4

Zippers and Development

One of the many time-consuming and often frustrating tasks faced daily in the nineteenth century was the fastening and unfastening of the many buttons or hooks and eyes found on articles of clothing, including high-button shoes. With so many fasteners spaced so closely together, it was not uncommon for someone dressing quickly or inattentively to skip a button or a hook, only to find an extra button hole or eyelet at the bottom of a vest or the top of a blouse, requiring a lot of undoing back to the mistake and then redoing. Among the many people who must have noted and even cursed this and other problems with buttons and hooks and eyes was Elias Howe, Jr., the inventor of the sewing machine. Rather than just complain about the problem, however, Howe came up with "certain new and useful Improvements in Fastenings for Garments, Ladies' Boots, and other articles to which they may be applicable," and he was awarded a patent in 1851. His patent consists of one page of drawings (Fig. 4.1) and one page of text.

Howe's device, like all inventions, addressed shortcomings associated with the existing way of doing things, as he clearly stated: "The advantage of this manner of fastening garments, &c., consists in the ease and quickness with which they can be opened or closed, while there is no liability of their getting out of order." The manner in which the new fastening device was intended to function can readily be seen in the patent drawings, and it clearly could work in principle. Certain difficulties in its continued smooth operation can also be easily imagined, however. For example, Howe's fastening device would require that its metal clasps fit snugly, but not too tightly, around the beaded fabric along which they would slide. Assuming that this close tolerance between the clasps and beading could be achieved in manufacture, it is questionable that it could be maintained long in use. As the fastening device was sat upon or bumped while moving about, the clasps would no doubt be bent to the

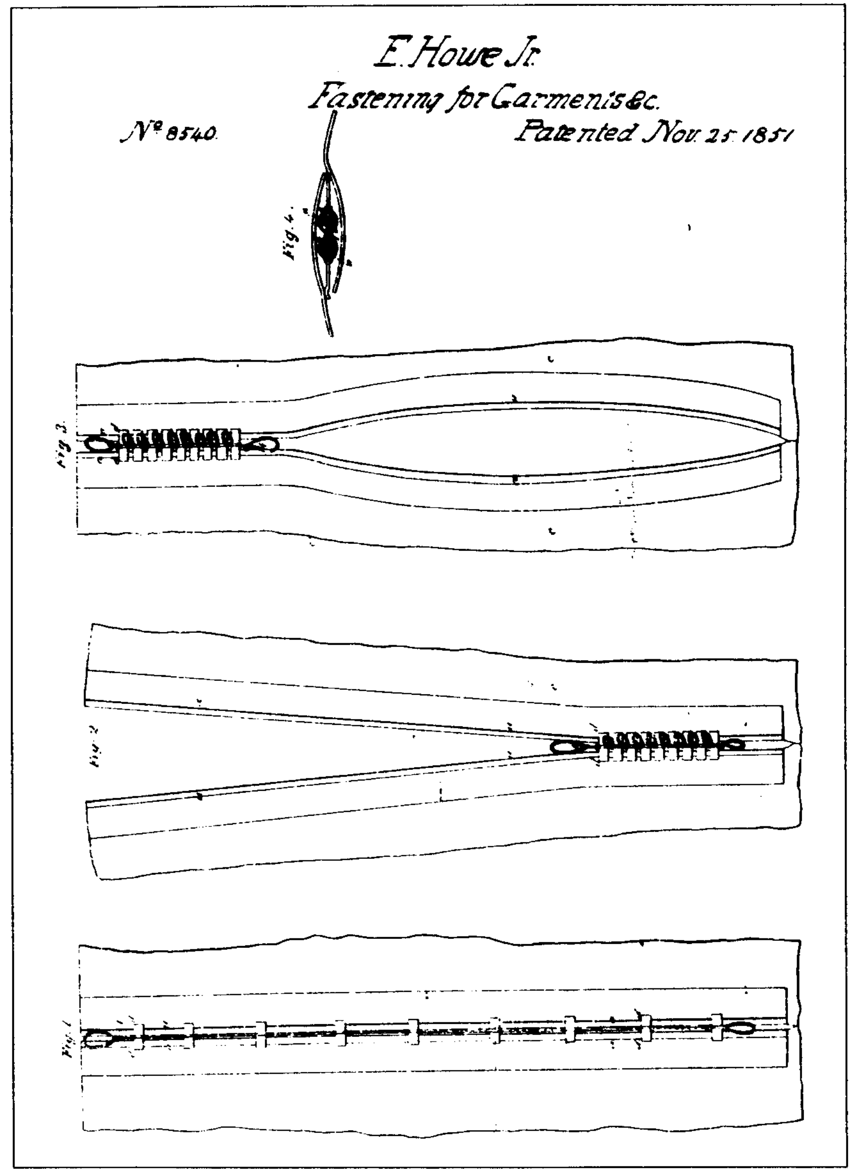


FIGURE 4.1 Elias Howe, Jr.'s 1851 patent for a fastening device

point where they would become more closed and thus bind on the cloth or become more loose and thus pull free from the beading. Even if those problems could be avoided, in time the repeated back-and-forth movement of the metal clasps on the fabric would fray it to an ineffective, or at least an unsightly, condition.

Whether he foresaw these as insurmountable difficulties with his invention or whether he put it aside because of his preoccupation with potentially more lucrative patent-infringement lawsuits that he was pursuing against thriving sewing machine manufacturers like Isaac Singer, Howe appears not to have tried to improve and market his garment-fastening device. Thus, the design was not developed into a successful product, and it survives only on paper. Some historians of technology even deny it a place in the history of the zipper, arguing that it does not have the interlocking teeth that characterize a true zipper.

SLIDE FASTENERS

The person generally credited with inventing the zipper, although it would not be called that for more than 30 years after he obtained his first patents for the device, was Whitcomb L. Judson, a Chicago mechanical engineer whose earlier patents related to such things as a "pneumatic street railway," whose motive power was derived from compressed air. Judson has been described as a portly individual who had grown tired of bending over to lace up his high boots. Thus finding fault with existing technology, Judson came up with a "clasp locker or unlocker for shoes," for which he applied for a patent in 1891. Unlike Howe, Judson did not neglect his idea, and he kept thinking of ways to improve upon his own invention. Even before the first patent was issued he filed for another, for a "shoe fastening" device (Fig. 4.2). Unlike his first idea, which would have altered the way shoes were manufactured, Judson's newer scheme had the advantage of being able to be laced into existing shoes. Both applications were approved, and the patents were granted on the same day in 1893. While Judson may have been motivated by the difficulty he encountered in bending over to tie his shoes, he clearly recognized that his invention had much wider application: "'The invention was especially designed, for use as a shoe-fastener; but is capable of general application wherever clasps consisting of interlocking parts may be applied, as for example, to mail bags, belts, and the closing of seams uniting flexible bodies." All these applications would indeed be made, but first the basic

