np 6(b) cleared

#280 05

ADVISORY OPINION

6(b) CLEARED:

_____ No Mfrs Identified

_____ Excepted _____

✓ Mfrs Notified ok to release

Comments Processed

U.S. CONSUMER PRODUCT SAFETY COMMISSION

WASHINGTON, D.C. 20207

1980

OFFICE OF THE
GENERAL COUNSEL

David J. Richter, Esq.
Corporate Counsel
Roper Corporation
1905 West Court Street
Kankakee, Illinois 60901

Dear Mr. Richter:

This is in response to your correspondence received on June 23, 1980, in which you requested an exemption for the Roper Whip-Stik from the Safety Standard for Walk-Behind Power Lawn Mowers, 16 C.F.R. Part 1205. Your correspondence has previously been docketed as a petition under section 10 of the Consumer product Safety Act. However, after thoroughly examining the materials which you submitted in support of your petition, and other available information, we have concluded that the Whip-Stik pin device for which the supporting data were submitted is not within the scope of the Standard and that an exemption is not appropriate.

Under § 1205.3(a)(14) of the Standard, a "rotary mower" is defined as having one or more cutting blades. "Blade" is defined in § 1205.3(a)(1) as "any rigid or semi-rigid device or means that is intended to cut grass" (emphasis added). The requirement that, to be covered by the Standard, a blade must be rigid or semi-rigid was expressly included to eliminate "non-rigid blades, such as those made of a monofilament line," from the scope of the Standard. 44 Fed. Reg. 9998.

Exhibits E, G, and H submitted with your petition show that the Whip-Stik pin device produced injuries to a pig that are similar to the injuries produced by a monofilament line under the conditions of that test. It would appear that the type of injury that may be produced by the Whip-Stik pins and monofilament "blades" would not present the same risk of injury as the rigid or semi-rigid blades that the Standard addresses. In the judgment of the Commission's staff, the ability of the Whip-Stik pin to flex along its entire length presents an injury potential that is different from that of a conventional blade. This conclusion is supported by the reports and films submitted with your petition.

We cannot conclude from the available information that your company's Whip-Stik pin device is safe or that any risk associated with it is not unreasonable. However, it appears that the ability of the pin to flex along its entire length, when considered in relation to the injury potential associated with the pin, is sufficiently great that the particular pins for which your data were submitted would not be considered "rigid or semi-rigid" for purposes of the Standard. Therefore, a rotary lawn mower with your company's Whip-Stik pin device installed by the manufacturer would not be subject to the Standard.

I should point out that this determination applies only to the particular embodiment of the Whip-Stik for which the data were submitted. If any changes to that embodiment are made that decrease the flexibility of the pin or increase the potential for injuries like those resulting from blade contact, the change could cause the Whip-Stik to come within the scope of the Standard.

There is another issue associated with the use of the Whip-Stik pin device which should be mentioned at this time. If, after the effective date of the Standard, a mower manufacturer were to manufacture a mower using your Whip-Stik pin device, but mounted this device in a manner that allowed a conventional blade to be readily substituted by the user, the Commission staff could conclude that the mower contained a defect that constitutes a substantial product hazard under section 15 of the Consumer Product Safety Act, 15 U.S.C. § 2064. Similarly, if a conventional blade were manufactured to readily fit the special mounting system for the Whip-Stik pin device, that blade could be considered a substantial product hazard.

Sincerely,

Andrew S. Krulwich
General Counsel

UNITED STATES GOVERNMENT

U.S. CONSUMER PRODUCT SAFETY COMMISSION

# Memorandum

TO : THE COMMISSION
THRU: Office of the Secretary
THRU: Andrew S. Krulwich, General Counsel
THRU: Stephen Lemberg, Assistant General Counsel

DATE: NOV 5 1980

FROM : Harleigh Ewell, OGC

SUBJECT: Draft Letter to Roper Corporation Concerning Requested Exemption of Whip-Stik Mowers from the Power Lawn Mower Standard BALLOT VOTE DUE IN: Office of the Secretary _____, 1980

Attached is a draft letter to Roper Corporation that would inform Roper that the Commission does not consider the Whip-Stik cutting element to be a "blade" for purposes of the power lawn mower standard, 16 C.F.R. Part 1205. Thus, mowers using the Whip-Stik would not have to comply with the standard (especially the 3 second blade stop requirement).*/

This interpretation is based on the staff's conclusion that the Whip-Stik would not cause the type of serious injury that can be caused by a metal blade and that the fact that the Whip-Stik will flex to an extent along its entire length when it contacts an object contributes substantially to this lessened potential for blade contact injuries. Therefore, the conclusion can be made that the Whip-Stik is flexible and not "rigid or semi-rigid" as blades are defined in § 1205.3(a)(1).

