

SolarAttic, Inc.

Technology

The following discussion is an overview of SolarAttic's proprietary patents and technology. Additional information on the company's technology will be found in SECTIONS 4 & 5.

Products

The company's current "bootstrapped" product line consists of three pool heating systems, one space heating system, three combination ventilation-space heating systems and several paper products designed to enhance hardware sales. **Some of the company's products are now located in 29 states!**

The company has plans to introduce its ventilation only product by the 2Qtr97. The company's hot water heater requires substantial engineering resources to complete. It is now estimated that this product will be available by the 4Qtr98.

Product testimonials and literature follow the patent diagrams.

Technology

The following written discussion should be read in conjunction with and while viewing the various patent drawings being discussed. It is not necessary to be concerned with all the item numbers on each drawing. These drawings are presented only to demonstrate the broader product concepts available with the company's new technology. They do not represent all of the patent drawings available. Copies of actual patents may be obtained for more analysis if desired.

Drawing **Figure 1** from **U. S. Patent 5,014,770** is shown first to point out the pool heating application using attic heat. This is the primary product currently being sold by word of mouth. A pool plumbing diagram is presented later [product information] to show how the system is installed. You can observe that a simple air to liquid heat exchanger [46] is located inside the attic. Pool water is pumped to the heat exchanger automatically where solar radiation from the roof and attic are removed to heat the pool [76]. Over 124 of these systems have now been shipped into 29 states. Some systems have been operating for over 5 years.

Figures 5 and **6** from the same patent are then shown to indicate that this "technology" patent also covers the heating of domestic hot water from attic heat and also space heating using the hot water in conjunction with a hydronic heater [in house wall radiator]. This patent also shows how the company's new technology can work in conjunction with heat pump technology to reduce the chemical and electrical requirements of heat pumps. The patent also discloses a proprietary electronic control system that uses various sensors. A detailed explanation of the control logic involved is presented within the patent.

The essence of patent 5,014,770 is a new solar technology for the heating of liquids via a forced air to liquid heat exchanger placed inside the attic. The patent also covers any form of sensing technology and control mechanism used with the heat exchanger. Solar energy is efficiently extracted. In fact, an enormous amount of solar radiation can be obtained for very little energy input. I. E. The pool heater heats a pool for about \$10.00 a month in electricity. In contrast, the popular gas heater heats a pool for \$150.00 - 300.00 per month in natural gas. This is a dramatic energy savings that provides a fast payback to pool owners. Also, the company's technology provides free renewable solar energy without having to use roof mounted solar panels. Marketing studies show that people want renewable solar energy but they do not want roof mounted solar panels.

Drawing **Figure 1** of **U. S. Patent Re. 32,607** is presented next to show the company's current space heating application and product. This second patent was acquired from Ohio inventor David C. Smith. A small compact blower-plenum assembly is installed inside the attic. Warm air is sucked into the blower and transferred back into the house or other space by ceiling diffusers using insulated flexible duct. The system is fully automatic sensing both inside temperature and attic temperature. Again, the technology used is highly energy efficient and can collect warm attic air during the fall and spring in northern states and during the fall-winter-spring in southern states. Re. 32,607 is a reissue of Patent 4,502,467.

The essence of patent Re. 32,607 is a specific device that removes attic heat and relocates it for supplementary space heating purposes. The technology was originally installed in the Ohio-West Virginia area. It was even studied by the University of West Virginia and it has been installed and tested in both residential and commercial buildings. The patent covers both applications. This technology has reduced annual residential space heating in the Ohio area by up to 30%.

Drawing **Figure 1** of the company's third **U. S. Patent 5,452,710** (issued on September 26, 1995) is then presented to show technology that can be used to provide free domestic hot water. It should be noted that, while this doesn't seem to be a big deal in Minnesota, it will work 5-7 months of the year in the state.

However, in states like Florida, the technology will find mass applications. An example is Florida Power & Light's (FPL) electrical service area where substantial reductions in electrical consumption could take place. FPL has an estimated 2.5 million customers with electric hot water tanks. Combined, they consume the output of three FPL power plants daily. A whopping 470 megawatts of power! If deployed on a system wide basis, the company's technology could eliminate 80-90% of this power consumption and possibly even more.