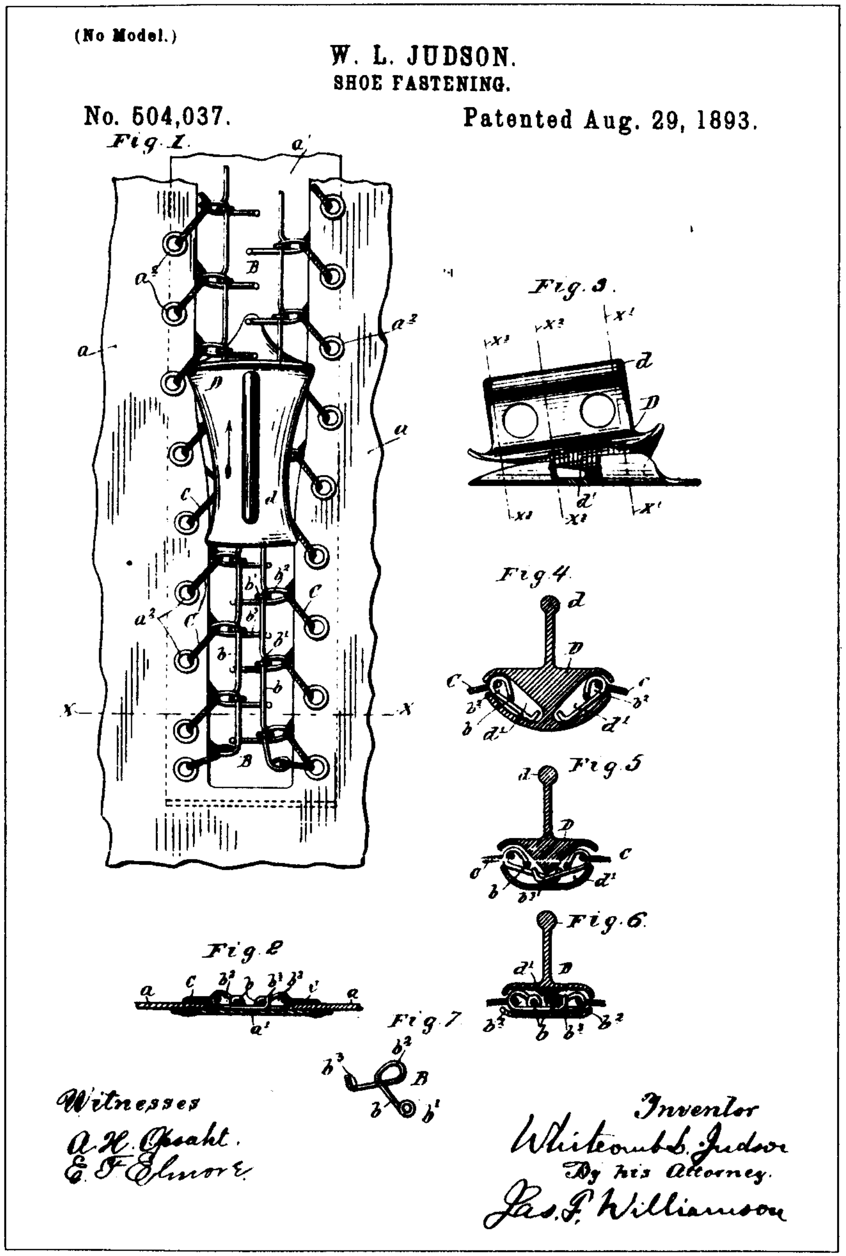


FIGURE 4.2 A second patent issued to Judson in 1893, for a shoe-fastening device

design had to be developed into a reliable device that could be economically manufactured.

The promise of Judson's idea attracted the support of Harry L. Earle, whom Judson had known since they were both salesmen of agricultural machinery and who had been a promoter of the pneumatic railway scheme. Principal financial backing came from Lewis A. Walker, a Pennsylvania lawyer who foresaw a fortune to be made from Judson's invention, and the Universal Fastener Company was formed to exploit the patents. Judson's next two patents, issued in 1896, were assigned to the company, and they show designs that look more substantial. Early Universal fasteners did not sell very well, however, in large part because they tended to pop open at inopportune times and because their sharp edges and pointed ends tended to tear the fabric of what they were supposed to fasten. Furthermore, unless the labor-intensive methods of manufacturing early versions of the devices were effectively automated, the prices of the fasteners could not be kept low enough to make them attractive to potential customers. Thus, Judson had to continue to develop his device while at the same time design a machine to manufacture it.

A decade after his first fastener-patent application, Judson applied for a patent for a "chain-making machine," which was granted in 1902 (Fig. 4.3). This machine was designed to make the "interlocking chains . . . of hooks and links" that were crucial components of a successful fastener. Compared to the earlier patents for the fasteners, this one for the machine is long, with eight pages of drawings and nine of text. This should not be surprising, however, for machines that can automate the manufacture of complex products are even more complex, and can contain a great deal more moving parts, than their products. Unfortunately, neither Judson's machine nor the variety of fasteners that it made was reliable or effective enough. He thus developed a new fastener device, in which the troublesome chains were replaced with hooks and eyes fastened directly to lengths of fabric that could be attached to shoes, garments, and other items, and it was possible to make a simpler machine. In the meantime, the Universal Fastener Company had evolved into the Fastener Manufacturing and Machine Company, which in turn became the Automatic Hook and Eye Company.

The new fastener was marketed under the name C-curity, which clearly implied that it did not share its predecessors' characteristic of popping open when it was not supposed to. Advertisements for the C-curity fastener trumpeted its advantages: "A pull and it's done! No more open skirts . . .