Interpretations concerning products covered by a standard are usually made by the staff without prior Commission approval. In this case, however, approval is sought because Roper's request had previously been docketed as a petition and because the interpretation could be considered controversial. Since we plan to make editorial changes and corrections in the letter, the vote below should be considered to be on the concept of the interpretation and not on the exact language of the letter. Please submit any editorial comments to the Office of General Counsel.

The following are alternatives to the proposed interpretation:

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*/ Roper has petitioned for an exemption from the standard. A copy of their petition is attached. The Exhibits in support of the petition are available in the Office of the Secretary.

SUBJECT: Draft Letter to Roper Corporation Concerning Requested Exemption of Whip-Stik Mowers from the Power Lawn Mowers Standard

1. Interpret the Whip-Stik to be covered by the standard, but propose an exemption. In this case, the staff would have to develop a description of the characteristics of the Whip-Stik that ensure its injury reduction potential, in order to make the exemption generic to other manufacturers and to insure that only relatively safe cutting elements are included within the scope of the exemption.

2. Interpret the Whip-Stik to be covered by the standard and deny the petition because the available data do not show that the standard is not reasonably necessary to prevent an unreasonable risk of Whip-Stik injuries.

Specific options are not provided for these alternatives because the staff has not prepared a package sufficient to fully evaluate the resources required to propose an exemption or the injury potential, economic and other considerations relevant to a determination of unreasonable risk.

Please indicate your vote on the alternatives given below.

I. APPROVE INTERPRETATION THAT PARTICULAR WHIP-STIK CONFIGURATION IS NOT WITHIN THE SCOPE OF PART 1205.

_____ (Signature) _____ (Date)

II. DISAPPROVE THE INTERPRETATION THAT THE WHIP-STIK IS NOT WITHIN THE SCOPE OF THE STANDARD. (Staff will submit a briefing package oriented toward granting or denying the petition.)

_____ (Signature) _____ (Date)

Comments:

UNITED STATES GOVERNMENT

# Memorandum

U.S. CONSUMER PRODUCT
SAFETY COMMISSION
WASHINGTON, D.C. 20207

OCT 15 1980

TO: The Commission
THROUGH: Andrew S. Krulwich, General Counsel
THROUGH: Richard A. Gross, Executive Director
THROUGH: Bert G. Simson, Director, OPM
THROUGH: Douglas L. Noble, Program Manager for Emerging Hazards, OPM

FROM: Elaine A. Tyrrell, Project Manager, Petitions, Office of Program Management

SUBJECT: Transmittal of Draft Letter to Roper Corporation on Petition CP 80-7, Requesting Exemption of "Whip-Stik" Mowers from the Lawn Mower Standard, 16 C.F.R. Part 1205.

Attached for the Commission's review and consideration is a draft letter prepared by the Office of General Counsel on the subject petition and a technical memorandum prepared by the Directorate for Engineering Sciences in support of the position articulated in the draft letter. This draft letter was developed in lieu of a briefing package on the basis of discussions of the Executive Management Team with the Office of General Counsel, the Program Manager for the Powered Equipment Hazards Program and the Petitions Team.

The development of the draft letter was discussed with the Commission's Special Assistants in a meeting held on September 4, 1980, where it was agreed that the letter would be circulated for Commission approval via ballot vote.

The Directorates for Hazard Identification and Analysis, Engineering Sciences, Health Sciences, Compliance and Enforcement, Communications, and Field Operations, and the Office of Budget, Program Planning, and Education have concurred with the language in this draft letter.

Attachments

U.S. GOVERNMENT PRINTING OFFICE: 1974 733-333/3604 1-3

ROPER WHIP-STIK LETTER:

This is in response to your correspondence received on June 23, 1980, in which you requested an exemption for the Roper Whip-Stik from the Safety Standard for Walk-Behind Power Lawn Mowers, 16 C.F.R. Part 1205. Your correspondence has previously been docketed as a petition under section 10 of the Consumer Product Safety Act. However, after thoroughly examining the materials which you submitted in support of your petition and other available information, we have concluded that your Company's Whip-Stik pin device, for which the supporting data were submitted, is not within the scope of the Standard and that an exemption is not appropriate.

Under §1205.3(a)(14) of the Standard, a "rotary mower" is defined as having one or more cutting blades. "Blade" is defined in §1205.3(a)(1) as "any rigid or semi-rigid device or means that is intended to cut grass" (emphasis added). The requirement that, to be covered by the Standard, a blade must be rigid or semi-rigid was expressly included to eliminate "non-rigid blades, such as those made of a monofilament line," from the scope of the Standard. 44 Federal Register 9998.