The electrical energy needs of an attic based hot water heat transfer system is relatively low and estimated to be .5 amperes or less. This can easily be offset by a very small solar photovoltaic cell array. In Figure 1, item 14 shows a very small PV cell array located at the apex of the roof. Today, PV cells are being manufactured in materials that look like roofing material. The bottom line is that a very small cell array can power the electrical energy needs of the system. Item 60 shows a back up battery power. Because the PV cell array is "very small", it does not interfere with the heat collection capability of the roof and is not an aesthetic issue with consumers.

The essence of Patent 5,452,710 is free domestic hot water. The patent shows how this is obtained without having to use the utility company's power grid. As electrical power consumption rises in the afternoon for FPL, peak solar radiation is available to provide both power and heat energy. Thus, free hot water!

Drawing **Figures 1-4 of Patent application 08/528,720** are shown next. These drawings show the substance of the company's fourth patent application which covers SolarAttic's new duct and ventilation technology. U of M Professor Ephraim M. Sparrow is listed as a co-inventor with the company's president Ed Palmer on this 4th patent application. Item number 20 in figures 1-3 show a duct with holes punched (burned, etc.) into it so that the duct provides even air collection or air distribution.

Figure 1 shows the even collection of air and its discharge from fan 40. The hole pattern constructed allows for the compensation of pressure differences along the length of the duct. This, in turn, allows each linear foot along the duct's length to collect the same amount of air [heat, moisture]. Cap 30 is installed at the end of the duct.

Figure 2 shows the even distribution of air and its discharge through duct 20. The hole pattern constructed allows for the compensation of pressure differences along the length of the duct. This, in turn, allows each linear foot along the duct's length to discharge the same amount of air [heat, moisture]. Air is drawn into fan 40 and discharged evenly along duct 20. Cap 30 is installed at the end of the duct.

Figure 3 shows the duct used in an application for venting the attic. Air is drawn through the eave holes [72] as normally would be. However, the air is then drawn into duct 20 evenly along its length. Air is discharged outside via fan 40. This application shows the elimination of all roof vents of all types and the controlled ventilation of the attic space.

Figure 4 shows the use of two additional ducts [52a & 52b] at the location where eave vents would normally be installed.

The use of the additional ducts shows that virtually all access holes into the attic can be eliminated except for one inlet and one outlet. The attic ventilation can therefore be totally controlled now without having to use roof vents or eave vents. The traditional attic ventilation scheme is highly unreliable and is the direct cause of roof dams and other building problems associated with poor attic ventilation. The company's new technology for the first time provides "control" over this highly needed function.

Ventilation or heat collection. Either of these two functions can be addressed by the new duct technology. The duct can wind its way around corners in modern attics and collect all of the heat efficiently. This heat can then be exhausted or used to supplement space heating, for pool heating or for hot water heating. The applications are numerous. A product can easily be created that will work for 12 months of the year in MN. I.E.—The GB Series ventilation-space heater system.

In the fall, free solar heat energy [from the attic] will be returned to the house to supplement space heating. In the winter, excess moisture and heat will be ventilated out of the attic to eliminate ice dams and other structural problems. In the spring, free solar heat energy will again be returned back into the house for supplementing the heating of the structure. In the summer, the heat will be exhausted or used in hot water or pool heating. All this is done automatically and with very little energy input. And, it is free solar energy without having to use roof mounted solar panels. A prototype of such a device was presented to thousands of consumers at the 1995 Minnesota State Fair. In 1996, the actual GB980 product was presented to thousands more at the Minnesota State Fair. At both events, the product and its concept [+pricing in '96] received overwhelming consumer acceptance and people wanted to buy the product right out of the booth.

The essence of Patent application 08/528,720 shows how to collect and distribute air in a duct system in a “uniform” way. That is, air is collected or distributed evenly along the length of the duct. The technology has broad applications which even include applications in the medical and other industries. A computer program exists that determines where and at what size a hole should be placed in the duct. The company expects that a robotic laser or other burn device or a high pressure water device can be built to automatically manufacture the duct holes in the desired pattern. Such manufacturing can produce either “standard” or “custom” ducts for a wide variety of applications.

