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On Safety Codes and Standards

by Ralph L. Barnett¹

Synopsis

This article posits that 1) compliance, or non-compliance, with safety codes is presently the only rational way to judge whether a design is safe or defective, and 2) safety codes cannot properly protect the public interest unless they define both lower and upper bounds, or limits, on the conduct of designers. Engineers are introduced to the doctrine of "rebuttable presumption" relative to safety standards. Further, a semantic problem concerning the use of the term "minimum safety standards" is addressed.

I. Introduction

One cannot minimize safety defects in technological creations without a clear definition of *defect*. The pontification of the judicial system is simply not good enough for the designer. At present, the very best we can offer the men and women who build our systems are the traditional codes and standards that arise from consensus, regulation or legislation. Very few states, however, accept compliance with professional safety codes as a defense in product liability cases.

The notion that code compliance should represent a rebuttable presumption of safe design is explored in the following "Discussion" previously published by the author.

II. Rebuttable Presumption

In 1981, the American Society of Mechanical Engineers published a position paper entitled "The ASME Code and Product Liability: Should Compliance Create a Rebuttable Presumption of Proper Design?" by M.S. Seltzer.²

The following discussion of this paper by Ralph L. Barnett was published in response to an invitation by the Pressure Vessels and Piping Division of ASME:

Discussion

"The dwarf sees farther than the giant when he has the giant's shoulders to mount on." (Coleridge: The Friend VIII)

Engineers recognized this simple truth very early in the development of their profession and they began to form code committees to pool the best, the latest and the most balanced thinking on specific design problems. The effectiveness of their codes in promulgating advanced technology encouraged them in their efforts to pursue this effective form of communication among their practitioners and their students. To this end, enormous amounts of time and money were volunteered in the professional pursuit of code development and code updating. Given this background, can you imagine the engineer's frustration when he discovered that the field of product

¹ Professor, Mechanical and Aerospace Engineering, Illinois Institute of Technology, Chicago, Illinois.

² American Society of Mechanical Engineers, *Critical Issues in Materials and Mechanical Engineering*, PVP-Vol. 47 (1981) pp. 219-233

liability regarded compliance with his codes as a necessary, but not sufficient condition for prevailing in a product liability lawsuit based on design? The fact is that very few states accept code compliance as a defense in a product liability case and, indeed, many states will not even allow the codes to be introduced.

The fundamental argument against the use of codes stems from a 1932 decision by Judge Learned Hand:

“Indeed, in most cases reasonable prudence is, in fact, common prudence; but strictly, it is never its measure; a *whole calling* may have unduly lagged in the adoption of new and available devices.”

The overwhelming response to this decision has been to emphasize the negative aspects of the ruling and not its positive ones. Slowly, ever so slowly, it has become apparent to the legal profession that the social consequences of disregarding the positive contribution of code compliance are unacceptable from both a safety and an economic point of view. An important outcropping of this concern may be found in the Draft Uniform Product Liability Law described in the Federal Register Vol. 44, No. 9, January 12, 1979. Referring to Section 106(e) we find the following proposal:

“A product seller may, by a motion, request the court to determine whether the injury-causing aspect of the product conformed to a non-governmental safety standard having the following characteristics:

- (1) It was developed through careful, thorough product testing and a formal product safety evaluation;
- (2) Consumer as well as manufacturer interests were considered in formulating the standard;
- (3) It was considered more than a minimum safety standard at the time of its development; and
- (4) The standard was up to date in light of the technological and scientific knowledge reasonably available at the time the product was manufactured.

If the court makes such a determination in the affirmative, it shall instruct the trier of fact to presume the product was not defective. This presumption may be rebutted by clear convincing evidence that, in light of the factors set forth in Sections 104(b) and (c), the product was defective.”