Exhibits E, G and H submitted with your petition show that the Whip-Stik pin device produced injuries to a pig that are similar to the injuries produced by a monofilament line under the conditions of that test. It would appear that the type of injury that may be produced by the Whip-Stik pins and monofilament "blades" would not present the same risk of injury as the rigid or semi-rigid blades that the Standard addresses. In the judgment of the Commission's staff, the ability of the Whip-Stik pin to flex along its entire length presents an injury potential that is different from that of a conventional blade. This conclusion is supported by the reports and films submitted with your petition.

We cannot conclude from the available information that your Company's Whip-Stik pin device is safe or that the risk associated with it is reasonable. However, it appears that the ability of the pin to flex along its entire length, when considered in relation to the injury potential associated with the pin, is sufficiently great and that the particular pins for which your data were submitted would not be considered "rigid or semi-rigid" for purposes of the Standard. Therefore, a rotary lawn mower with your Company's Whip-Stik pin device installed by the manufacturer would not be subject to the performance requirements of the Standard. We do, however, recommend the use of a label warning users not to insert hands into the discharge chute.

I should point out that this determination applies only to the particular embodiment of the Whip-Stik for which the data were submitted. If any changes to that embodiment are made that decrease the flexibility of the pin or increase the potential for injuries like those resulting from blade contact, the change could cause the Whip-Stik to come within the scope of the Standard.

There is another issue associated with the use of your Company's Whip-Stik pin device, which should be mentioned at this time. If, after the effective date of the Standard, a mower manufacturer were to manufacture a mower using your Whip-Stik pin device, but mounted this device in a manner that allowed a conventional blade to be readily substituted by the user, the Commission staff could conclude that the mower contained a defect that constitutes a substantial product hazard under section 15 of the Consumer Product Safety Act. Similarly, if a conventional blade were manufactured to readily fit the special mounting system for the Whip-Stik pin device, that blade could be considered a substantial product hazard.

Sincerely,

Andrew S. Krulwich
General Counsel

UNITED STATES GOVERNMENT

# Memorandum

U.S. CONSUMER PRODUCT SAFETY COMMISSION

TO Elaine A. Tyrrell, EX-P
Through: James I. Price, Director, ESMT

DATE: 1 OCT 1980

FROM Roy W. Deppa, Program Representative, ESMT

SUBJECT Roper Corporation Petition, CP 80-7

1. The Roper Corporation has submitted a petition requesting an exemption from the Safety Standard for Walk-Behind Power Lawn Mowers for the Roper Whip-Stik mower. In support of this request, Roper attached a number of documents and films which they claim demonstrate that the behavior of the Whip-Stik is more like the behavior of the monofilament line cutter than that of a coventional bladed mower.

2. While ESMT has not run or witnessed the tests documented in the Exhibits, the reports and films demonstrate a high degree of flexibility of the Whip-Stik pins in operation. ESMT feels that the low energy transfer evidenced when various objects are struck by the Whip-Stik may be attributed to the low weight of the individual pins and to the relatively low sectional stiffness along their length. The lack of severe cutting action may also be attributed to the lack of a sharp cutting edge.

3. Based upon the evidence submitted by the petitioner, ESMT feels that the Whip-Stik cutting element as described does not exhibit the rigid or semi-rigid behavior required to cover a blade under the standard. More specifically, the Roper Whip-Stik appears to behave in a manner very similar to monofilament line cutters which are excluded from the standard. However, as a number of factors appear to influence this behavior, any change from the specific design presented could change our position.

Concurrence:

Don R. Clay, DAED, ES

UNITED STATES OF AMERICA

BEFORE THE CONSUMER PRODUCT SAFETY COMMISSION

| | | |
|---|---|---|
| In the Matter of the Petition of Roper Corporation for an Exemption from the Safety Standard for Walk-Behind Power Lawn Mowers | : | No.:_____ |

PETITION FOR EXEMPTION

Pursuant to Section 10 (a) of the Consumer Product Safety Act (15 USCS §2059 (a)), Roper Corporation, Petitioner, hereby petitions the Consumer Product Safety Commission to commence a proceeding for the issuance of an Exemption from the Safety Standard For Walk-Behind Power Lawn Mowers (16 CFR 1205) (hereinafter referred to as the "Standard") for lawn mowers utilizing a cutting device which comprises a substantially disc-shaped pin carrier and tapered round plastic pins carried by the pin carrier, such pins performing the actual cutting function.

Roper Corporation is a Delaware corporation engaged in the manufacture of lawn mowers and having a place of business at 1905 West Court Street, Kankakee, Illinois 60901.