Company Now Expects 4th Patent

The company has already heard back from the patent office and they have notified us that we have “allowable” subject matter. At this time [10/96], there doesn’t appear to be any significant reason why the company will not obtain this Patent. The company has filed a file wrapper continuation application and feels that it can successfully address all of the Patent Office’s current objections. The company estimates that the 4th patent will be issued between the 4th quarter of 1996 and the 2nd quarter of 1997.

4th Patent High Priority

This fourth patent provides a substantial gain technologically and in overall market size. The company will need to file for international protection on this fourth patent by September 1997. This will give the company an edge overseas even with the products from the three prior heat transfer patents. The new duct technology can be “added” onto the company’s heat transfer products making them more energy efficient. It gives the company another proprietary marketing edge. Anyone who wants to buy the product will have to buy it from SolarAttic. Because SolarAttic owns the technology!

PATENTS

TABLE 1

Patent	Expires	Description
Re. 32,607 4,502,467	March 5, 2002	A device specific patent that shows a system for supplementing space heating by relocating warm attic air to the inside of the house or building structure. Re. 32,607 is a reissue of 4,502,467.
5,014,770	May 14, 2008	A new solar technology patent that shows how to heat hot water, swimming pools and space through the heating of liquids by attic based solar heat energy. Patent also shows technology useful in heat pumps. And it also discloses a custom electronic control system.
5,452,710	May 14, 2008	A new solar technology patent that shows how to heat hot water free without the use of the utility company power grid.
Application No. 08/528,720 FWC/CIP [10/96] Application No. 08/717,148	Estimated to issue & expire between December 2013 and June 2014	A new duct technology patent application that shows how to create an inexpensive duct system to collect all heat within an attic or other cavity for augmenting heat transfer. Also useful for controlled ventilation of the attic. Eliminates the need for roof holes. Patent is now expected to be issued during 4Qtr96 - 2Qtr97. Technology has numerous applications. This includes applications in the medical industry and others.

MARKETS

TABLE 2

Market Identified	Market Size Estimate	Patents
Ventilation & Blowers	\$2.85 Billion	Re. 32,607 4,502,467 08/717,148 Pending
Electric Hot Water Heating	\$393 Million	5,014,770 5,452,710 08/717,148 Pending
Swimming Pool Heating	\$195 Million	5,014,770 08/717,148 Pending
Space Heating	New Category	Re. 32,607 4,502,467 5,014,770 08/717,148 Pending
Total U. S. Market Estimate	\$3.44 Billion	
Worldwide Market Estimate	Exceeds \$10 Billion	