It is clear that the position expressed by Martin S. Seltzer, in the issue which I am discussing, is in complete harmony with that espoused by the Draft Uniform Product Liability Law. The rebuttable presumption concept represents nothing short of a revolution in legal thinking. It provides a means for defining “reasonably safe.” It provides a fixed, tangible entity — a criterion that all can use to judge acceptability or unacceptability of a design. Let us contrast this with the conventional position of the legal community which says to the engineer and the manufacturer, “Don’t put any defects into your devices and your systems.”

Engineers and manufacturers have responded to this admonition by saying, “OK, we’ll take out the defects, if you’ll tell us what they are.” The judicial system then responds with the greatest array of irrational and ephemeral definitions ever introduced into an intellectual arena. For example:

(1) The definition of “defect” will be left to each jury, as well as the application of such definition.

(2) A device is defective if its benefits do not outweigh its inherent dangers. The burden of determining the adequacy of a product’s design under the “risk-benefit” standard shall shift to the defendant. [**Barker v. Lull Engineering Co. (20C.3d413).**]

(3) A device is defective if it is not designed for its foreseeable use which includes both its intended use and its reasonably foreseeable misuse. Here, we note that the concept of reasonably foreseeable misuse is more complicated than the definition of “defect” itself.

There is a German aphorism which states, “It is better a certain law than a just one.” Products law, which depends intimately on the definition of a defect, provides neither certainty nor justice.

The central notion of this position paper by M.S. Seltzer is the achievement of a controlled balance between cost and safety while providing protection against lawsuits. Balancing cost and safety is the heart of the practice of engineering. If engineers succumb to the creation of standards which protect against the extreme misuses of our products, we accomplish several things:

- (a) We maximize product cost to every citizen;
- (b) We maximize the profits to engineers and manufacturers;
- (c) We minimize the legal exposure of engineers and manufacturers.

In short, we become prostitutes. Furthermore, we will not decrease accidents because we are not smart enough to deal with “misuse.” According to Henry David Thoreau, “It is impossible to make anything foolproof because fools are so ingenious.”

III. Minimum Safety Standards

The rejection of code compliance as a defense in product liability cases is due, in part, to a semantic trap which engineers created and by which they’ve subsequently been ensnared. Engineers constantly use the term “minimum” in their codes: “minimum criteria,” “minimum requirements,” etc. Trial attorneys regularly exploit the fact that these technologists who draft codes are not word craftsmen. Regardless of how strict and far reaching the admonitions of safety codes, some members of the legal community characterize them as “merely minimum standards of safety.” Codes, so characterized, can never meet the third criteria quoted from the Draft Uniform Product Liability Law; “it was considered more than a minimum safety standard at the time of its development.” An

examination of several hundred codes and standards, however, reveals that they do not establish a *minimum* level of safety at all —

Codes and standards establish *minimum means* for achieving a *desired level* of safety.

The following excerpts are typical of what we found in our code review (emphasis added in all examples):

1981: *American National Standard for Oxygen Concentrators for Medical Use, ANSI Z79.13-1981*. New York, American National Standards Institute, Inc., 1981

“This standard was developed by physicians, manufacturers, and paramedical personnel to guide individuals employing this new device for oxygen therapy in respiratory care. It specifies *minimum requirements for the safety*, performance, and control of oxygen concentrators for medical use.”

1980: *American National Standard for Diving Equipment for Commercial and Industrial Diving Operations, ANSI Z135.3-1980*. New York, American National Standards Institute, Inc., 1980.

“Recognizing the risks inherent in or associated with these diving operations, the standard provides *minimum requirements and guidelines for the safe design*, fabrication, and maintenance of the diving equipment employed.”

1973: *American National Standard for Elevating Work Platforms, ANSI A92.3-1973*. New York, American National Standards Institute, Inc., 1973.

“This standard, like the previous ones, is intended to set forth *minimum requirements* that must be considered and built into such work platforms to provide for *proper and safe operations*.”

1981: *American National Standard Safety Requirements for Portable Wood Ladders, ANSI A14.1-1981*. New York, American National Standards Institute, Inc., 1981.

“This standard prescribes *rules* and establishes *minimum requirements* for the construction, testing, care, and use of the common types of portable wood ladders described herein in order to *ensure safety* under normal conditions of usage.”