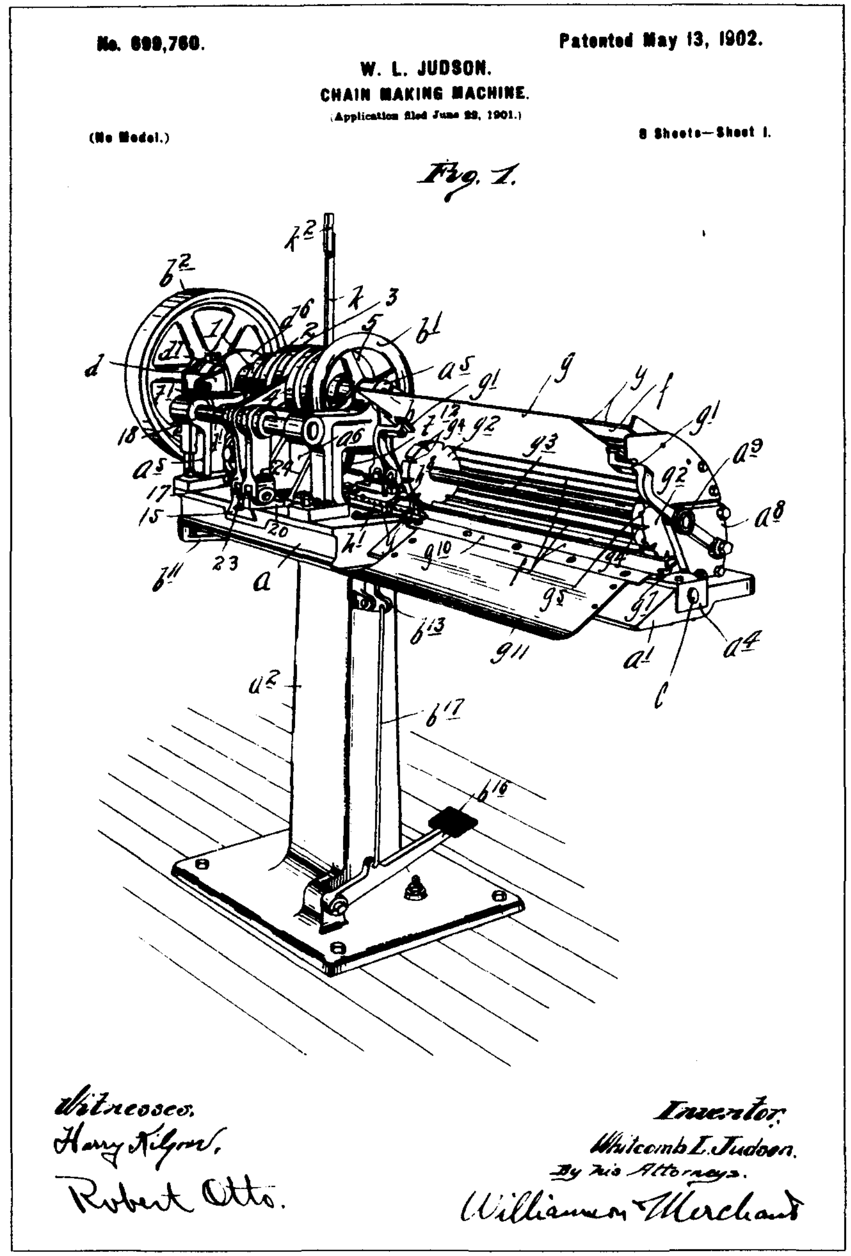


FIGURE 4.3 Patent for a chain-making machine

Your skirt is always securely and neatly fastened." Unfortunately, the product did not live up to its promise, and C-curity fasteners were famous for pulling apart when they were supposed to be holding securely together and for the slider getting stuck at the end, locking the embarrassed wearer into an open skirt or pair of trousers. Every manufacturer should want to know of such problems with its products, of course, so that they may be addressed in further development. However, in the case of C-curity, the already wordy and complicated instructions for applying the fastener to garments seemed to convey a lack of uncertainty on the part of the manufacturer: "Customers will confer a favor on us by reporting any difficulty in applying fastener, in which case we will send more detailed instructions."

The Automatic Hook and Eye Company was becoming concerned that Judson's earliest patents were soon to expire, and other inventors were beginning to patent newer versions of what were coming to be known as slide fasteners. Among these was Ida Josephine Calhoun, of Tampa, Florida, whose 1908 patent represented an "improvement in the application of the slide fastener to dresses." At about the same time, inventors in Europe were also being issued patents for slide fasteners. One design that was very similar to what would eventually become the familiar zipper was invented by Katherina Kuhn-Moos and Henri Forster of Zurich, Switzerland, who received Swiss, German, and British patents in 1912.

In the meantime, the Automatic Hook and Eye Company had hired Gideon Sundback, who was born in Sweden and educated in Sweden and Germany as an electrical engineer. He came to America in 1905 and began working for the Westinghouse Electric and Manufacturing Company in Pittsburgh, but a year later went to work for Automatic Hook and Eye as a draftsman and design engineer responsible for further development of the machinery. Sundback was brought to Automatic Hook and Eye by Peter Aronson, who had been responsible for keeping "Judson's machine running long enough and steadily enough so that its defects could be diagnosed and cured," and who had come to be in charge of manufacturing. It has also been said that Aronson's daughter, whom Sundback later married, had something to do with the engineer leaving Westinghouse for Automatic Hook and Eye. While Sundback's electrical engineering background might appear to have been odd for someone expected to work on the development of machinery that was more in the realm of mechanical engineering, such seemingly cross-disciplinary career moves by engineers have always been common. Well into the second half of the twentieth century, there was a great deal of commonality among the different engineering curricula, with electrical engineers expected to know about machinery and mechanical engineers expected to know about electricity.

Sundback began working on improvements to the C-curity fastener, which continued to have a tendency to spring open when it was flexed, and on the machinery. After the aging Judson died in 1909, Sundback became the engineer most committed to the development of the fastener, and his new model, called the Plako because of its intended application to the seam opening in garments known as a placket. The Plako, however, also left a lot to be desired, and sales were not strong. It was said that the secretary of the company, who proudly wore a Plako in his trousers, had to rush home one evening because the fastener popped open and got stuck in that position. The Automatic Hook and Eye Company verged on bankruptcy, and it maintained its existence mainly by manufacturing various kinds of small metal devices, including paper fasteners. Sundback would not give up on the slide fastener, however, and he continued to develop the basic idea and the machinery to implement it economically with a high degree of reliability.

HOOKLESS FASTENERS

Since the hooks of the various fastener models seemed to be the cause of most of the malfunctions, Sundback began to look toward ways of eliminating them. One model, whose patent application was initially filed in 1912 and amended in 1917 (Fig. 4.4), had clasps on one side that fit over a bead on the other, with the slider opening and closing the clasps to open and close the fastener. Lewis Walker, whose financial support had been faithful for over two decades, was enthusiastic about the new model and described it as having a "hidden hook," but it came to be known as a "hookless fastener," eventually to be called Hookless No. 1. However, as could be anticipated with Howe's concept of 60 years earlier, there was considerable catching during operation and much wear and tear on the bead. Sundback went back to the drawingboard.

Sundback described the next design that he came up with as another "radical departure in principle from the design of earlier slide fasteners," one that was "built up of nested, cup-shaped members." His patent application was filed in 1914, and it represented the efforts of over 20 years of design, redesign, and development that had taken place since Judson's first promising patents were issued. The radical departure, (shown