Fig. 1

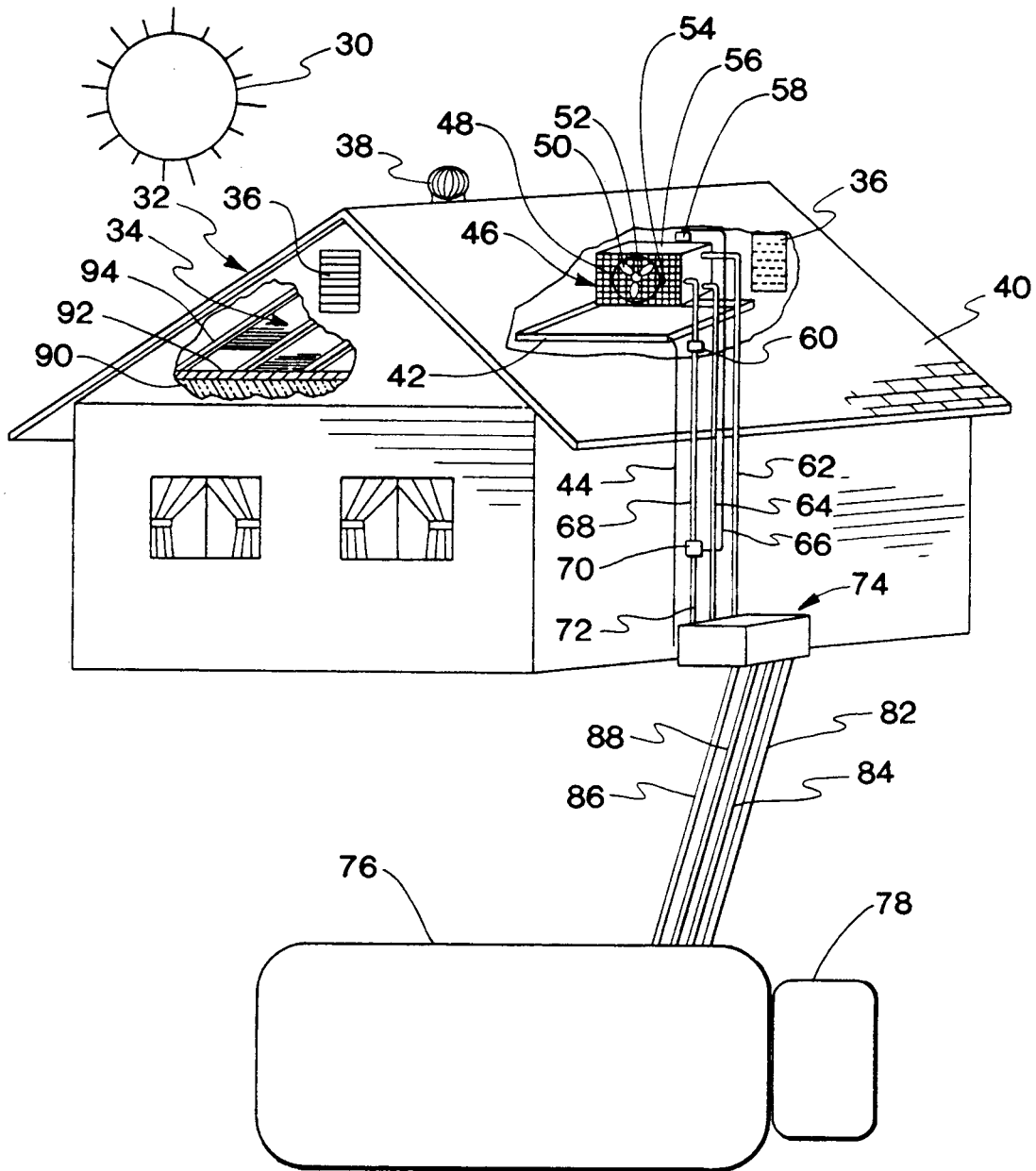


Fig. 5

