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(54) SLIDING VALVE SYSTEM WITH AND WITHOUT OPERATION MECHANISM, FREE OF MAINTENANCE AND MADE OF PLASTIC MATERIAL

(57) THROUGH 20 YEARS OF PERSONAL EXPERIENCE IN THE FIELD OF IRRIGATION IN MEXICO, I HAVE OBSERVED THAT THE IN TRADITIONAL WAYS OF MANUFACTURING ELECTROMECHANICAL EQUIPMENT (FLOODGATES AND MECHANISMS AMONG OTHERS) FOR IRRIGATION SYSTEMS STRUCTURAL STEEL IS COMMONLY USED, BRONZE AND CAST IRON WHICH IS THEN MACHINED TO GIVE IT ITS FINAL SHAPE. THE EQUIPMENT UNDERGOES ANTICORROSIVE AND LUBRICATING TREATMENTS.

MY IDEA IS TO ELIMINATE TO A GREAT DEGREE, THE SERIOUS PROBLEMS IN: DESIGN, OPERATION, MAINTENANCE, AND USEFUL LIFE GIVEN THE HIGH DEGREE OF DETERIORATION THAT THEY PRESENT, CAUSED BY SEWAGE, WASTE, WATER WITH A HIGH ALKALINE CONTENT, ETC.

AS A RESULT OF A LOT OF RESEARCH I HAVE DEVELOPED, TESTED, AND RE-TESTED ARRANGEMENTS WHICH ARE A COMBINATION OF SIMPLIFIED MACHININGS AND/OR MOLDINGS WHICH ADDED TO THE SIMPLICITY OF MY DESIGNS AND THE MATERIAL USED (NYLON, POLYPROPILENE, ULTRA-HIGH MOLECULAR WEIGHT POLYETHILENE, HIGH-DENSITY POLYETHILENE, AND PVC) ARE THE IDEAL SOLUTION.

MAIN FEATURES:

- SIMPLICITY OF DESIGN
- EASY INSTALLATION
- NO LUBRICATION
- NO MAINTENANCE
- EASY OPERATION
- ECOLOGICAL
- NO SEALS
- LONGER USEFUL LIFE
- NO WASTE

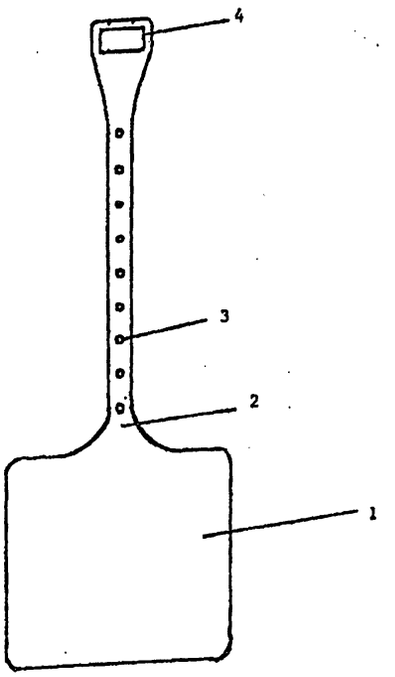

FIGURE 1

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Description

THE INVENTION'S HISTORY

[0001] WATER IS AN IMPORTANT PART OF OUR HISTORY, THE ANCIENT EGYPTIANS CONSTRUCTED A VERY EXTENDED RESERVOIR SYSTEM TO STORE THE NILE'S WATERS. THE BIBLE MAKES FREQUENT REFERENCES TO THE WATER SUPPLY GENESIS CHAPTER 26, FOR EXAMPLE, NARRATES HOW ISAAC'S SHEPHERDS FOUGHT WITH THE CAESAR'S VALLEY INHABITANTS FOR THE POSSESSION OF THE VALLEY'S SPRINGS. LONG AFTER, KING EZEQUIAS "MADE A POOL AND CARRIED WATER TO THE CITY OF JERUSALEM" (11 KINGS 20,20). ANCIENT ROME MIGHT NOT HAVE REACHED ITS GRANDEUR WITHOUT THE ASSISTANCE OF THE HYDRAULIC ENGINEERS. THE WATERS FROM THE TIBER HAD BECOME TOO POLLUTED TO BE CONSIDERED DRINKABLE. THE ENGINEERS BUILT ALMOST 650 KILOMETRES OF AQUEDUCTS, THAT CARRIED WATER TO THE CITY FROM DIFFERENT SOURCES LOCATED OUTSIDE OF IT.

