted. A centering head is disposed within the hollow member for properly aligning the associated head of the bowling pin, and a sleeve member is disposed beneath the support member and substantially coaxially arranged with respect to the aforementioned hollow member. Flexible centering means provided at said sleeve member can be adjusted in radial direction for centering the belly of the bowling pin.

The present invention has reference to a new and improved construction of centering apparatus for the bowling pins of an automatic bowling pin setting or spotting machine wherein each such pin is affixed to a pulling cable or rope.

One problem existing with such type centering apparatuses is to align or bring the bowling pins raised by the associated rope or cable into such a position that after lowering them they are located in the correct position. This requires an exact adjustment possibility of the centering means at the site of the bowling machine.

Accordingly, a primary object of this invention is concerned with an improved centering apparatus for the bowling pins of a pin spotting machine which properly aligns the raised pins such that they can be correctly spotted at the pin spotting section of the bowling alley.

Another noteworthy object of my invention is directed to an improved centering apparatus for bowling pins which is relatively inexpensive to manufacture, uncomplicated in its physical structure, highly reliable in operation, and easy to service and maintain.

Yet a further important object of this invention resides in the provision of a centering apparatus for bowling pins which properly aligns such while in raised position so that upon lowering thereof onto the pin spotting section of the bowling alley, these pins are properly spotted, and further, it is possible to easily readjust the aligning capability of the centering apparatus.

In order to implement these and still further objects of the invention which will become apparent as the description thereof proceeds, the inventive centering apparatus is manifested by the features of a hood-shaped member located above a support plate, a centering head disposed within said hood-shaped member for properly aligning the head of the associated bowling pin, a sleeve member disposed beneath said support plate and substantially coaxially arranged with respect to the hood-shaped member, and flexible centering means provided at said sleeve member which are adjustable in radial direction for the centering or aligning of the belly of the bowling pin. The inventive device enables the provision or utilization of relatively simple centering means which can be easily adjusted and economically manufactured from synthetic material, e.g. plastic, and apart from such, is not readily sensitive to impacts or blows.



Other features, objects and advantages of the invention will become apparent by reference to the following detail description and drawings in which:

FIGURE 1 is a vertical sectional view through a portion of the inventive centering apparatus depicting details thereof with a bowling pin raised within the hood-shaped member, and as taken along the line I—I of FIGURE 2;

FIGURE 2 is a top plan view of the hood-shaped member for a bowling pin of the centering apparatus of FIGURE 1; and

FIGURE 3 is a front view depicting details of the centering ring used in the arrangement of FIGURE 1.

Describing now the drawings and, in particular, directing attention to FIGURE 1, it will be understood that above the pin spotting section of the non-illustrated bowling alley there is located a support member such as a support plate or frame **10** at which there is affixed as many centering apparatuses as there are bowling pins **3**. The mutual position of each of the centering devices or means with respect to one another corresponds to the position of the bowling pins to be spotted upon the bowling alley. Generally speaking, after the bowling ball has been thrown, the bowling pins are raised by means of a respective pulling cable **9** attached in suitable manner to the head **26** of each bowling pin **3**, then aligned or centered by the associated centering device, and thereafter again deposited in the proper position onto the bowling alley.

The centering device or apparatus of the invention comprises a hollow raised pin-receiving member such as the hood-shaped member **11** preferably formed of a transparent synthetic material, e.g. plastic, which possesses a radially projecting flange **16** bearing upon the upper surface of the attachment or support plate **10**. The lower cylindrical portion **5** of the hood-shaped member **11** telescopically engages with a hollow annular sleeve member **12** secured to the underface of the plate **10**, so that this sleeve member **12** and the hood-shaped member **11** are centered relative to one another and extend coaxially with respect to one another. Hood-shaped member **11** includes a hood head portion **13** within which there is arranged a centering head means **14** formed of flexible rubber or synthetic material, such as a flexible plastic. This centering head means **14** is advantageously of substantially circular configuration and possesses an outwardly depending marginal edge **8** engaged from beneath by a rib **7** of the hood-shaped member **11**. This centering head means **14** further possesses inwardly directed shoulders or ribs **6** which bear against the head **26** of the raised bowling pin **3** affixed to the pulling cable or rope **9** and serves to center or align such pin.