On February 26, 1979 the Commission promulgated the Safety Standard for Walk-Behind Power Lawn Mowers (Title 16, Part 1205) which describes a consumer product safety standard for lawn mowers requiring a foot probe test, a blade control and a warning label. That standard as promulgated applies to all lawn mowers having a blade which is any rigid or semi-rigid device or means that is intended to cut grass.

Pursuant to Section 7(a) of the Consumer Product Safety Act (15 USCS §2056(a)), "Any requirement of a consumer product safety standard shall be reasonably necessary to prevent or reduce an unreasonable risk of injury associated with such product." Petitioner urges that there is not an unreasonable risk of injury associated with a rotary lawn mower utilizing a tapered round plastic pin as a cutting element as defined herein. Since the requirement of the Standard is not reasonably necessary to prevent or reduce an unreasonable risk of injury associated with the tapered round plastic pin, the Standard should not be applied to lawn mowers utilizing tapered round plastic pins as cutting elements. Thus an exemption from the Standard for the tapered round plastic pins is respectfully requested.

The Tapered Round Plastic Pin

The device for which Petitioner requests an exemption is a tapered plastic pin which is flexible. The taper extends from the head end of the pin to the tip end. The pin generally is about six inches long, tapers from about 3/8 inch to 1/8 inch and can be made from a variety of plastics. One example of such a tapered pin is shown in the detailed drawing attached as Exhibit "A".

One plastic which has been used extensively by Petitioner in such pins is a nylon composition from DuPont called "Zytel" ST 801 or Z-801. Z-801 is desirable because it has desirable physical properties which include resiliency, relative freedom from abrasion and relative freedom from notching. Additional background information on such a pin is set forth in U.S. Patent 4,165,597, copy attached as Exhibit "B".

One or more of these tapered pins is mounted in a pin holder or disc such as shown in the detailed drawing attached as Exhibit "C". The underside of the disc is substantially smooth circumferentially so that anything approaching from the underside will not be "grabbed" or caught. The disc is about 14 inches in diameter and each tapered pin, when mounted on the disc, projects about 3 inches beyond the periphery of the disc. Thus the cutting diameter is about 20 inches.

The disc and pins are mounted for rotation on a standard rotary lawn mower in place of a steel blade. The engine has a typical and conventional operating speed in the range of 2850 to 2900 rpm so that the tip speed of the pin is approximately 15,000 feet per minute.

Petitioner submits the following reasons and facts in support of this Petition For Exemption.

The Tapered Round Plastic Pin As A Lawn Mower Blade Does Not Present An Unreasonable Risk of Injury; It Is A Significantly Safer Blade.

The Consumer Product Safety Commission in adopting the Standard did not intend the Standard to apply to blades which do not present a substantial hazard. The Supplementary Information, part D of the promulgation of the Standard contains the following statement by the Commission:

> "The limitation to rigid and semi-rigid blades was included so that the standard would not apply to mowers with blades of monofilament line which may not present the same risk of injury as do mowers with more rigid blades." (See Federal Register, Vol. 44, No. 33, Thursday, February 15, 1979, p. 9993).

Since the Commission did not include one type of cutting device which does not present an unreasonable risk of injury, other cutting devices which do not present an unreasonable risk of injury should also be excluded or exempted. Petitioner's tapered pin is a cutting device which does not present an unreasonable risk of injury and should not be included within the Standard.

Consumers Union, an organization that worked closely with the Commission in the drive for safer rotary mowers and was an "offeror" in the process of developing the Standard, has tested one of Petitioner's mowers utilizing a disc and the tapered plastic pins molded of Z-801 nylon. Consumers Union found the tapered plastic pins significantly safer than conventional steel blade mowers. They reported the results of their test in the July, 1977 issue of their publication, Consumer Reports, page 391, copy attached as Exhibit "P". They stated that the mower with the tapered pins would

> ". . .significantly reduce the severity of an injury as compared with a conventional mower.
>
> . . .
>
> "It promises a substantial reduction in the likelihood of serious injury from contact with the cutting mechanism, and a lessening of danger from some kinds of flying objects."

Petitioners tests and evaluation of mowers utilizing tapered pins agrees with and extends beyond that of Consumers Union.

Many different items have been placed in contact with the tapered pin while it is rotated at its operating speed. Severe injuries or damage did not result in any instance.