[0002] IN ARIZONA AND NEW MEXICO, IN THE UNITED STATES OF AMERICA, THE ARCHEOLOGISTS STILL EXPLORE THE WATERING SYSTEMS BUILT BY THE ANCIENT INDIAN ENGINEERS OF NORTH AMERICA. THE WATER GOES THROUGH A WELL DEFINED HYDROLOGICAL CYCLE, CALLED WATER CYCLE. IT FALLS TO THE EARTH IN THE FORM OF RAIN OR IN ANY OTHER PRECIPITATION. PART OF IT IS ABSORBED BY THE SOIL, USED BY PLANTS AND RETURNS TO THE ATMOSPHERE BY MEANS OF TRANSPIRATION OF THE AERIAL PARTS OF THE VEGETABLES. SOME OF THE PRECIPITATION IS FILTERED THROUGH THE PERMEABLE, POROUS ROCKS AND IS INCORPORATED INTO THE UNDERGROUND WATER SUPPLY. THIS IN TURN, FINDS ITS WAY TO THE RIVERS OR REACHES THE SURFACE AS SPRINGS.

[0003] SOMETIMES IT IS EXTRACTED BY MEANS OF WELLS.

[0004] A LARGE PART OF WATER FROM PRECIPITATION FLOWS ON THE EARTH'S SURFACE AS RIVERS OR STREAMS OR IS COLLECTED IN LAKES AND LAGOONS. MOST OF THIS WATER RETURNS TO THE OCEAN. THE SUN EVAPORATES IT FROM THE SURFACE AND TAKES IT TO THE CLOUDS, FROM WHERE IT PRECIPITATES TO THE EARTH AGAIN, THUS STARTING ANOTHER CYCLE.

[0005] CONSEQUENTLY, IN THE HYDROLOGICAL CYCLE, WATER PASSES FROM THE ATMOSPHERE TO THE SOIL AND THEN AGAIN TO THE ATMOSPHERE. IN ORDER TO OBTAIN WATER FOR OUR SUPPLY SYSTEMS WE MUST RESORT TO RIVERS AND LAKES; OR TO EXTRACT IT FROM UNDERGROUND BY MEANS OF WELLS.

[0006] WHEN IT COMES FROM A RIVER OR OTHER WATER COURSES, THE ENGINEER MUST DECIDE IF THESE CAN SATISFY THE MAXIMUM DEMANDS OF THE POPULATION WHEN THESE REACH THEIR LOWEST LEVEL. THE SUMMER HEAT REDUCES THEM BY MEANS OF EVAPORATION. AT THE SAME TIME, THE AMOUNT OF WATER USED FOR IRRIGATION INCREASES, AS WELL AS FOR AIR CONDITIONING AND OTHER PURPOSES. LET'S ASSUME THAT THE ENGINEER DETERMINES THAT PEOPLE WOULD USE MORE WATER THAN THE RIVER CAN PROVIDE DURING THE LOW PERIODS. HE WILL TAKE MEASURES TO STORE A PART OF THE WATER WHEN THE RIVER IS HIGH. CONSTRUCTING A DOCK THAT DAMS UP SOME OF ITS FLOW. THE WATERS THAT ACCUMULATES AT THIS SPOT FORMS A DAM OR WATER COLLECTING RESERVOIR.