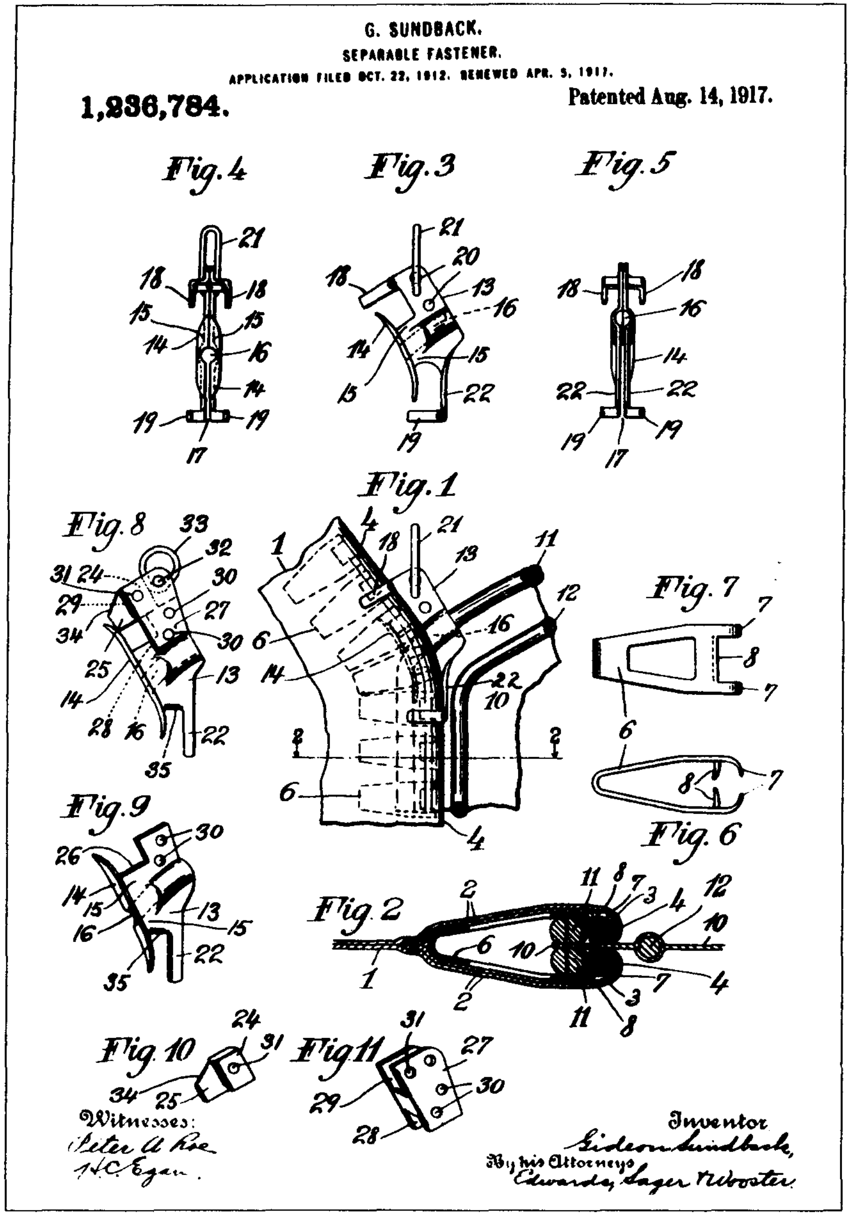


FIGURE 4.4 One of Gideon Sundback's 1917 patents for a separable fastener

in Fig. 4.5) came to be known as Hookless No. 2 and is remarkably similar to today's zipper. However, even though the principle of the slide fastener had finally been "perfected" in the latest hookless model, there remained the problem of its efficient manufacture. To address this, Sundback undertook another arduous period of development, which resulted in a new machine, which he called the S-L machine, with the letters standing for "scrapless." In its final form, the machine worked wonderfully, slicing off pieces of specially formed wire with a Y cross section, stamping a pocket into one side and letting it bulge out the other, and pinching the open part of the Y around fabric tape being fed through the machine. There was indeed no wasted or scrap metal, and production was smooth and reliable. Figure 4.6 shows a later version of a zipper-making machine.

While the long development process had finally reached its goal about a quarter century after it began, marketing and sales of hookless fasteners still faced some difficult years. There was a measure of success during World War I, when hookless fasteners were sewn into flying suits, making them windproof for flyers, and into money belts that were sold to army and navy personnel. Another application, also foreseen by Howe in 1851, was the limited use of hookless fasteners in mail pouches, but the incorporation of the devices into tobacco pouches proved to be more profitable.

Clothing applications remained scarce, in part because manufacturers would have had to invest in retraining their employees to sew in the more expensive fastening devices, and such applications were not to become very prominent until the 1930s. Rubber galoshes were another matter, however, and the hookless fastener proved to be an excellent means for opening and closing overshoes, which had to be put on and taken off very easily and quickly in cold and snowy weather. In the early 1920s the B. F. Goodrich Company began to order increasing numbers of fasteners, and they soon introduced their new product: "The Mystik Boot with the patented Hookless Fastener. Opens with a pull. Closes with a pull." The name Mystik did not attract the business Goodrich thought the boots deserved, however, and for the 1923 season they were renamed to suggest the way they zipped open and closed. Hence, the trademarked name Zippers, which soon became the unofficial name of the hookless fasteners themselves. In 1928 the Hookless Fastener Company began to use the brand name Talon to suggest the tenacious gripping power of the claw of a bird of prey and convey the idea that the newer fasteners would not fall open at the wrong time. About ten years later, the company's name was changed to Talon, Inc.

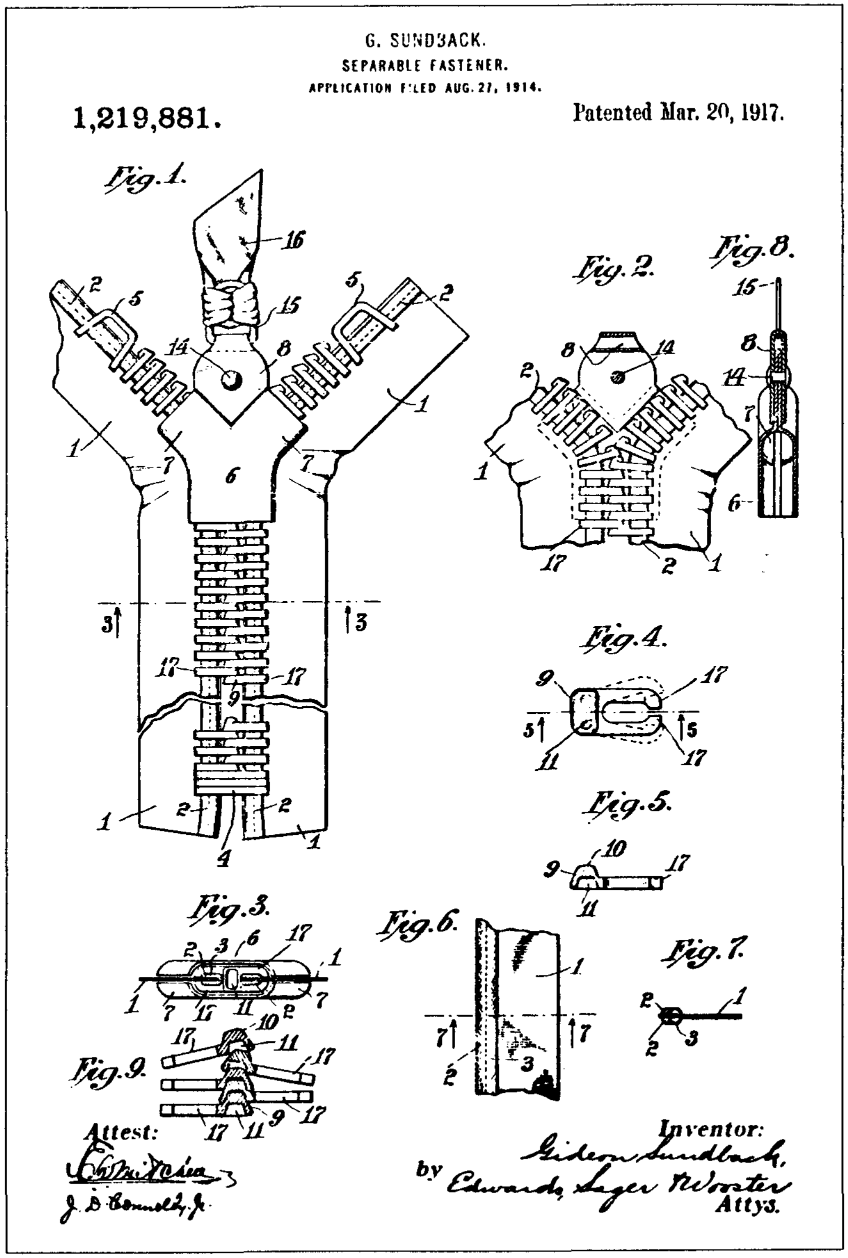


FIGURE 4.5 Another 1917 patent for a separable fastener issued to Gideon Sundback, this one resembling a modern zipper