An engineer working on the development of the pins and disc for Petitioner inserted his unprotected fingers into the path of the cutting device on a rotary lawn mower which employed tapered pins as the cutting element, and no noticeable injury was inflicted to the engineer's fingers. Attached as Exhibit "D" is an affidavit of Gerald C. Fisher stating that he inserted his fingers and was not injured. He inserted his fingers from beneath the mower deck, perpendicular to the plane of rotation. The fingers entered the plane of rotation of the tapered pins and were impacted by the pins. The fingers were impacted on the palm side. The fingers were consciously held in the plane of rotation of the pins, i.e., the fingers were not retracted upon first sensation of impact as is the normal human reaction. A stinging sensation was experienced, but no noticeable injury occurred. Petitioner believes that the experience by Mr. Fisher, and the fact that he suffered no injury to his fingers, is strong evidence that the tapered pins do not present an unreasonable risk of injury.

One project was conducted by Battelle Columbus Laboratories entitled "Biomedical Feasibility Investigation Of Non-rigid Blade Energy Versus Injury Severity" wherein the skin of a young piglet was impacted by tapered pins and monofilament cutters. One of the conclusions stated by Battelle was "All of the non-rigid cutting elements investigated in this study produced only minor injuries." A copy of the Final Report by Battelle on this investigation is attached as Exhibit "E".

A young piglet was used because it is recognized in the biomedical field that the skin of young pigs is similar to human skin. The Battelle report states "[t]he skin and flesh of a young piglet is reasonably similar to human skin. . . .the physical and physiological characteristics are quite similar." (page 2 of Exhibit "E") Another example of this recognition is in a report dated February 1973 by George D. Winter, PH.D., B. Sc., M.I. Biol. (copy attached as Exhibit "F") who is associated with the Department of Biomedical Engineering, Institute of Orthopaedics (University of London), Brockley Hill, Stanmore, Middlesex, England. Dr. Winter states on page 3 of his report:

> "The domestic pig was used. . .because, as in man, the skin on the general body surface has no fur, is relatively thick, not thin and mobile. . .and has a substantial layer of fat under the dermis. Porcine epidermis is very similar to human epidermis, both of which are robust cellular layers, four or five living cells deep, having a well-formed system of ridges on the under surface which interdigitate with papillae of the superficial dermis." (emphasis added)

The investigation by Battelle was conducted with the tapered pins having a tip velocity of about 15,000 feet per minute (20 inch cutting diamter and rotation at 2875 rpm). The piglet was anesthetized and struck adjacent the backbone along its ribs after the skin was shaved of hair. Interference between the rotating tapered pins and the piglet was varied between 1/8 inch and 3/4 inch; with one test at 1/8 inch, two tests at 1/4 inch, three tests at 1/2 inch and one test at 3/4 inch interference. The time of pin contact with the piglet was held constant at three-tenths (3/10) of a second for all tests, and the time for moving the pin into and out of contact with the skin was one-tenth second each so that total time was one-half (1/2) second. Battelle stated that this exposure time was selected because it is typical of human reflex reaction time.

The injuries suffered by the piglet due to being hit by the tapered pins were superficial scrapes or bruises. The Battelle report states "The injury severity in the experiments with the [tapered pins] was very similar to that in experiments with the [filament] cutters". In other words, the injuries caused by the tapered pins "were all, in general, similar to a scrape. . . .The bleeding was minimal and the mechanical integrity of the skin was intact. . . . In no case was there any penetration of the dermal layer of the skin."

Photographs of the piglet after impacting by the tapered pins are attached as Exhibit "G". The amount of interference between pin and piglet for each experiment, as labeled on the photographs, was as follows:

| Experiment | Interference |
|---|---|
| # 1 | 1/8 inch |
| # 2 | 1/4 inch |
| # 3 | 1/4 inch |
| # 4 | 1/2 inch |
| # 5 | 1/2 inch |
| # 6 | 1/2 inch |
| # 7 | 3/4 inch |

A comparison photograph of the piglet after impacting by the filament cutters is attached as Exhibit "H". The interference in those experiments with the filament cutter varied from 1/8 inch to 7/8 inch.

Petitioner believes that the data developed by Battelle Columbus Laboratories in the above mentioned study provide strong evidence that the tapered pins do not present an unreasonable risk of injury.

Several people have inserted one of their feet into the tapered pins while the pins were rotating at conventional speed within a lawn mower housing. The foot was encased within a shoe, either leather or canvas. No injuries were experienced by these people. Several people have inserted a foot many times. One of these people is Mr. Joseph E. Scanland. Attached as Exhibit "I" is an affidavit by Mr. Scanland stating that he has inserted his foot into an operating mower utilizing tapered pins many times and has not suffered an injury therefrom.