[0007] IF THE DOCK HAS BEEN DULY CONSTRUCTED, THE WATER LEVEL IN THE DAM WILL REMAIN LOW BEFORE THE SPRING SPATES OCCUR. IN CONSEQUENCE, THE RESERVOIR IS ABLE TO RECEIVE AND STORE THE WATER SURPLUS FROM THE OVERFLOW. AS SUMMER PASSES BY THE COMMUNITY SHALL RESORT TO THIS RESERVOIR TO COMPENSATE THE LACK OF THE RIVER'S ADEQUATE FLOW.

[0008] THE USE OF DAMMINGS AND RESERVOIRS OFTEN CREATES MANY PROBLEMS. IN MOST PARTS OF THE UNITED STATES, FOR EXAMPLE, THE LAW DOES NOT ALLOW A CITY TO COLLECT AND STORE ALL OF A RIVER'S FLOW. THE LAW ACKNOWLEDGES THE RIGHT OF THE INHABITANTS LOCATED DOWNSTREAM FROM THE DAM TO RECEIVE A PART OF THE WATER. GENERALLY, THE CITIES MUST HAVE AGREEMENTS ON THE AMOUNT OF WATER THESE CAN TAKE FROM A RIVER AND ACCUMULATE IN A DAMMING. WHEN THE ENGINEERS CONSTRUCT A RESERVOIR THEY MUST CONSIDER MANY IMPORTANT FACTORS. THE DOCKS MUST HAVE CLOSING WALLS THAT EXTEND DOWNWARD, SO THAT NO FILTRATIONS ARE PRODUCED UNDER THE DAMMING.

[0009] THE SLOPES OF THE SOIL DOCKS MUST BE MODERATED ENOUGH SO THAT THE SOIL REMAINS IN PLACE EVEN WHEN IT IS SATURATED, THE SOIL DAMS MUST BE PROVIDED WITH A WATERPROOF CORE, SUCH AS CLAY OR CONCRETE, SO THAT THE WATER DOES NOT FILTER. IF THE ENGINEERS CONSTRUCT A CONCRETE DAM, THEY MUST TAKE THE CONTRACTION AND EXPANSION INTO ACCOUNT. THE DOCK MUST BE STRONG ENOUGH SO THAT THE WATER PRESSURE AGAINST ITS WALLS DOES NOT KNOCK IT DOWN. THE DAMS, MADE OF SOIL AS WELL AS WELL AS OF CONCRETE, MUST HAVE ENOUGH DUMP CAPACITY TO CONTAIN THE HIGHEST FLOW FROM THE STORMS. THE WATER FLOWS FROM A RES-

ERVOIR TO THE SUPPLY SYSTEM THROUGH OUTLETS OR INTAKE MECHANISMS. AT THE DAMMINGS WITH SOIL DOCKS AN OUTLET TOWER IS ERECTED FAR AWAY FROM THE SHORE. THIS IS FITTED WITH A SERIES OF FLOODGATES AT DIFFERENT LEVELS THROUGH WHICH THE WATER FLOWS TO AN OUTLET SYSTEM. IF THE WATER IS COLLECTED AT A RUBBLEWORK DAM, THE OUTLET STRUCTURE CAN BE CONSTRUCTED IN THE SAME DAM.

[0010] GENERALLY, IN THE OUTLETS THICK GRIDS ARE PLACED, IN ORDER TO PREVENT LARGE FLOATING OBJECTS, INCLUDING ICE, FROM ENTERING THE DUCTS. INSIDE THE THICK GRIDS THERE ARE OTHER FINER ONES THAT INTERCEPT LEAVES, AQUATIC VEGETATION, FISHES AND LARVAE. THESE GRIDS MUST BE CLEANED FREQUENTLY, IN LARGE SYSTEMS, MECHANICAL CLEANING DEVICES ARE OFTEN EMPLOYED.

[0011] SEVERAL METHODS TO SOLVE THIS PROBLEM ARE KNOWN.

[0012] ONE OF THESE IS DREDGING, WHILE THE OTHER CONSISTS IN USING SEDIMENTATION POOLS.