The required level of safety is never explicitly characterized in any of the codes and standards. Each code contributor brings to the consensus standard his own notions of humanity tempered by his experience, safety research studies, accident statistics, case law, insurance premiums, and a subjective feeling for the nature of things. To

this value system, composed of many hearts, the drafters of codes specify explicit means for achieving their notion of an acceptable level of safety. The level of safety, however ephemeral, is acceptable, not minimal. In the codes studied, the word “minimum” always applies to the conduct of the designers, maintainers, and users of the products, or to the devices or warnings needed to *assure safety*.

IV. Maximum Safety Standards/ Unreasonably Safe Design

Consider the hypothetical design of a 100 psi pressure vessel that employs a safety factor of five on the ultimate strength as specified in a safety code. Through experience, some users discover that they can carry 500 psi in these tanks. If an explosion occurs at such pressure levels, one will be confronted with the legal arguments that the safety code which specified the safety factor of five is merely a minimum standard and that this misuse of the tank was reasonably foreseeable. The tank design is, therefore, defective because its safety factor is too low. Some designers will respond to these legal attacks by increasing the safety factor to eight, whereupon, the entire scenario is repeated at 800 psi with the accusation that eight is too low a safety factor.

Clearly, there is no upper bound on the size of the safety factor which is determined by such a process. It is entirely possible that conscientious users of 100 psi tanks could be forced to use vessels with a 1500 psi ultimate strength; i.e., with a safety factor of 15. Assume, for simplicity, that the tank cost is proportional to its ultimate pressure capacity (although in actuality, the situation is much worse). The safety code requires that the user pay five times the functional cost to achieve the “acceptable level of safety” defined by its drafters. When the safety factor is augmented by the product liability system to 15, all conscientious users will pay more than three times what the code intended, albeit the level of safety has been increased over the previously established *acceptable* level. This “hidden tax” on conscientious users is analogous to the insurance premiums paid for “uninsured motorist” protection.

The public has traditionally looked to engineers to protect their economic interests by balancing all factors, including safety and function. Does the “safety at any cost” system just described square with this professional mandate?

There is, of course, nothing intrinsically wrong with exceeding an acceptable level of safety and it would not appear logical or practical to place an upper bound on the safety level itself. However, the *means* for achieving safety can be limited or bounded by safety codes to provide economic protection to the public. In our example, the safety code would incorporate an additional requirement that the safety factor *not exceed a specified value*.

What Is a Defect (Part III)

The current definition of a defective product in each state may be found in the case law of that state. Triodyne Inc. relies on the trial bar for the selection of the leading court decisions. It is a pleasure to acknowledge the efforts of our contributors.

Colorado

Bradford v Bendix-Westinghouse Automotive Air Brake Co., 33 Colo. App. 99, 517 P.2d 406 (1974) In this case, a motorist was injured when struck from the rear by a truck that lost its air brake power while heading downhill. The motorist and her insurer brought a product liability action against the manufacturer of the truck brake pedal assembly.

The court found for the plaintiff, adopting the doctrine of strict liability as defined in Restatement (Second) of Torts §402A:

“(1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if

(a) the seller is engaged in the business of selling such a product, and

(b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold.

(2) The rule stated in Subsection (1) applies although

(a) the seller has exercised all possible care in the preparation and sale of his product, and

(b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.”

The court goes on to say:

“Under this formulation, a plaintiff must show that the product in question was sold in a defective condition unreasonably dangerous to the user; that the injury to the ultimate user was caused by the defective condition; and that the product reached the user without substantial changes in the condition in which it was sold.”

The court uses the word “defective” to encompass “imperfections in manufacture,” “use of material which is unsafe for purpose intended” and “unreasonably dangerous design.”