Another person who used a rotary lawn mower having tapered pins is Mr. E. F. Lindsley, Engineering Editor of Popular Science. He reported his results and observations in an article published in Popular Science, January 1977. His report appears on page 108 thereof and a copy thereof is attached as Exhibit "J". In that article he states:

> "I shoved my foot under the mower housing, right into the path of the rotary cutters. No, I hadn't taken leave of my senses, as an examination of my undamaged shoes revealed.
>
> The stunt was performed to demonstrate the safety of Roper's new Blade-Less Whip Stik 20-Inch Rotary Mower. . .
>
> "As for a foot in the cutters,. . .any reasonable pair of street or work shoes will come out undamaged, as will the foot inside."

Another instance of an observance of a mower having tapered pins which has run over the foot of an individual was reported by Mr. John Bowman, Managing Editor of The Daily Journal, a newspaper published in Kankakee, Illinois. Mr. Bowman reported in an article published Friday, September 17, 1976, copy attached as Exhibit "K", that Mr. "Scanlon (sic) completed the demonstration by sticking his foot inside the running mower. He pulled his foot out and held it up, revealing no visible marks on his shoe."

In addition, Petitioner has conducted tests wherein many inanimate objects were run over with rotary mowers utilizing tapered pins, such as, small "rag" dolls, toy metal trucks and children's tennis shoes. No significant damage to any of these items was observed. Movies were taken of some of the occassions of running over these items and a copy of such film is enclosed as Exhibit "L". Some of the footage in Exhibit "L" was taken at high speed (4000 frames per second) to "slow down" the action of the cutting means and the balance of the footage was taken at the standard filming speed.

Based on the above presented facts, Petitioner submits that tapered pins as a cutting element do not present an unreasonable risk of injury.

The Tapered Plastic Pin As A Lawn Mower Blade Is Flexible And Not Within The Definition Of "Blade" Set Forth Within The Standard

The Commission in adopting the Standard excluded non-rigid blades because as the Commission said "The Commission believes that there may be sufficient differences in blade mass, stiffness, and/or sharpness between these mowers and mowers which use a rigid or semi-rigid blade. . . ." (See Supplementary Information, Part F, d, Federal Register, Volume 44, No. 33, Thursday, February 15, 1979, p 9998) There are sufficient differences between Petitioner's tapered pin and a rigid or semi-rigid blade. Petitioner's pin has a great deal of flexibility and therefore should not be included within the Standard.

Consumers Union recognized the flexibility of the tapered pin upon testing a rotary mower utilizing tapered pins. They found that the pins flexed when run over a stuffed shoe and other objects. As stated in their report, Exhibit "P", "They're [tapered pins] also flexible, designed to give when they hit stones, bottles, and other debris, thereby reducing the force of impact."

One measure of flexibility known to Petitioner is the "initial deflection modulus". The inital deflection modulus is the ratio of the deflection of the free end of the pin to the force applied perpendicularly to the axis of the pin at the free end to produce a deflection. The initial deflection modulus is expressed in units of inches per pound. To determine the initial deflection modulus, a pin was mounted horizontally, in a cantilevered fashion, about its shank area adjacent the head. A known weight was then applied vertically at the free end of the pin and the deflection of the free end of the pin was measured.

A tapered pin having dimensions such as shown in Exhibit "A" and molded from Z-801 nylon material has an initial deflection modulus of 1.4 inches per pound. The pin as mounted had a projecting length of about five inches and a weight of 0.2 pounds was hung from the tip of the pin. The pin deflected about 0.28 inches.

Another measurement of flexibility conducted on the tapered pin was the "$90^{\circ}$ bending force", which is expressed in pounds force. The $90^{\circ}$ bending force is the force required to bend the pin in a $90^{\circ}$ arc. A tapered pin having the dimensions shown in Exhibit "A" and molded from Z-801 nylon had a $90^{\circ}$ bending force of about 3.75 pounds. That is, it took 3.75 pounds to bend the tapered pin in a $90^{\circ}$ arc.

A third index of flexibility is known as the "bending modulus", which is expressed in terms of $inch^2$-pounds. The bending modulus defines beam characteristics of the pin. It defines the deflection characteristics of a cantilever beam in terms of the moment of inertia of the beam structure and the flexual modulus of the beam material.

A tapered pin having dimensions such as shown in Exhibit "A" and molded of Z-801 nylon has a bending modulus of about 85.2 $inch^2$-pounds in the shank area and a bending modulus of about 0.48 $inch^2$-pounds adjacent the tip.

The above data definitely shows that the tapered pin is flexible. These bending characteristics for the tapered pin are disclosed and taught in Exhibit "B", particularly, columns 6 and 7.

Additional evidence of the flexibility of these pins can be seen from certain motion film taken of the tapered pins striking objects. In particular, in Exhibit "L one can see the tapered pin contacting a rag doll under the deck of a mower. The rag doll is a soft doll which compresses readily. Despite the fact that it is a soft doll, the pin is seen to readily bend backward upon contacting the doll without harming the doll. The fact that a soft object like a doll will bend the pin at operational speeds shows the flexibility of the pin.