[0013] THESE RECEIVE THE WATER BEFORE IT PASSES TO THE RESERVOIR AND RETAIN THE SILT IT CONTAINS. LOGICALLY, THE POOLS MUST BE DREDGED FROM TIME TO TIME IN ORDER TO ELIMINATE THE SILT. A THIRD METHOD CONSISTS IN THE USE OF FLOODGATES AT LOW LEVEL, THROUGH WHICH THE SILT EXITS FROM THE RESERVOIR DURING THE RISING PERIODS.

[0014] A FOURTH METHOD CONSISTS IN EXTRACTING CLEANER WATER FROM THE COAST ZONES BY MEANS OF LOG OUTLETS.

[0015] THIS SYSTEM IS CURRENTLY VERY LITTLE USED.

[0016] MANY TIMES A TOWN MUST OBTAIN WATER FROM DISTANT SOURCES. THE WATER PROVISION OF BOSTON, MASSACHUSETTS, COMES FROM A LAKE SITUATED 80 KILOMETRES AWAY FROM THE CITY. NEW YORK OBTAINS MORE THAN HALF OF THE WATER CONSUMED FROM THE CATSKILL MOUNTAINS, LOCATED MORE THAN 150 KILOMETRES AWAY. LOS ANGELES RECEIVES PART OF ITS WATER SUPPLY FROM PARKER'S DAM, LOCATED MORE THAN 400 KILOMETRES AWAY THESE CITIES HAVE SIMILAR PROBLEMS TO THE ONES FACED BY THE ENGINEERS IN ANCIENT ROME WHEN THEY BUILT THE AQUEDUCTS THAT TOOK WATER TO THE CITY.

[0017] IN FACT, TODAY'S ENGINEERS HAVE BETTER MATERIALS AVAILABLE.

[0018] THE LINKS THAT CONNECT THE WATER SOURCE TO THE DISTRIBUTION SYSTEM ARE THE AQUEDUCTS, ALSO CALLED TRANSMISSION WATERWAYS. IN THE MAJORITY OF THE AQUEDUCTS, THE WATER FLOWS THROUGH GRAVITY. IN THESE STRUCTURES, THE SLOPE BY WHICH THE WATER RUNS DOWNSTREAM, ALSO CALLED HYDRAULIC GRADIENT, MUST BE STEEP SO THAT CONTINUOUS FLOW EXISTS, BUT NOT SO MUCH THAT IT CAUSES EXCESSIVE PRESSURES. IN SOME CASES, THERE ARE SYPHONS THAT CARRY WATER OVER MOUNTAINS, UNDER RIVERS AND THROUGH VALLEYS. THE PUMPS CAN FORCE IT THROUGH THE TRANSMISSION WATERWAYS TO PLACES IT COULD NOT ARRIVE BY THE SOLE FORCE OF GRAVITY.

[0019] THE WATER TRANSMISSION LINES GENERALLY COME IN THE FORM OF CLOSED DUCTS, OR DRAINS, EVEN THOUGH IN SOME CASES OPEN DITCHES ARE USED. THE ENGINEERS OFTEN DO NOT SUPPORT THE EMPLOYMENT OF THE LATTER FOR WATER PROVISION, DUE TO THE DANGER OF CONTAMINATION.

[0020] TO CONDUCT WATER EFFICIENTLY, THE DUCT WOULD OFFER THE LEAST SURFACE IN RELATION TO THE VOLUME OF WATER IT CARRIES. EVIDENTLY, THE CIRCULAR TUBES ARE THE ONES THAT BETTER RESPOND TO THESE DEMANDS, BUT IN VERY LARGE SIZES CAN BE VERY EXPENSIVE. IN THOSE CASES, THE ENGINEERS USUALLY SELECT AN EASIER CONSTRUCTION TYPE, WITH CROSS SECTIONS IN HORSESHOE FORM.