It will also be recognized that an annular intermediate compartment or space **4** is formed between the cylindrical portion **5** of the hood-shaped member **11** and the depicted opening of the support plate **10** receiving the former and by means of which it is possible to undertake a course adjustment of the centering device. The sleeve member **12** is provided at its upper end with a radially extending flange **17** bearing against the underface of the support plate **10**. This flange **17** possesses a substantially square or rectangular configuration and is clamped to the flange **16** of the hood-shaped member **11** by means of four screws **19'** or equivalent fastening expedients passing through suitable apertures **19*a*** of the support plate **10**.

It will also be seen that at the underface of the sleeve member **12** there is attached by means of four screws **20** or the like a centering ring **18** having a form as best seen by reference to FIGURE 3. A metallic reinforcement ring **19** having a central opening **19*b*** bounded by curved walls **19*c*** is disposed between the radially extending col-

lar 21 of the hollow sleeve 12 and the aforementioned centering ring 18. The openings 21*a* at the radially inwardly directed collar 21 as well as at the reinforcement ring 19, and designated by reference character 19*d*, are constructed as elongated holes extending in radial direction and permitting fine adjustment of the centering ring 18 by means of the associated screws 20. Naturally, the elongated holes could be alternatively provided at the centering ring 18. Moreover, a respective threaded plate 31 cooperates with each screw 20 for the attachment of the centering ring 18 and the reinforcement ring 19, and wherein these screws are seated in a respective recessed bore 32 of the centering ring 18 and are accessible from therebelow. Screws 20 are preferably provided with a hexagonal head 20*a*.

As best seen by referring to FIGURE 3 this centering ring 18 possesses four inwardly directed projections 22, 23, 24 and 25 between which the belly 27 of the bowling pin to be aligned is guided and thus properly centered. Each of these projections 22, 23, 24 and 25 is advantageously provided or may be provided with a slotted recess 33 in order to increase the flexibility of each such projection. Naturally, if a sufficiently elastic material is chosen which is not readily subject to wear, then such recesses can be dispensed with.

A rotatable roller 15 is mounted upon the head 13 of the hood-shaped member 11 and is retained for rotation in a bearing element 34 with the aid of a suitable bolt 35. This bearing element or block 34 can be positionally adjusted about the vertical axis of the hood-shaped member with the aid of screws 36 piercingly extending through the segmented slots 37 to permit limited displacement of the roller 15. Once such desired position has been selected then the bearing block is fixed by means of the aforementioned screws 36. To enable the pulling cable or rope 9 passing about the deflecting roller 15 to piercingly extend through the head portion 13 of the hood-shaped member 11, there is provided thereat a hollow sleeve 38 which also keeps down wear of the pulling rope.

After each throw of the bowling ball all of the bowling pins are raised in the usual manner irrespective whether they are deadwood or still standing, by means of the respective pulling rope 9 associated with each bowling pin 3. Hence, each such bowling pin is pulled into the associated centering apparatus or device. In the uppermost position, the head 26 of the bowling pin 3 bears against the shoulders or ribs 6 and at the same time the belly portion 27 thereof is tightly or snugly guided at the centering ring 18. Inasmuch as both the centering head means 14 as well as also the centering ring 18 are formed of a soft plastic or rubber for instance, they are able to quickly dampen any oscillatory or pendulum motion of the raised bowling pin 3. Thereafter, the bowling pins 3 suspended upon their pulling ropes or cables 9 are again lowered onto the bowling alley, and specifically in their correct predetermined positions, in other words properly spotted, so that the next bowling ball can be thrown.

The hood-shaped member 11 is preferably formed of a transparent synthetic material to facilitate the exact adjustment with raised bowling pin 3. Of course, it would also be possible, if the surface or jacket of such hood-shaped member were provided with openings, to carry out such adjustment in reasonably simple manner.

The reinforcement ring 19 is advantageously formed of metal and can serve to deflect the bowling pin head if such should arrive at an inclination in the opening thereof. Owing to the fact that the centering apparatus is essentially formed of thermoplastic elements, it is unnecessary to subsequently mechanically work them, and by means of the inventive device it is possible to construct lightweight, noisefree and economical bowling pin centering installations.

While there is shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practised within the scope of the following claims.

What is claimed is:

1. Centering apparatus for the bowling pins of a bowling pin spotting machine wherein each bowling pin is secured to a pulling rope, comprising, in combination, a support plate, a hollow hood-shaped member carried by and extending above said support plate provided for each bowling pin to be spotted, a centering head located within said hollow hood-shaped member for properly aligning the associated head of the bowling pin, a sleeve member disposed beneath said support plate and substantially coaxially arranged with respect to said hollow hood-shaped member, flexible centering means provided at said sleeve member mounted to be adjustable in radial direction for centering the belly of the bowling pin, said flexible centering means comprising a centering ring incorporating at least three radially extending projections distributed substantially uniformly about the inner circumference of said centering ring, and a metallic reinforcement ring located above said centering ring and radially outwardly withdrawn with respect to said radially extending projections capable of bearing against the belly of the bowling pin when in raised position.