Mr. E. F. Lindsley, Engineering Editor of Popular Science, also recognized that the pins are flexible. One of the photographs included with his article (attached as Exhibit "K") shows one of the pins being easily bent. Underneath that photograph the text states that "Pins are tough and flexible."

In addition, attached as Exhibit "M" is a photograph of a tapered pin mounted on a disc wherein the tip of the tapered pin is easily bent around to a $90^{\circ}$ position. This bending of the pin shows the flexibility of the pin.

The extreme flexibility of the pins during rotation at conventional speeds is seen vividly when viewed upon striking objects. High speed motion pictures (4000 frames per second) were taken of the tapered pin upon striking objects under the mower deck. The motion pictures were taken through a viewing port in the top side of the deck. The flexing of tapered pins was filmed while the pins were striking a metal stake which was driven in the ground, a childs canvas shoe, foam "peanuts" generally used as packing, and a golf ball. As shown in the film enclosed as Exhibit "N", when striking the stake in the ground, the flexing of the pins is very severe and the pins look like a "wet noodle" which is being shook. The pins flex $90^{\circ}$ through a small radius of curvature and do so rapidly, but return to their straight configuration substantially within one revolution after striking the stake. In the film enclosed as Exhibit "Q", the pins are shown hitting a childs canvas shoe and the packing foam. The pins when striking the canvas shoe flex almost as severely as when striking the stake in the ground and do not damage the shoe. The packing foam is shown impacted by the pins without apparent damage to the foam and the pins appear to be flexing even though the pieces of packing foam are of very low mass. The film enclosed as Exhibit "R" shows the pins hitting a golf ball. The flexing of the pins is extreme even when hitting the golf ball, although not as extreme as with the stake or shoe. With the golf ball, the pins flex through $90^{\circ}$ but the radius of curvature is greater than when the pins hit the stake or shoe.

Since the tapered pin is quite flexible as shown above and is significantly different than known metal or rubber blades, Petitioner submits that the tapered pin should be excluded from the Standard.

Risk Of Injury By Tapered Plastic Pins As A Lawn Mower Blade Is Not Significantly Different Than Risk Of Injury By Monofilament Cutters

As mentioned above, the Commission did not include monofilament cutters within the Standard because they saw significant differences between the monofilament cutters and the metal blades which created the risks that the Commission desires to eliminate. The risk of injury from a tapered pin is not significantly different than the risk of injury by monofilament cutters. Tapered pins react substantially the same with respect to causing injuries as the monofilament cutter.

The Battelle report, mentioned above and attached as Exhibit "E", shows that the risk of injury from a tapered pin is not significantly different from that of a monofilament cutter. The effect of both devices upon the piglet was substantially the same in that neither device caused significant injuries. Battelle concluded that "All of the non-rigid cutting elements investigated in this study produced only minor injuries."

The monofilament cutters produced, at most, abrasions and bruises to the piglet. The tapered pin produced only scrapes and bruises. The injuries caused by the monofilament cutters are shown in the picture attached as Exhibit "H". The injuries caused by the tapered pins are shown in the pictures attached as Exhibit "G".

It should be noted that in the Battelle experimental program, the worst condition for the monofilament cutter was at 7700 rpm and a filament diameter of 0.065 inch. The filament tip traveled in a 12 inch diameter for that experiment resulting in a tip speed of about 24,200 feet per minute. Current filamentary cutters in trimmers operate at a higher tip speed and with larger diameter monofilament without producing a significant risk of injury to Petitioner's knowledge. Commerically available filament trimmers are believed to operate at a tip speed of 29,000 to 35,000 feet per minute and use a monofilament having a diameter of 0.100 to 0.125 inch. It is believed that the higher tip speed and the larger diameter should be more egregious than the filament cutters tested by Battelle. Yet, these commerically available trimmers have not resulted in a significant risk of injury to Petitioner's knowledge.

Since the tapered pin does not produce a significantly different risk of injury than a monofilament cutter and the monofilament cutter has not been included within the Standard, Petitioner submits that the tapered pin should also not be included within the Standard

The Destructive Effect Of The Tapered Plastic Pin Is Significantly Less Than The Destructive Effect Of Steel Blades

The Commission adopted the Standard to reduce injuries caused by known lawn mower blades. The Commission stated in its Summary of the promulgation of the Standard "The Commission adopts a consumer product safety standard containing performance requirements intended to reduce injuries from contact with the rotating blades of rotary walk-behind power lawn mowers having a rigid or semi-rigid blade, the type consumers usually use." (See Federal Register, Volume 44, No. 33, Thursday, February 15, 1979, p 9990) The tapered pin is not a rigid or semi-rigid blade of the type consumers usually use. It is significantly different and its destructive effect is significantly different.