[0021] BECAUSE OF THE SMOOTHNESS OF THEIR INTERNAL SURFACE, CONCRETE TUBES ARE GOOD CONDUCTORS TO CARRY WATER UNDER PRESSURE, THESE ARE OFTEN PRESTRESSED. A VERY STRONG, WELL-TIGHTENED WIRE IS WOUND AROUND THE CONCRETE PIPE, AND THEN WITH A PNEUMATIC GUN CEMENT MORTAR IS PULVERISE ON THE CORE THAT HAS BEEN WRAPPED WITH WIRE. THIS MAINTAINS THE INTERNAL CORE IN COMPRESSION. WHEN THE WATER ENTERS THE PIPE UNDER PRESSURE, THE ELEMENT SUPPORTING THE LOAD IS THE STEEL WIRE AND NOT THE CONCRETE.

[0022] ANOTHER USEFUL MATERIAL FOR TRANSMISSION WATERWAYS IS CAST IRON. IT LASTS LONG, REQUIRES LITTLE MAINTENANCE AND CAN BE MOULDED TO SUPPORT HUGE PRESSURES. DIFFICULTIES MAY OCCUR IF CORROSIVE WATER IS SENT THROUGH AN UNTREATED CAST IRON DRAIN. IN THE AQUEDUCTS AND WATER STORAGE LAGOONS CONSTRUCTED IN VERY REMOTE TIMES, MANKIND FACED THE DIFFICULT TASK OF HAVING WITH SAFE AND PRACTICAL ENOUGH MECHANISMS FOR CONTROL AND BETTER USE THEREOF. THERE ARE RECORDS SHOWING DIFFERENT FORMS OF CONTROLLING THE FLOWS MAKING CLAY MIXES THAT EVEN THOUGH THEY STOPPED SUCH WATER RESULTED INOPERATIVE. FOR THIS REASON WOOD BEGAN TO BE USED FOR THEIR CONTAINMENT IN ORDER TO MAKE THESE RESERVOIRS MORE MANUAL. IN THE