Union Supply Co. v Pust and Holly Sugar Corp., 196 Colo. 162, 583 P.2d 276 (1978) An employee in a sugar beet refinery had his arm nearly severed when he reached under a conveyor belt with a pole to scrape away loose pulp. The injured employee brought action against the manufacturer of the conveyor system on theories of strict liability and implied warranty. The manufacturer brought a third-party action for indemnity against the refiner.

Mr. Pust’s strict liability claims were for “1) design defects in the conveyor; and 2) failure to adequately warn of the hazards of working at the ‘nip point’ of the conveyor.”

In addressing Mr. Pust’s first claim, the Supreme Court of Colorado agreed with the Colorado Court of Appeals in **Bradford v Bendix-Westinghouse Automotive Air Brake Co.** stating, “if a product is unreasonably dangerous because of a defect in its design strict liability may lie.”

The court went on to clarify the liability of a manufacturer of component parts:

“Elements of strict liability cause of action based on design defects against manufacturer of component parts are that component parts must be in defective condition unreasonably dangerous to user or consumer, that product is expected to and does reach user or consumer without substantial change in condition in which it is sold, that design defect must be cause of plaintiff’s injury, that defendant sold product and is engaged in business of selling such products, and that plaintiff has sustained damages as result.”

“In order to maintain strict liability cause of action based on design defects against manufacturer of component parts, showing must be made that defectively designed component parts were not expected and did not undergo substantial change after they left manufacturer’s hands.”

“Small changes and minor processing will not relieve component parts manufacturer of liability in a products liability cause of action based on design defects.”

“Substantial changes which do not affect a preexisting design defect in parts do not absolve component parts manufacturer of liability in a products liability cause of action based on design defects.”

“In strict liability cases, court is not concerned with who had duty to provide safety guards, but rather with whether product was in defective condition unreasonably dangerous because of failure to provide safety guards before it reached ultimate user or consumer.”

Addressing Pust’s second claim that Union Supply failed to adequately warn of danger, the court maintained:

“Defective condition of a product is ‘unreasonably dangerous’ to user or consumer if manufacturer does not give sufficient warnings of dangers inherent in product or in its intended use in order to make it safe.”

“Alleged patent nature of defect in product is not in and of itself a defense to strict liability; simply because hazard is open and obvious does not prevent it from being unreasonably dangerous to user or consumer.”

“Assumption of risk, voluntarily and unreasonably proceeding to encounter a known danger, is a defense to strict liability.”

“To establish assumption of risk defense to strict liability, defendant must demonstrate that plaintiff had actual knowledge of specific danger posed by defect in manufacture or design, not just general knowledge that product could be dangerous.”

“Defendant has burden of establishing assumption of risk defense to strict liability.”

“Ordinary contributory negligence, consisting of failure to exercise due care to discover a defect or to guard against its possible exercise, is not a defense to strict liability.”

(Cases selected by: Robert A. Zupkus, White & Steele, 1660 Lincoln Center Building, Denver, CO 80203.)

Connecticut

Wachtel v Rosol, 159 Conn. 496, 271 A.2d. 87 (1970) In this case the plaintiff became ill after eating an egg salad sandwich contaminated with salmonella bacteria. He brought action against the seller of the sandwich to recover damages in the first count for breach of an implied warranty of merchantability and in the second count on the theory of strict tort liability.

The Supreme Court of Connecticut addressed the second count. Following precedents set in **Rossignol v Danbury School of Aeronautic, Inc., 154 Conn. 549, 559, 227 A.2d 418** and **Garthwait v Burgio, 153 Conn. 284, 289, 216 A.2d 789**, the court adopted the principles stated in §402A of the Restatement (Second) of Torts, ruling that the sandwich falls within the meaning of “any product” in the Restatement. The rule set forth in the Restatement is as follows:

“Special Liability of Seller of Product for Physical Harm to User or Consumer (1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if (a) the seller is engaged in the business of selling such a product, and (b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold. (2) The rule stated in Subsection (1) applies although (a) the seller has exercised all possible care in the preparation and sale of his product, and (b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.”