Consumers Union discovered the significant difference between the destructive effect of the tapered pins and conventional steel blades during their testing. In their report, Exhibit "P" attached, they reported that "It [tapered pins] did not shatter stones, break bottles, or even cut through a soda can, as conventional mowers do." Consumers Union also discovered that the tapered pins did not impart as much momentum or energy to foreign objects and reported "Thanks to the flexibility of its cutting pins,. . . [it] did not throw the objects forcefully or far."

The fact that the tapered pins do not impose the destructive effect of steel blades is well known to Petitioner. This lack of destructive effect is shown in the motion picture enclosed as Exhibit "L". That film shows a comparison of the effect of the tapered pin and a steel blade on a rag doll. The tapered pins gently move the doll around the periphery of the mower and out the discharge chute. The steel blade immediately catches the rag doll and begins ripping it to shreds. The steel blade ultimately and totally destroys the doll.

Another comparison between the destructive effect of the tapered pins versus the steel blade are shown in the photograph attached as Exhibit "O". The mower on the left hand side utilized tapered pins while the mower on the right hand side utilized a steel blade. The objects shown in front of each mower were run over by that mower. The child's canvas shoe, rag doll, metal toy and juice glass which were run over by the tapered pin mower are unscathed as shown in the photo. Duplicates of those objects which were run over by the metal blade mower are shown destroyed. The sole of the child's canvas shoe is split wide open and there are numerous cuts in other areas of the shoe. The rag doll is cut and ripped to shreds. The metal toy is bent, twisted, cut and broke. The juice glass is shattered.

Mr. Lindsley, Engineering Editor of Popular Science, in his article attached as Exhibit "J" made a comment concerning the comparative destructive effect between tapered pins and steel blades. He stated, "Weed patches tend to hide stones, stumps, and other obstacles that ruin blades and crank shafts. I used the Whip Stik in just such an area. . . .The noises were horrible as I hit fist-sized rocks and exposed roots. A blade would have been a wreck here, but nothing happened to the Whip Stik."

Another observation of the lack of destructive effect of the tapered pins was made by Mr. John Bowman, Managing Editor of The Daily Journal . In an article published in that newspaper on Friday, September 17, 1976, copy enclosed as Exhibit "K", Mr. Bowman observed some tests of tapered pins and stated in his article:

> "Then he [Mr. Scanlon] ran the mower over a soft drink can to show that the mower does not shred metal and does not send objects streaking through the air as a steel blade mower does. He also ran the mower over a cotton doll without tearing the doll."

Mr. Bowman also reported in his article as follows:

> " [Alan] Ehrlich [standards coordinator for the CPSC's office of standards coordination and appraisal] then was permitted to conduct his own test of the machine's safety. He had brought along several thin wooden dowels. Each had a different type of tape wrapped around it. He inserted each of the dowels into the running mower, then

> examined each. There were some marks on some of the thinnner pieces of tape but no marks on the tougher types, such as electrical tape."

Mr. Scanland discussed the test with Mr. Ehrlich. Mr. Ehrlich stated that the dowel was to simulate a finger and the different tapes were to simulate skin. The tapes were graduated in thickness and toughness to provide a range. If the tapered pins did not break or cut through the tape, then Mr. Ehrlich would consider them acceptable as a cutting means. The tapered pins did not cut through the tape on Mr. Ehrlich's test dowels.

Summary

The Commission in promulgating the Standard and including within the Standard semi-rigid blades stated:

> ". . .no convincing evidence has been presented to the Commission to show that these blades semi-rigid present a different risk of injury than metal blades. If these blades are rigid or semi-rigid, they appear to present an unreasonable risk of amputation, laceration, fracture, or avulsion in the same manner as metal blades."

The facts submitted above show that the tapered pin as a cutting means does present a different risk of injury than metal blades. The tapered pin does not present an unreasonable risk of amputation, laceration, fracture, or avulsion in anywhere near the same manner or magnitude as metal blades.

The evidence demonstrates that the risk of injury presented by the use of tapered plastic pins as a lawn mower blade is, at the most, minimal and that the Standard should not be applied to rotary lawn mowers utilizing such tapered plastic pins. Therefore the Commission should exclude the tapered plastic pins from the Standard, for to do otherwise would not be in the public interest.

The Petitioner requests the prompt action of the Commission on this petition. Should the Commission desire further information on the tapered plastic pins, please contact the Petitioner.

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