LAST CENTURY AND THE BEGINNING OF THIS ONE, MOSTLY STRUCTURAL STEEL FLOOD-GATES WERE DESIGNED, TO OBTAIN BETTER RESULTS IN THE DAMMING AND DISTRIBUTION OF THE WATER TO BE USED. MODERN HISTORIANS BELIEVE THAT VARIOUS ASIATIC CIVILIZATIONS ALREADY KNEW HOW TO MANUFACTURE STEEL WITH IRON ABOUT 500 YEARS A.C. INDIA'S WAS APPARENTLY OF VERY GOOD QUALITY FOR SURGICAL INSTRUMENTS ACCORDING TO THE MEDICAL REPORTS FROM YEAR 400 TO 300 A.C. THE DAMASCUS FAMOUS SABRES WERE MADE, WITH HINDU STEEL IN ANCIENT SYRIA. IN THOSE DAYS, THIS MATERIAL WAS PRODUCED IN VERY SMALL QUANTITIES. THE MOST IMPORTANT METAL THEN AND DURING MANY CENTURIES WAS IRON. IT IS NOT KNOW HOW LONG AGO MAN EXTRACTED IT FOR THE FIRST TIME FROM ITS MINERAL, BUT THIS MUST HAVE BEEN LONG BEFORE THE XIII CENTURY A.C. IN SAID PERIOD IRON OBJECTS WERE ALREADY BEING MANUFACTURED, SOME OF WHICH STILL LAST. THROUGHOUT THE GREEK AND ROMAN PERIODS AND MOST OF THE MIDDLE AGE, THE MALLEABLE IRON, WAS NAMED WROUGHT IRON, WAS PARTICULARLY IMPORTANT. CAST IRON, WAS ALSO MANUFACTURED IN CONSIDERABLE AMOUNTS, IN EUROPE, AS OF THE XIV CENTURY. LITTLE PROGRESS WAS MADE IN THE CONVERSION OF LARGE AMOUNTS OF IRON TO STEEL, UNTIL THE CHEMICAL NATURE THEREOF WAS KNOWN, IN 1781 THE SWEDISH CHEMIST TORBEN OLOF BERMAN, MADE ONE OF THE FIRST ATTEMPTS TO SCIENTIFICALLY ANALYSE STEEL. HE DEFINED WROUGHT IRON, CAST IRON, AND STEEL BY THE AMOUNT OF CARBON THAT EACH ONE CONTAINED. TODAY WE KNOW THAT WROUGHT IRON, CAST IRON, AND STEEL ARE IRON AND CARBON MIXES (PLUS OTHER SUBSTANCES) AND THAT THEIR RESISTANCE MUST BE DUE MAINLY TO CARBON. WROUGHT IRON, WHICH HAS A LOW CONTENT OF CARBON, LESS THAN 0.2 PER CENT. IS THE SOFTEST OF THE THREE ALLOYS. IT CAN BE HAMMERED AND FOLDED IN A VARIETY OF FORMS, WHICH JUSTIFIES ITS NAME. WROUGHT IRON IS MUCH HARDER, EVEN THOUGH RELATIVELY BREAKABLE. THIS IS DUE TO ITS HIGH CARBON CONTENT OF 2.0 TO 4.5 PER CENT. FOR CENTURIES THIS ALLOY HAS BEEN MOLDED OR CAST IN USEFUL FORMS. THE STEEL CARBON CONTENT IS LOCATED BETWEEN THESE TWO ENDS. GENERALLY IT IS LOWER THAN 1.2 PER CENT STEEL POSSESSES PART OF THE CAST IRON FLEXIBILITY AND IT IS MORE RESISTANT THAN CAST IRON. EVEN AFTER STEEL'S NATURE, WAS KNOWN, MANUFACTURES CONTINUED PRODUCING IT ONLY IN SMALL QUANTITIES, IT STARTED TO BE WIDELY USED IN THE 1850'S DECADE WITH THE INTERVENTION OF THE BESSEMER PROCEDURE, THAT ALLOWED TO CONSIDERABLY INCREASE THE METAL'S AVAILABILITY. THE BESSEMER STEEL

[0023] PROVIDED GREAT PART OF THE STEEL USED IN THE CONSTRUCTION OF THE FIRST RAILWAYS AND SKYSCRAPERS THE OPEN HOME OR MARTIN-SIEMENS PROCEDURE, INTRODUCED IN 1860, POINTED OUT A NEW ADVANCE OF THE TWENTIETH CENTURY THAT WAS A WITNESS TO THE IMPLEMENTATION OF THE ELECTRIC OVEN PROCESSES OF OXYGEN AND VACUUM TO MAKE STEEL.

[0024] AS A CONSEQUENCE OF THE PROGRESS IN THE MAKING OF THE STEEL, AMONG THEIR MULTIPLE APPLICATIONS ELECTROMECHANICAL DEVICES FOR WATER CONTROL IN DAMS AND RIVERS BEGAN TO BE DESIGNED. THUS, PIPES, VALVES AND METALLIC FLOODGATES WITH THEIR RESPECTIVE OPERATING MECHANISMS STARTED TO BE MANUFACTURED, THE SAME THAT ARE DESIGNED ACCORDING TO THE DIFFERENT NEEDS OF THE PROJECTS. THESE CAN BE OF DIVERSE TYPES ACCORDING TO THE DESIGNS DEVELOPED.

[0025] THE COMMONLY EMPLOYED STEELS FOR THE MANUFACTURE OF THIS EQUIPMENT, CAN'T RESIST THE CORROSIVE ATTACK OF WATER AND ITS POLLUTING AGENTS, BY THEMSELVES SO IT IS NECESSARY TO SUBMIT THEM TO ANTICORROSIVE TREATMENTS. SUCH TREATMENTS ARE GENERALLY PERFORMED BY FIRST CLEANING THE SURFACE TO BE PROTECTED BY MEANS OF SILICOQUARZ SANDBLAST UNTIL ITS SURFACE IS LIKE WHITE METAL IN ORDER TO IMMEDIATELY APPLY AN INORGANIC LAYER OF ZINC, THEN A LINK AND FINALLY A HIGH SOLID POLYCHLORIDE VINYL FINISH, IN ORDER TO COMPLETE SAID TREATMENT.