Giglio v Connecticut Light and Power Co., 180 Conn. 230, 429 A.2d 486 (1980) The owner of a gas furnace was severely burned when she opened the furnace door while the pilot light was on but the furnace was not

running. There was a “roll-out” of flames caused by unburned fuel that accumulated in the furnace. The plaintiff contended that Connecticut Light and Power’s failure to warn of the “roll-out” danger constituted an unreasonably dangerous condition, thereby rendering the furnace defective.

The Supreme Court of Connecticut agreed with the plaintiff. Upholding precedents set in **Garthwait v Burgio** and **Rossignol v Danbury School of Aeronautics, Inc.**, the court again accepted the principles contained in §402A of the Restatement (Second) of Torts.

“In order to recover under the doctrine of strict liability in tort the plaintiff must prove that: (1) the defendant was engaged in the business of selling the product; (2) the product was in a defective condition unreasonably dangerous to the consumer or user; (3) the defect caused the injury for which compensation was sought; (4) the defect existed at the time of the sale; and (5) the product was expected to and did reach the consumer without substantial change in condition.”

“The plaintiff must prove that the product is unreasonably dangerous. Comment i of the Restatement (Second) of Torts, §402A, defines an ‘unreasonably dangerous’ product as one dangerous to an extent beyond that which would be contemplated by the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics.”

The court added:

“In this regard, it is important to note that it is not necessary that the plaintiff in a strict liability tort action establish a specific defect, so long as there is evidence of some unspecified dangerous condition.”

Regarding warnings, the court stated:

“Failure of seller to give adequate warnings of dangers in a product of which he knows or should know, not only dangers arising from improper design or other negligence in manufacturing, but also dangers inseparable from a properly made product of the particular kind, is, itself, a defect.”

“Duty to warn involves more than instructions intended for service personnel; warning must consider consumer’s comprehension; technical language or instructions are insufficient as is language directed to persons who could not reasonably be expected to understand the nomenclature; warnings must specifically identify for user the danger inherent in the product’s use.”

(Cases selected by: John Bradley, Great American Insurance Co., Hartford, CT.)

SAFETY BRIEF



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Consulting Engineers and Scientists