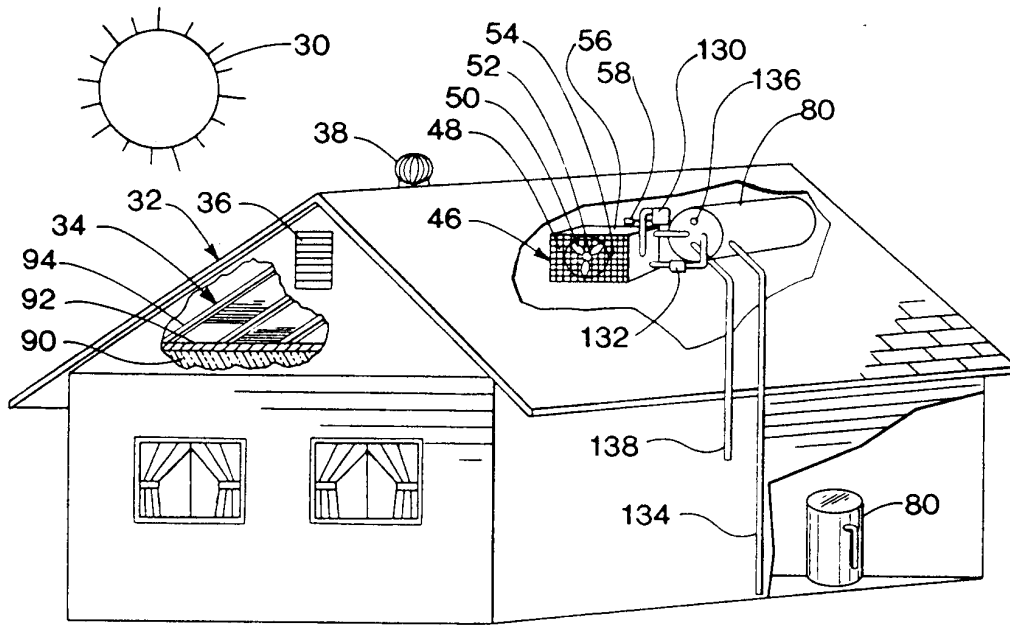