[0026] THE EXPERIENCE I HAVE ACQUIRED THROUGH 15 YEARS OF PROFESSIONAL DEVELOPMENT MAINLY IN THIS FIELD HAS LED ME TO REALIZE THAT THE DIFFERENT TREATMENTS THAT HAVE BEEN USED ARE NOT DURABLE ENOUGH TO PREVENT THE CONSTANT DETERIORATION THAT THEY UNDERGO. AS THE MATERIALS INVOLVED IN THE PREVIOUSLY MENTIONED TREATMENTS DETERIORATE, THE EQUIPMENT IS EXPOSED TO THE DETERIORATION OF ITS COMPONENTS, THEREBY ITS WORKING LIFE DEPENDS DIRECTLY UPON THE PERIODICAL APPLICATION OF THESE TREATMENTS, WHICH ARE HIGHLY EXPENSIVE.

[0027] EVEN MORE SERIOUS IS THE DETERIORATION OF THESE FLOODGATES AND IRON MECHANISMS WHEN THERE ARE RESIDUAL SUBSTANCES MIXED IN THE WATER AS A RESULT OF LARGE GROUPS OF PEOPLE AS IN BIG URBAN AREAS, WHICH DRASTICALLY ACCELERATE THE DETERIORATION PROCESS OF THIS EQUIPMENT. THIS WATER IS USED IN GREAT MEASURE TO IRRIGATE

CROPS MEANT MAINLY FOR HUMAN CONSUMPTION. IT HAS BEEN OBSERVED THAT THE PARTICLES OF IRON (RUST) AND OF THE DIFFERENT CHEMICAL COMPONENTS USED IN THE AFOREMENTIONED ANTICORROSIVE PROTECTION AND IN THE DIFFERENT ELASTOMERS AND LUBRICANTS USED FOR ACTIVATION THAT SEPARATE ARE ADDED TO THE ALREADY CONTAMINATED WATER.

[0028] AS A RESULT OF THESE EXPERIENCES I BEGAN TO RESEARCH ALTERNATIVES THAT WOULD ALLOW US TO DIMINISH THESE SERIOUS PROBLEMS. AS A RESULT OF THIS RESEARCH I HAVE CREATED A NEW DESIGN THAT IS SIMPLER AND MORE PRACTICAL AND OFFERS SIGNIFICANT ADVANTAGES OVER THOSE THAT ARE TRADITIONALLY EMPLOYED. THIS DESIGN, IN ADDITION TO THE SAVINGS DUE TO THE SIMPLIFICATION IN THE MANUFACTURING OF ITS COMPONENTS, OFFERS A GREATLY REDUCED WEIGHT SINCE IT CONTEMPLATES THE USE OF A HIGHLY ENGINEERED PLASTIC, MENTIONED IN THE MARKS MECHANICAL ENGINEERS MANUAL, SECOND EDITION AS TYPE 6 NYLON, AND IS QUOTED FOR USE IN GEARS AND OTHER MACHINERY PARTS.

[0029] THIS MATERIAL, WITH A FEW ADDITIONAL COMPONENTS, OFFERS ADVANTAGES SUCH AS:

- EXCELLENT CORROSION RESISTANCE.
- IT PRACTICALLY ELIMINATES LUBRICATION THROUGH OILS AND GREASES, SINCE IT IS POSSIBLE TO LUBRICATE BY WAY OF WATER.
- IT IS HIGHLY ABRASION RESISTANT.
- IT IS HIGHLY IMPACT RESISTANT.
- MINIMUM FRICTION COEFFICIENT.
- IT RESISTS CHEMICAL ATTACK BY DIVERSE CORROSIVE COMPOUNDS FOUND IN RESIDUAL WATERS.