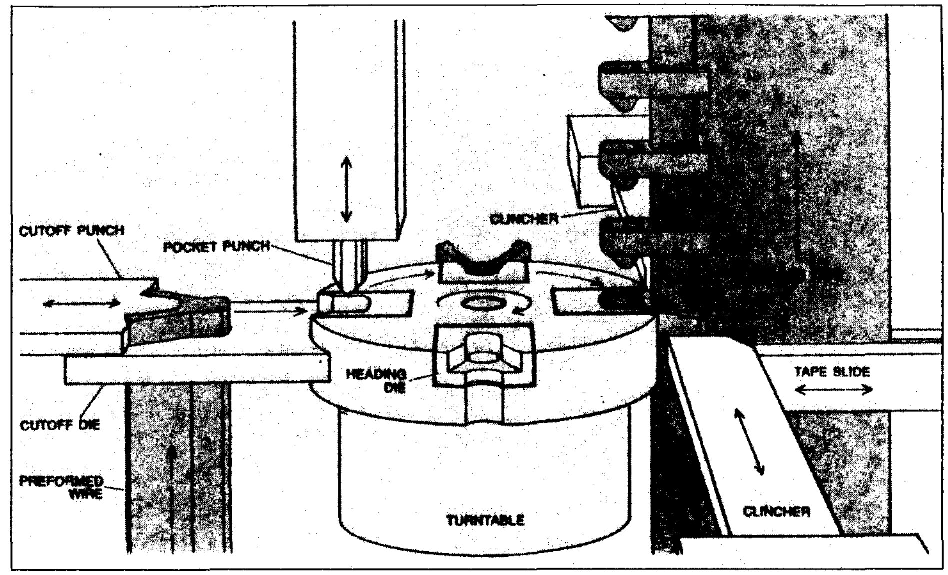


FIGURE 4.6 A later process for making zippers

RELATED DEVELOPMENTS

By the end of the 1930s, Talon was facing active competition in the zipper industry. Early patents had expired, and other manufacturers had been designing and developing their own machines. One employed by the Conmar Products Corporation stamped zipper teeth, properly called scoops, out of a flattened strip of wire at the rate of 50 per second. Another, patented in 1932 by Gustav Johnson, cast the teeth directly onto a continuous piece of zipper tape. The toothed tape was then mated with another piece, and long lengths of it were collected on spools, ready to be cut and fitted with ends and sliders and thus formed into individual zippers of appropriate size and style.

German zipper factories were destroyed during World War II, but rather than rebuild them after the war to prewar standards, the Germans developed the new technology of plastic-toothed zippers, which had been pioneered in America in the 1940s. Instead of individual metal teeth or scoops, plastic ones could be fastened to the zipper tape (see Fig. 4.7). Subsequent developments included weaving notched plastic wire into lengths of zipper and casting plastic teeth or coils directly onto the zipper tape. Plastic zippers had the advantage of being able to be made in any

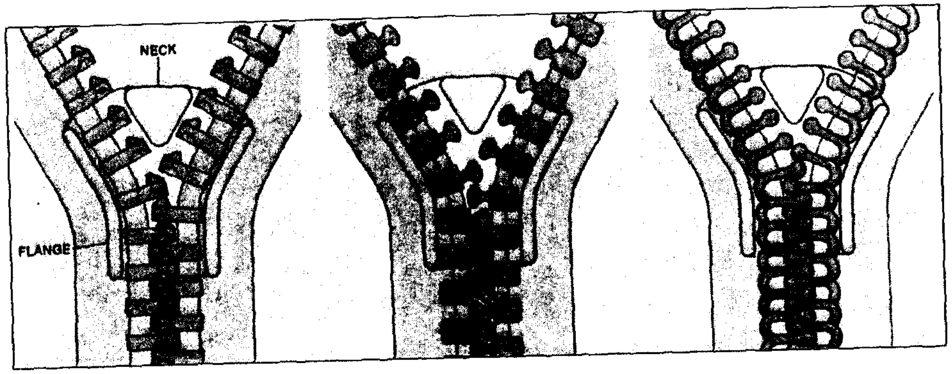


FIGURE 4.7 Forms of modern zippers, including two with plastic teeth

color. The cloth tape could be dyed to match the plastic scoops or coils, and thus the zippers sewn into garments could be made virtually invisible. This was a boon to the fashion industry and much appreciated by clothes buyers, for aesthetic and technical reasons alike.

Such developments were clearly motivated by looking for ways to make zippers better or more economical, and such incremental variations and improvements on the same basic idea characterize much of engineering research and development. In contrast to this kind of evolutionary change, however, there also can occur the kind of revolutionary change that comes not from looking at how to make an existing thing better but at how to make something in an entirely different way or based on an entirely different principle. The inspiration for such change can come to an inventor or engineer when it is least expected, but that is not to say that the individual's mind was not prepared to see in an instant the idea's potential.

In 1948, on returning from a walk with his dog through some Alpine woodland, the Swiss inventor George de Mestral stopped to remove some woodland cockleburs from his trousers and his dog's fur. As he was doing so, he wondered why the burs stuck the way they did, and he started home to look at them under a microscope in his workshop. On the way, he speculated about the mechanism that might cause the sticking, and he thought about how it might provide an alternative to the conventional zipper for fastening clothes. While he had not at the time been consciously thinking about inventing such a device, a few months earlier he had had an annoying time with a stuck zipper on his wife's dress. At that

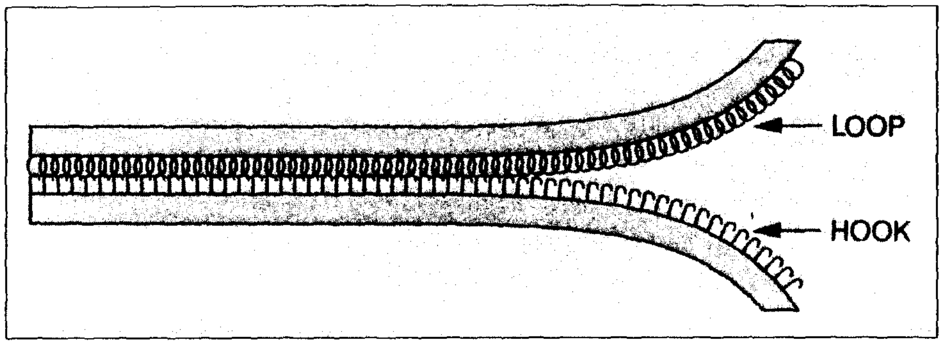


FIGURE 4.8 The principle of Velcro

time, he had wondered if he might not invent something to replace the metal zipper, but he had come up with nothing. De Mestral was no stranger to invention, however, for he had received his first patent when he was twelve years old, for a toy airplane. (He would receive his last, for a popular asparagus peeler, when he was in his sixties.)