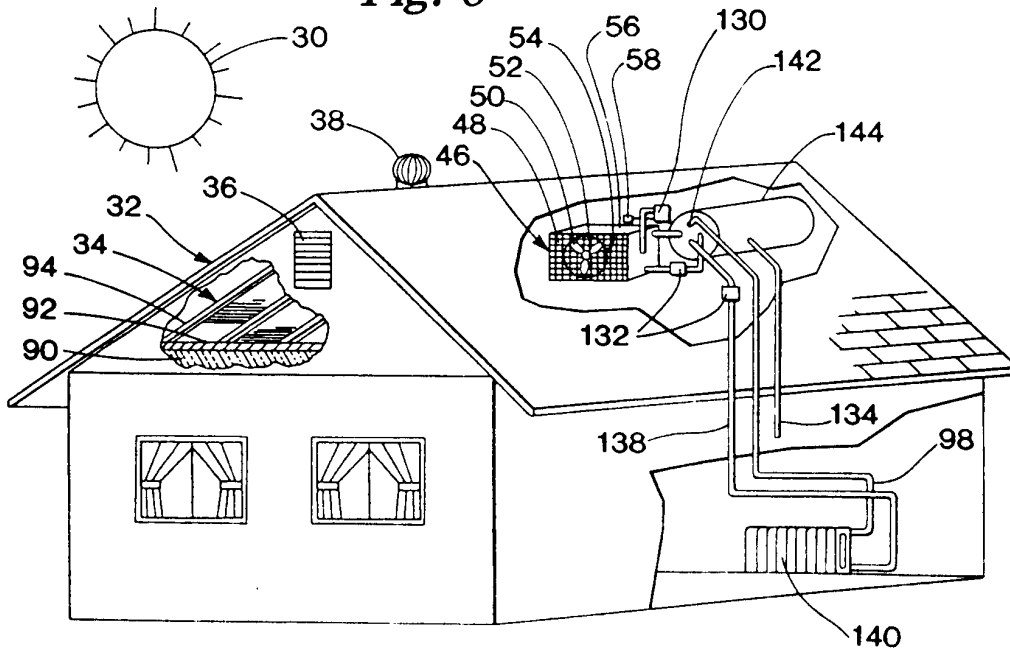
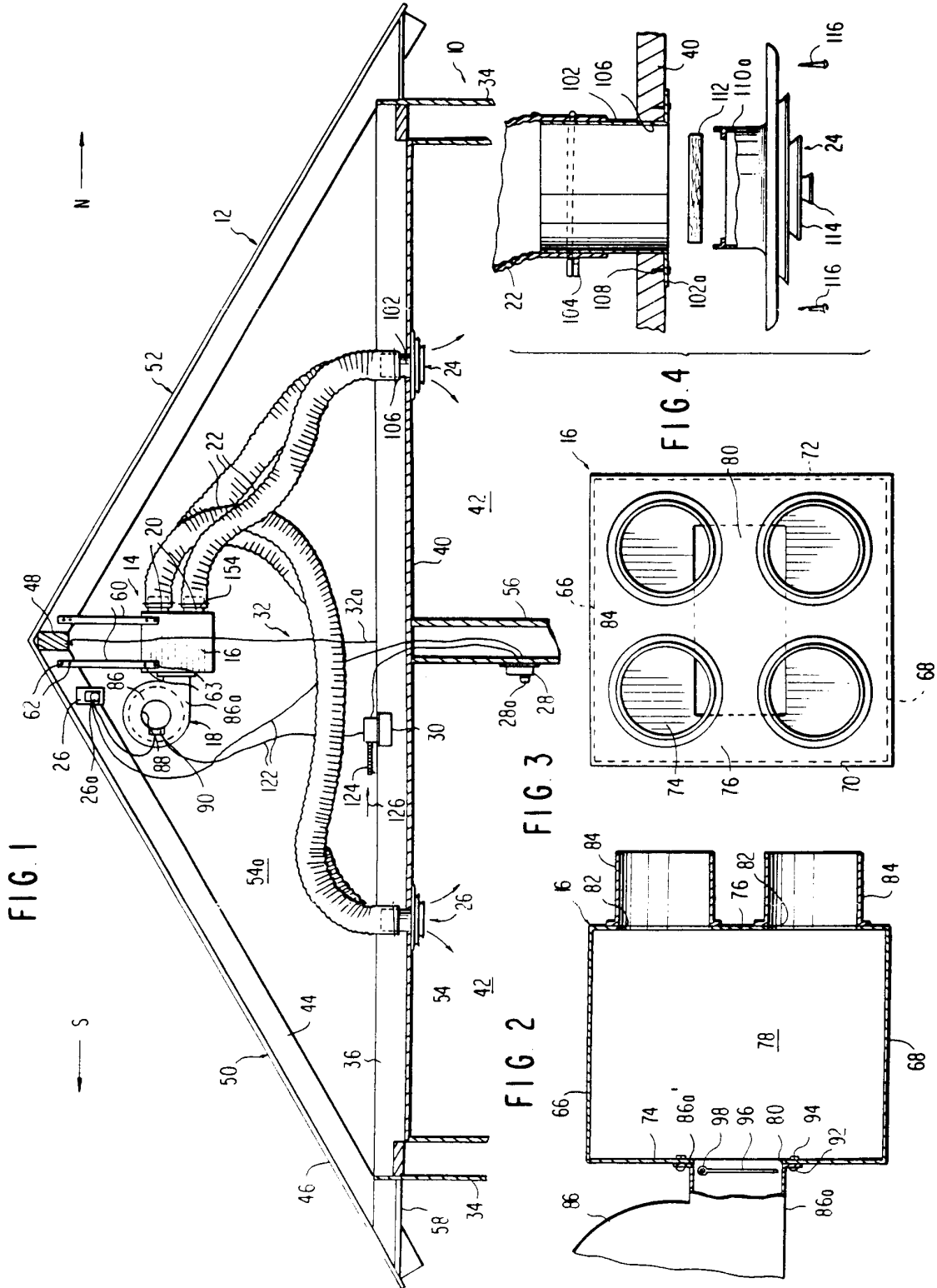