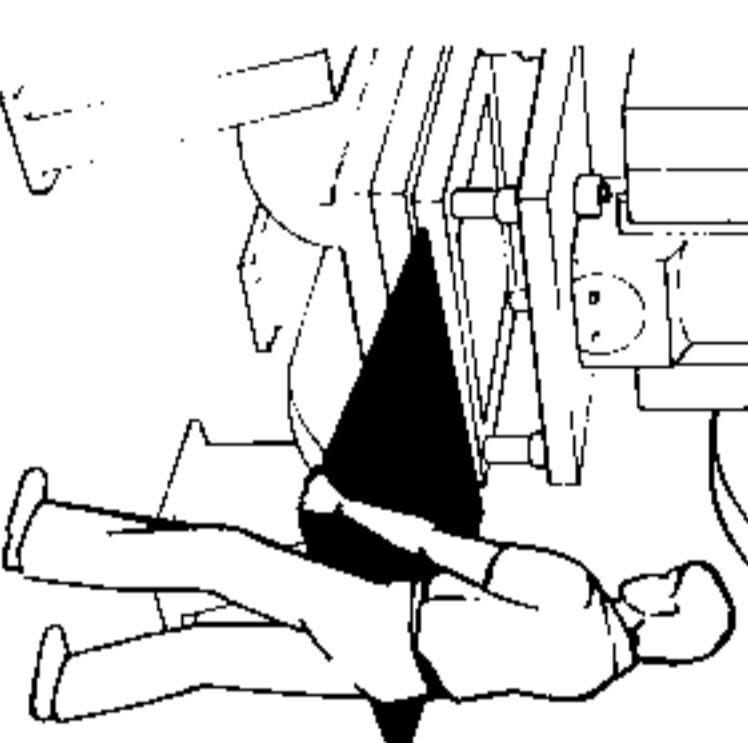
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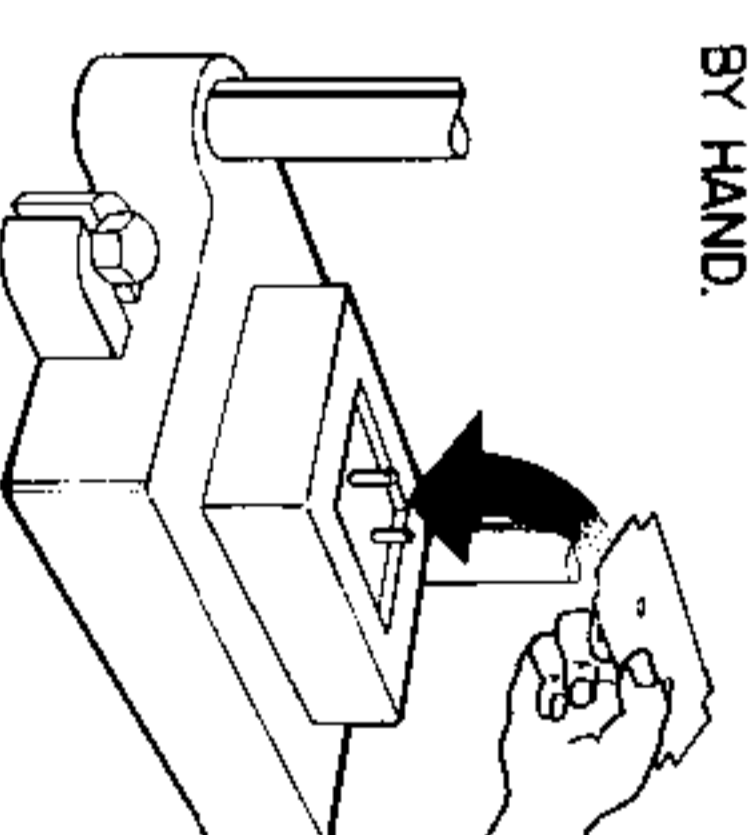
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