Under his microscope, de Mestral confirmed what he had suspected, namely, that the surface of the bur consisted of numerous tiny hooks, which easily got caught in the loops of woven clothing fabric, strands of dog hair, and the like. On the other hand, when rolled in his fingers, the bur felt springy, because the fingers simply depressed the rounded backs of the hooks. Almost immediately de Mestral conceived of a new fastening system consisting of two cloth strips, one faced with tiny hooks and a mating one faced with tiny loops (see Fig. 4.8). When sewn into a dress or other garment, with the hook and loop sides facing each other, a soft but tenacious fastener that would not get stuck would result.

As with Judson's metal zipper, the basic conceptual design was sound, but it had to be developed into a smoothly functioning product that could be manufactured in a reliable way. When he approached textile experts about manufacturing the hooked tape, they were skeptical. It was only when a weaver in a textile plant in Lyon, France, produced one strip of cotton fabric with little hooks and one with little eyes, the pair of which de Mestral called "locking tape," that the idea looked realizable. Yet many details still had to be worked out if the new fastening system was to be easy to open and close, hold firmly when closed, and continue to function through many wearings and cleanings. Among the many questions that had to be faced in developing a successful device were how many hooks it should have, of what material they should be made, how they were to be formed, and so forth. Similar questions had to be addressed for the loops (A proper number of loops was eventually found to be 300 per square inch.) In time, the cotton of the working prototype produced in Lyon would be replaced with nylon, which was more durable. And among the discoveries made during the process of development was that weaving the nylon under infrared light hardened it into hooks and eyes that were virtually indestructible.

In all, it took about six years from de Mestral's conceptual design to come up with a commercially viable product and the machinery to produce it economically. The first factory to manufacture the hook-and-loop tape was opened in 1957, almost ten years after the inventor's inspiring walk. The product was sold under the catchy trademark Velcro, which was a portmanteau made by combining the beginnings of the French words "velour" and "crochet." The former, meaning velvet, refers to the soft loop tape, while the latter, meaning small hook, refers to the firmer hook tape. As with so many successful products, the name for a particular one came to be used generically. Properly speaking, Velcro-like devices are collectively called hook-and-loop fasteners, but most people continue to use the shorter and catchier term velcro. By whatever name, 60 million yards of the stuff was being produced by the late 1950s, and it soon was being used in applications as diverse as sealing the chambers of artificial hearts, holding objects in place in the weightlessness of spacecraft, and closing dresses, diapers, and shoes.

Velcro was quite successful, but it did not displace the zipper in the way de Mestral might have dreamed. While the zipper continued to have its shortcomings, such as becoming stuck now and then, more significant shortcomings of velcro began to become apparent with its increasing use. No matter how hardened by infrared light, for example, the material did tend to wear out with time, especially when undergoing repeated washings. Thus the application in baby diapers did not live up to its early promise. While the very noise that it makes when opened or closed is associated positively with the zipper's name, the noise that velcro makes upon being opened can be considered harsh and annoying. Another problem with velcro is its bulkiness. Whereas metal and plastic zippers had evolved toward thinner and thinner designs, so that they are hardly noticeable in clothing, velcro fasteners tend to produce a certain bulkiness, especially when applied to thin fabrics. While velcro maintains certain advantages in specific applications, it did not turn out to be the last word in fastenings.

PLASTIC ZIPPERS

Problems with metal zippers, from sticking and snagging to rusting and losing teeth, continued to attract inventors who thought they could improve upon the device. Indeed, the increasing success the zipper experienced as a commercial product during the 1930s and 1940s, with a billion a year being made by the end of that period, increasingly brought its shortcomings to the minds of inventors all over the world. One of them lived in Denmark, and his name was Borgda Madsen. He came up with the idea of a completely plastic zipper—not just one with plastic teeth or loops or scoops attached to color-coordinated fabric but one that was entirely made of plastic and that had not individual interlocking parts but a single long pair of mating grooves. Not only did Madsen's zipper remove the problems of snagging and jamming, but it had the additional advantages of being waterproof, dustproof, and airtight. As such, it had considerable potential for applications well beyond the clothing industry, but these took years of development and marketing to realize.

Inventors always have the choice of developing their own inventions and manufacturing products incorporating them, but such endeavors take money that the inventors may not have and take time that they may prefer to spend pursuing other inventions. In the case of Madsen, he sold the rights to the plastic zipper to some British investors, who in turn sold the American and Canadian rights in 1951 to some refugees from Romania. Max Ausnit, his son Steven, and his uncle Edgar formed a New York-based company called Flexigrip to exploit the new product. But first it had to be developed into a reliable product, and that responsibility fell to the youngster, Steven Ausnit, who had a degree in mechanical engineering.

Since by this time the metal zipper had become so familiar in clothing, the first inclinations of the Flexigrip developers were to promote their product as a better clothing zipper. After all, unlike hard metal zippers, it was soft and pliable and thus promised to be more comfortable. However, the plastic-grooved zipper tended to twist and come apart in such applications, and it clearly was not going to be a very successful competitor. Prior to the introduction of the plastic zipper, the conventional metal variety had also been used in such applications as garment storage bags and similar products made of vinyl. However, the conventional zippers had to be sewn with thread into these products, and the sewing holes introduced served as stress concentrators from which began tears in the vinyl that eventually grew to unacceptable lengths. Such products were not easy to repair with needle and thread, and so they were not very popular. The totally plastic zipper promised to be ideal for these applications, for it could be heat welded to the vinyl and thus provide a strong and permanent bond.

Not until the mid-1950s, however, when the Flexigrip was applied to some products that remained essentially flat in their use, was the company able to realize some measure of growth. Among its products were plastic pencil cases and plastic briefcases, and the latter became especially popular at meetings and conferences, where they were distributed to attendees to carry around the various papers and programs they accumulated. (In 1955 President Eisenhower was called upon in the White House and presented with a portfolio fitted with a plastic "toothless" zipper in conjunction with an invitation to attend an upcoming meeting of the American Society of Mechanical Engineers.) Beginning in the early 1950s, experiments with plastics other than vinyl were also overseen by Ausnit, and from the earliest days of Flexigrip there was talk of extruding fasteners out of such materials as nylon and polyethylene. The latter could be used in conjunction with polyethylene film to provide airtight and water-tight packaging that could be opened and reclosed for storage.

In the early 1960s Ausnit applied for a series of patents relating to plastic fasteners intended for the top of plastic bags, thus providing convenient storage bags for small parts and other items. His idea was to modify the way a plastic zipper would open so that it would be more effective in such applications. There was also an increasing development away from the use of a slider and toward the use of forces applied directly by the fingers to open and close the bags (Fig. 4.9), thus reducing their bulk, cost, and complexity of manufacture. Ausnit's early patents show the zipper portion of the bag to be a distinctly different assembly than the bag proper, however, and this meant that the zipper had to be heat-welded to the bag as a separate manufacturing step, with all its attendant difficulties of curling and warping of the bag material that had to be anticipated and dealt with. In particular, the bag walls and strips attached to the zipper had to be made extra-thick, and hence extra-expensive, to accommodate the heat-sealing process without forming leakage holes or otherwise dam-