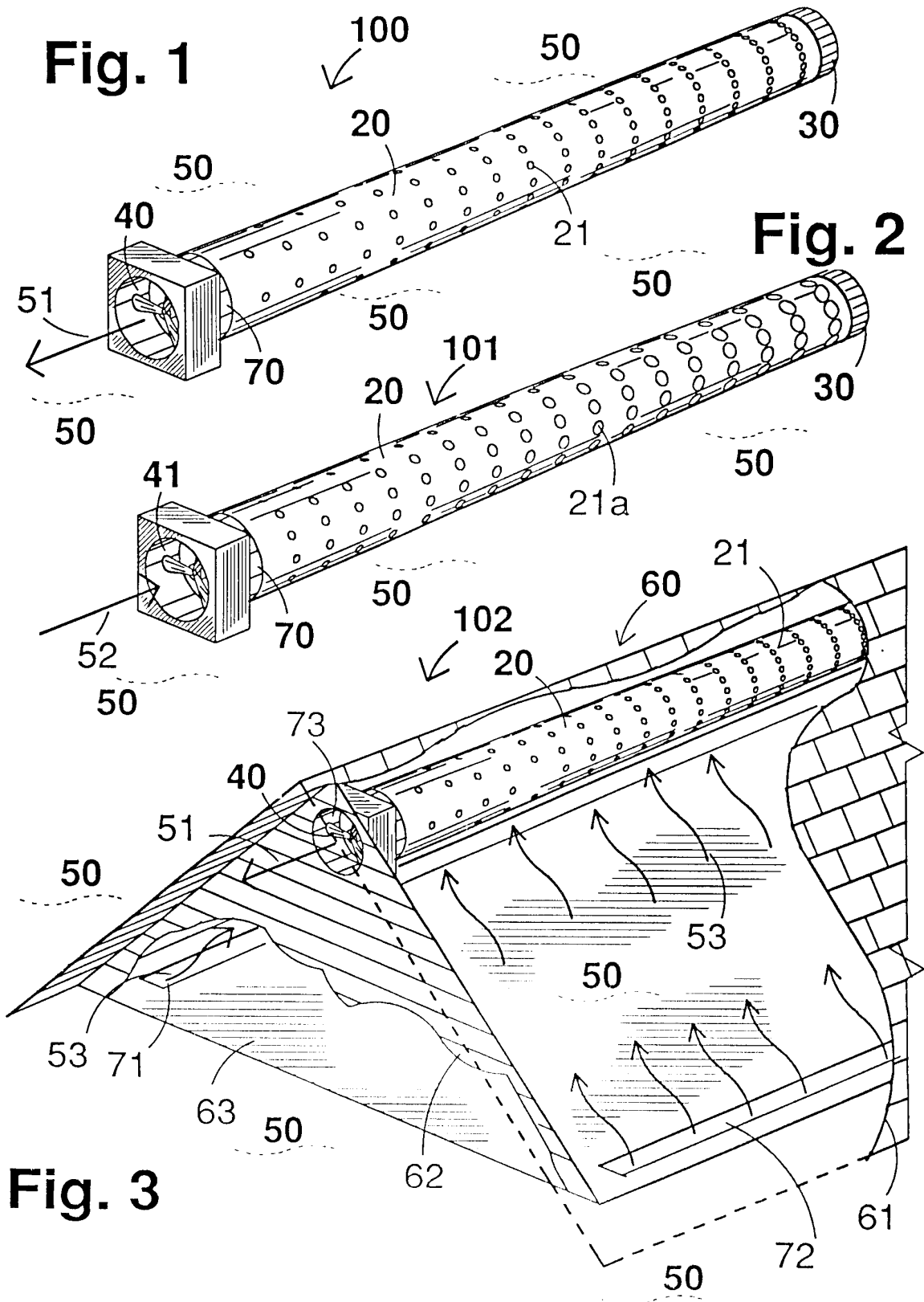