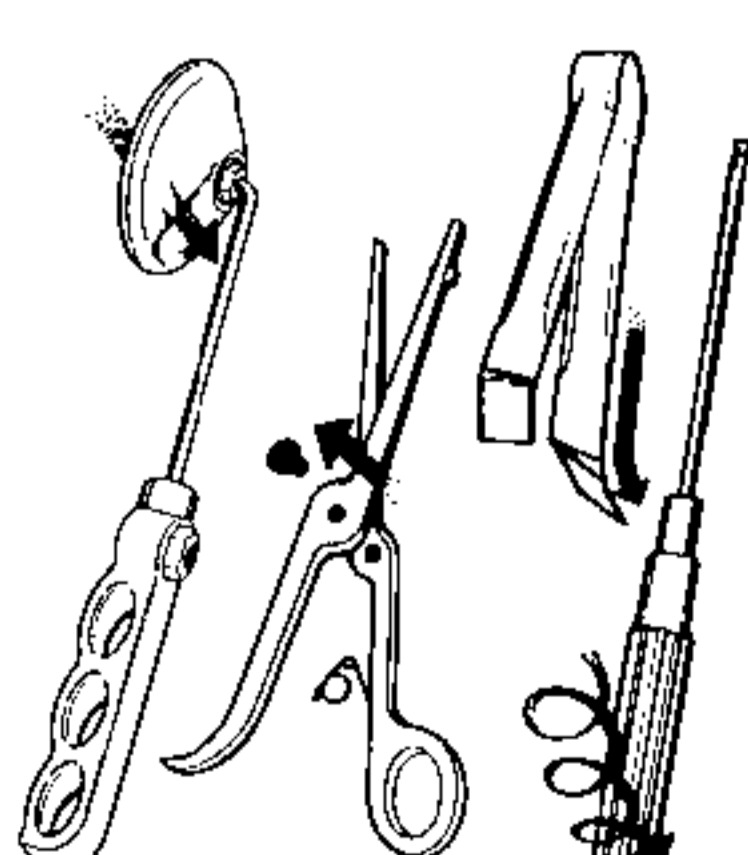
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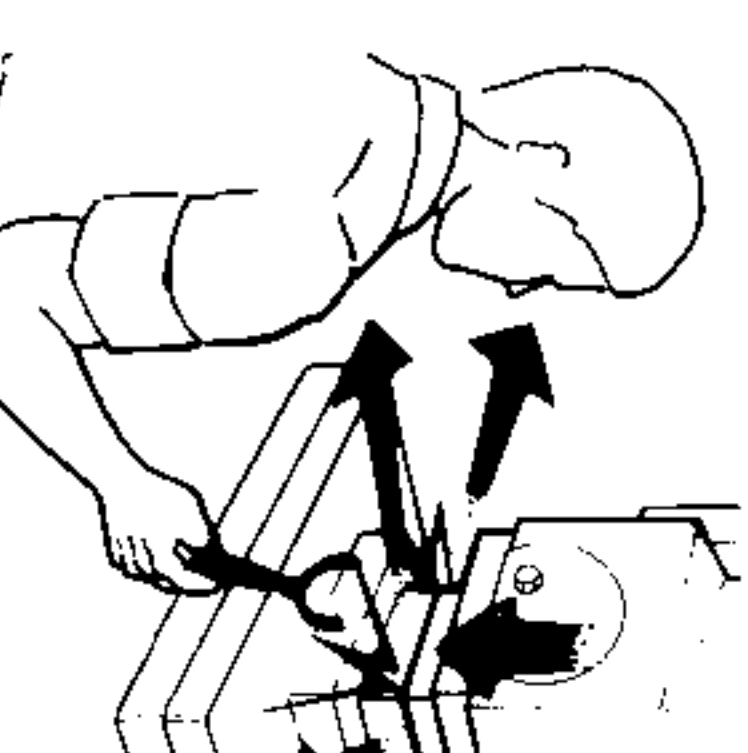