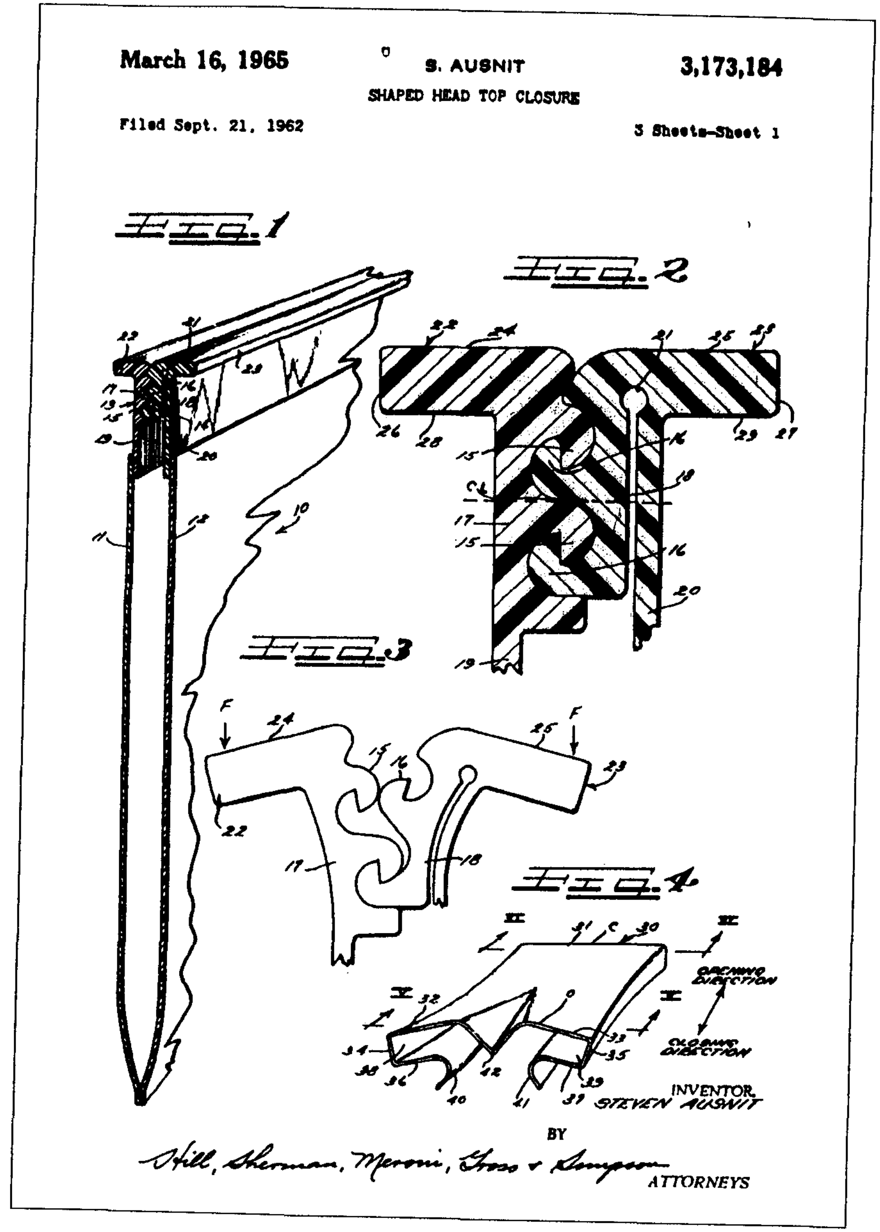


FIGURE 4.9 One of Steven Ausnit's many patents for a plastic zipper, this one opened and closed either with a mechanical slider or manually

aging the material. Whereas these precautions often called for a bag at least 3 to 4 mils thick (1 mil = 0.001 inch), an alternative means of forming the bags enabled them to be as thin as 1 mil.

This was made possible because a Japanese inventor, Kakuji Naito, had developed and patented a method whereby the components of the zipper closure could be extruded as an integral part of the plastic bag (Fig. 4.10). The bags come out of the extruder as long hollow circular tubes with the zipper components located at the proper points on the circumference. The tubes are air cooled to set the plastic before being flattened, thus mating the zipper parts, and rolled onto collector drums. The bags proper are formed by unrolling the flat tube, printing it where desired, and cutting it into bag lengths, which are heat sealed (Fig. 4.11). The top above the zipper opening can be left uncut, can be perforated, or can be cut at this time. The bottoms can also be cut to allow filling by automated machinery, after which they can be reclosed by heat sealing. Naito's patents were assigned to the Tokyo-based company Kabushiki Kaisha Seisan Nihon Sha, and they enabled resealable plastic bags to be manufactured at about half the cost of those made by heat-welding a separately extruded zipper.

In 1962 Ausnit's firm acquired American rights to the Japanese process, and the newly named company, Minigrip, Inc., became the first to manufacture in the United States a fully extruded plastic bag with integral miniature zipper. At first, however, it was difficult to get manufacturers to adopt it for use in their products, in part because it was unconventional. (The phenomenon of new products being rejected simply because they are too different from what they are intended to supersede has led to a design dictim among industrial designers that is captured in the acronym, MAYA. It stands for "Most Advanced Yet Acceptable.") For example, when the new bag was proposed as an ideal reclosable, dust-free outer packaging for record albums, record industry representatives rejected it because they did not believe record buyers would understand the package and would cut or tear it open, thus destroying its relatively expensive reclosable feature.

The way around this impasse came when Minigrip, in addition to making and selling resealable plastic bags themselves, granted the Dow Chemical Company an exclusive license to sell them directly to consumers through supermarkets. These handy new products came to be known as Ziploc bags, and their success helped Minigrip market the more heavy-