Fig. 6







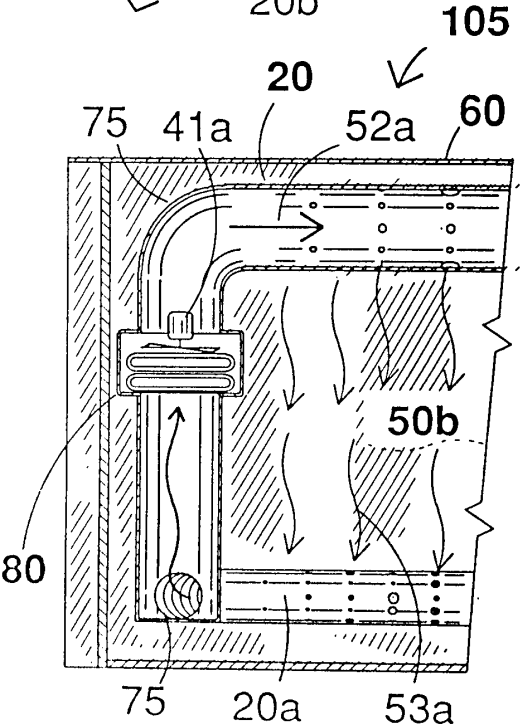
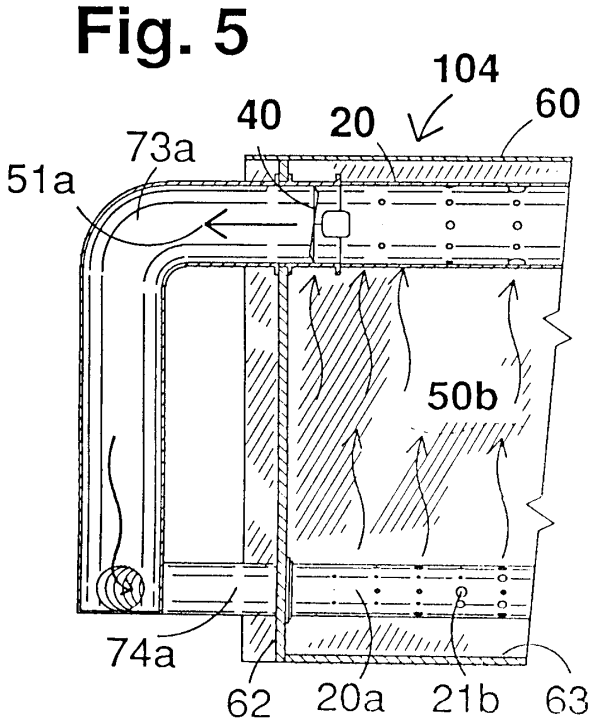
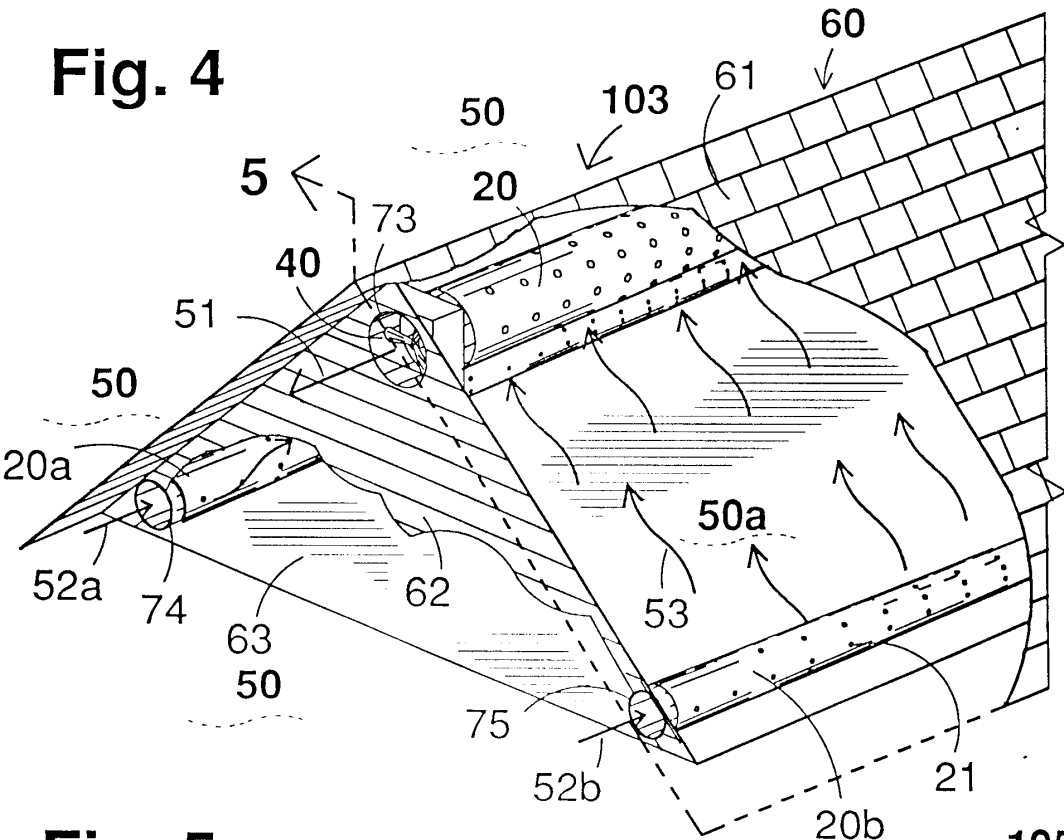


Fig. 6