2. Centering apparatus for the bowling pins of a bowling pin spotting machine as defined in claim 1, said sleeve member having a radially extending collar, fastening means extending in axial direction and cooperating with each radially extending projection of said centering ring and piercingly extending through said radially extending collar, said fastening means being accessible from beneath said centering ring, and means cooperating with said fastening means for permitting adjustment of the position of said radially extending projections.

3. Centering apparatus for the bowling pins of a bowling pin spotting machine as defined in claim 2, wherein said means cooperating with said fastening means comprises radially directed elongated holes.

4. Centering apparatus for the bowling pins of a bowling pin spotting machine as defined in claim 3, wherein said radially directed elongated holes are provided at least at said radially extending collar.

5. Centering apparatus for the bowling pins of a bowling pin spotting machine, wherein each bowling pin is secured to a pulling rope, comprising a hollow member provided for each bowling pin to be spotted, a centering head located within said hollow member for properly aligning the associated head of the bowling pin, a sleeve member disposed beneath and substantially coaxially arranged with respect to said hollow member, flexible centering means provided at the lower region of said sleeve member for centering the belly of the bowling pin, said flexible centering means incorporating a centering ring provided with a plurality of radially extending projections distributed about the inner circumference of said centering ring, said centering ring and said radially extending projections being formed of one single piece of elastic material, fastening means protruding from said centering ring in an axial direction and cooperating with said sleeve member, means for permitting adjustment of the position of each of said radially extending projections independently of each other by loosening said fastening means.

6. Centering apparatus for the bowling pins of a bowling pin spotting machine as defined in claim 5, wherein said hollow member and said sleeve member telescopically engage and are centered with respect to one another.

7. Centering apparatus for the bowling pins of a bowling pin spotting machine as defined in claim 6, wherein said sleeve member encircles said hollow member.

8. Centering apparatus for the bowling pins of a bowling pin spotting machine as defined in claim 5, further including a deflecting roller adjustably mounted upon said hollow member for movement about its vertical axis.

9. Centering apparatus for the bowling pins of a bowling pin spotting machine as defined in claim 5, wherein said hollow member is constructed as a transparent, one-piece plastic hood.

10. Centering apparatus for the bowling pins of a bowling pin spotting machine wherein each bowling pin is secured to a pulling rope, comprising a support member having an opening, a hollow member provided for each bowling pin to be spotted, said hollow member including radial flange means bearing upon said support member, said hollow member further including a lower portion which cooperates with said opening of said support member to define an intermediate compartment allowing for coarse adjustment of the centering apparatus, a centering head located within said hollow member for properly aligning the associated head of the bowling pin, a sleeve member disposed beneath and substantially coaxially arranged with respect to said hollow member, said sleeve member having radial flange means at its upper region bearing against the underface of said support member, with said lower portion and said sleeve member telescopically interfitting, flexible centering means provided at the lower region of said sleeve member for centering the belly of the bowling pin, said flexible centering means incorporating a centering ring provided with a plurality of radially extending projections distributed about the inner circumference of said centering ring, a reinforcement ring disposed above said centering ring, said sleeve member having a radially inwardly directed collar means at its lower end for supporting said reinforcement ring and said centering ring, and radial slit means for enabling a radial fine adjustment of each one of said radially extending projections relative to said sleeve member.

11. Centering apparatus for the bowling pins of a bowling pin spotting machine wherein each bowling pin is secured to a pulling rope, comprising, in combination, a support member, a raised pin-receiving member carried by said support member and provided for each bowling pin to be spotted, a centering head located within said raised pin-receiving member for properly aligning the associated head of the bowling pin, a sleeve member disposed beneath said support member and substantially coaxially arranged with respect to said raised pin-receiving member, flexible centering means provided at said sleeve member mounted to be adjustable in radial direction for centering the belly of the bowling pin, said flexible centering means comprising a centering ring incorporating radially extending projections distributed substantially uniformly about the inner circumference of said centering ring, and a reinforcement ring located above said centering ring and radially outwardly withdrawn with respect to said radially extending projections capable of bearing against the belly of the bowling pin when in raised position.




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