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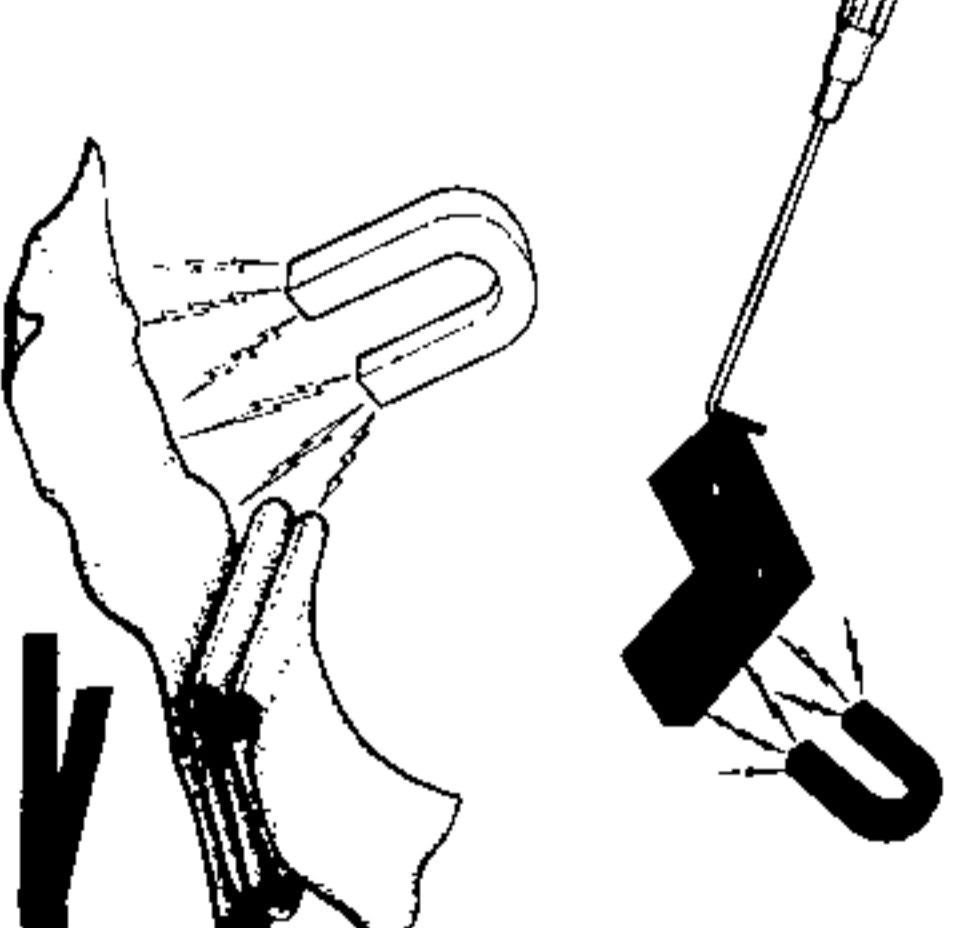
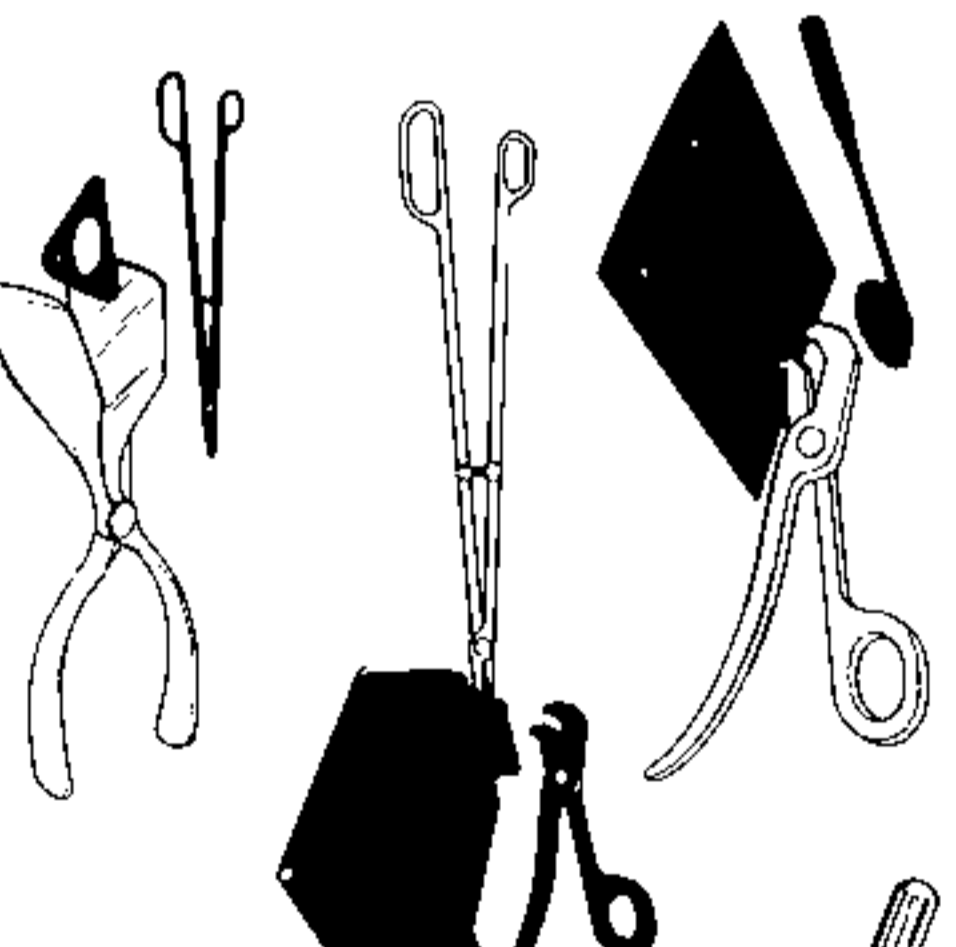
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