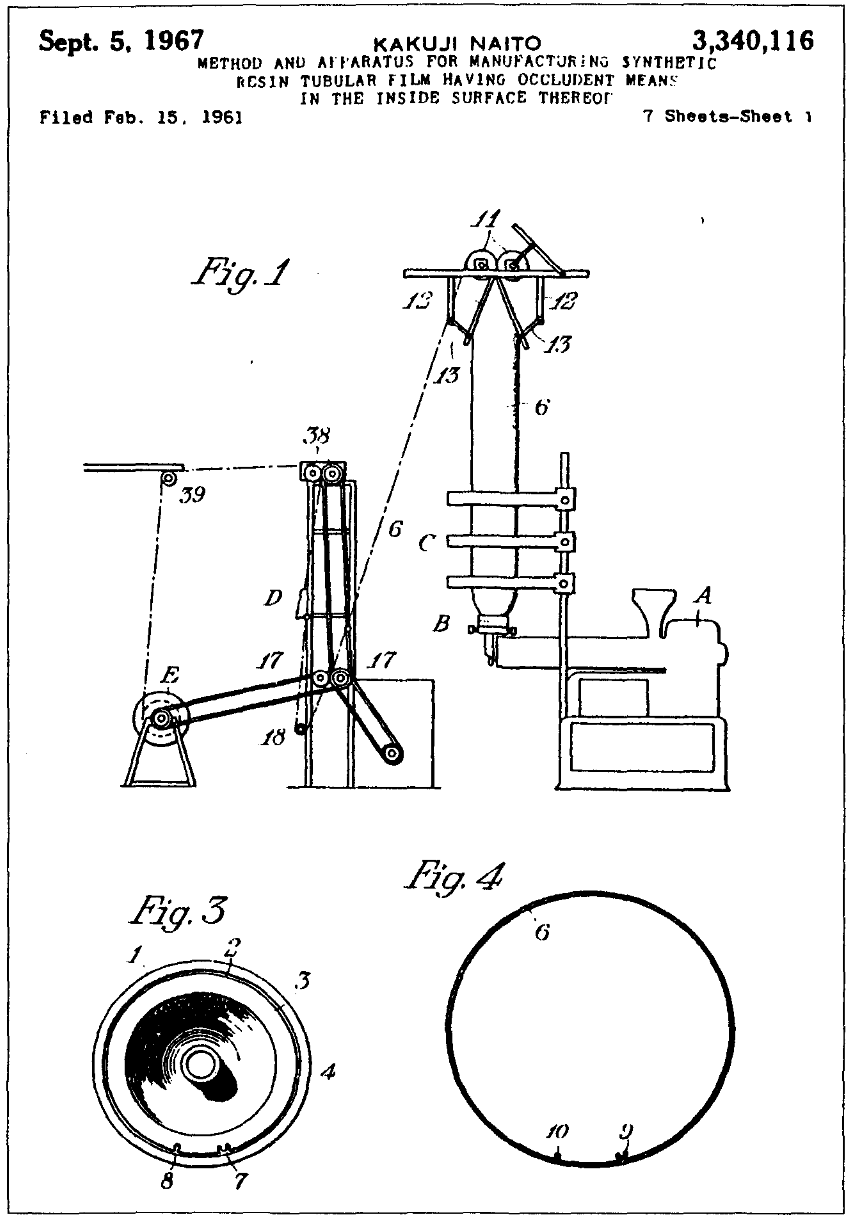


FIGURE 4.10 U.S. Patent issued to Kakuji Naito for a means for manufacturing tubular film having an integral plastic zipper

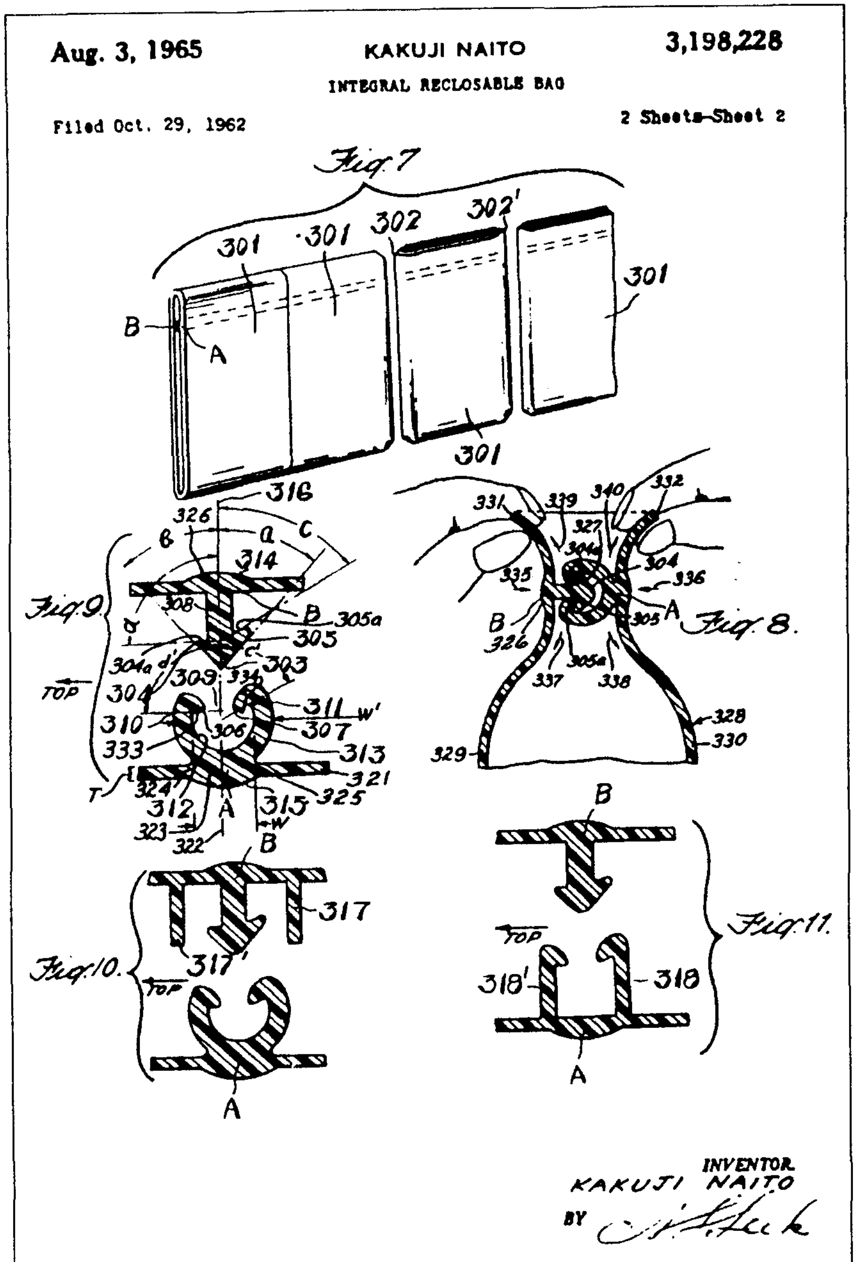
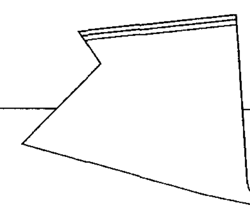


FIGURE 4.11 Another patent issued to Naito, showing how extruded tubular film may be slit for filling and cut into individual bags

IT'S RECLOSABLE, BUT IS IT CLOSED?

One of the frustrations experienced by users of early reclosable plastic bags was that it was not easy to determine when they were closed securely. A competitor thus introduced the idea of making the two sides of the plastic zipper closure appear as stripes of different primary colors, one yellow and one blue, which, when properly mated to give a good seal, produced a uniform green band. This useful improvement was not only patentable but also provided a very effective marketing device.

Can you think of some other modifications of plastic bags that would make it easier to close them tightly and to know that they are closed?



duty bags to commercial and industrial users, a right the company had retained.

The success of Ziploc bags naturally attracted rival brands, which employed improvements on the basic design to secure separate patents. As with the evolution of all artifacts, arguments for these new patents rested upon finding fault with existing patents. Ironically after reclosable bags became commonplace in the kitchen and workshop, it was not opening them but closing them properly that became the focus of manufacturers and users alike.

But not all potential competitors looked for new patents as a means of entering the market. Manufacturers in Taiwan and other Far East countries, in particular, totally disregarded the patents that Ausnit and Minigrip had so systematically acquired in order to protect their investment. Plastic bags from Taiwan, for example, produced with inexpensive labor and not having to recover the research and development or patent licensing costs normally associated with a new product, could be sold for a fraction of the cost of the Minigrip product. In such cases of unfair trade, a company can appeal to the International Trade Council Court, which Minigrip did. Such appeals are seldom upheld, but in this case an Exclusion Order was issued by the Court which essentially banned bags of foreign competitors that infringed on the patents held by Minigrip.

The stories of the original zipper, Velcro, the plastic zipper, and the resealable plastic bag derived from it each span many years and show how long and arduous the development of a conceptual design or a patent idea can be. These case studies also demonstrate how the success of one product leads to the conception and development of many derivative ideas, which in turn lead to others.