[0030] WE REALIZE EVERY DAY IN THIS RAPIDLY ADVANCING WORLD IN EVERY TECHNOLOGICAL ASPECT THAT WE NEED TO SUBSTITUTE THE MATERIALS THAT WE HAVE BEEN TRADITIONALLY USING. TODAY, WE FIND PLASTICS EVERYWHERE, AS THE NAME INDICATES, THEY CAN BE MOLDED, GIVING THEM DIFFERENT SHAPES, WHICH IS THE REASON THAT THEY ARE SO USEFUL. STONE, FOR EXAMPLE, IS NOT MALLEABLE, IN ORDER TO GIVE IT THE SHAPE WE WANT, WE HAVE TO CHISEL IT, BUT OTHER MATERIALS ARE, UP TO A CERTAIN POINT. IN REMOTE PERIODS SUCH AS THE NEOLITHIC ERA, MANKIND MADE CERAMIC RECIPIENTS FOR THEIR FOOD AND BEVERAGES OUT OF MALLEABLE CLAY: THEN DURING THE IRON AGE, THEY LEARNED HOW TO SHAPE COPPER, BRONZE, AND IRON, WITH WHICH THEY MADE TOOLS, THEY ALSO WORKED WITH WAXES, FISH, AND RUBBERS, FOR DIFFERENT PURPOSES. IN TIME, OTHER MALLEABLE SUBSTANCES WERE CREATED: GLASS, CEMENT, CONCRETE, MORTAR, AND RUBBER. SINCE THE NINETEENTH CENTURY, CHEMISTS, PHYSICISTS, AND ENGINEERS HAVE USED ALL THE RESOURCES OF MODERN SCIENCE TO CREATE A WIDE RANGE OF MALLEABLE ORGANIC SUBSTANCES CALLED PLASTICS. BECAUSE THESE MATERIALS ARE HIGHLY ADAPTABLE THEY ARE USED TO MAKE MANY DIFFERENT PRODUCTS: GOLF TEES, LIFE BOATS, FILM, WOODEN BOARDS, THREAD FOR STOCKINGS, ROPE, RAIN SHOES, RAIN COATS, DISHES, WATER PIPES, TABLE COVERS, WRAPPING FOR MEATS AND VEGETABLES, ETC. ALL PLASTICS ARE MALLEABLE, BUT NOT ALL MALLEABLE MATERIALS ARE CALLED PLASTICS: THE INORGANIC SUBSTANCES THAT CAN BE MOLDED, SUCH AS METALS, CLAY, GLASS, AND CEMENT ARE NOT CONSIDERED TO BE WITHIN THE FIELD OF THE PLASTIC INDUSTRY. NEITHER IS RUBBER.

[0031] MADE WITH POLYMERS. -- EACH PLASTIC CONSISTS OF ONE BASIC INGREDIENT OR CONTAINS ONE ORGANIC SUBSTANCE WITH A HIGH MOLECULAR WEIGHT WHICH CAN BE SOFTENED AND MOLDED WHEN PRESSURE OR HEAT OR BOTH ARE APPLIED. IT IS MADE OF GIANT MOLECULES CALLED POLYMERS, WHICH CONSIST OF SMALLER MOLECULES THAT ARE JOINED AT THE ENDS LIKE A CHAIN. SOMETIMES THE CHAINS CROSS EACH OTHER AS IN THE FORM OF A NET, IN SOME CASES, EACH LINK OF THE CHAIN IS THE SAME BASIC UNIT OR MONOMER, SOME POLYMERS, KNOWN AS COPOLYMERS ARE FORMED BY A MIX OF TWO OR MORE MONOMERS. THE MAJORITY OF PLASTICS ARE MADE BY THE SYNTHESIS OR UNION OF VARIOUS CHEMICAL SUBSTANCES WHICH RESULTS IN A PRODUCT IN WHICH CARBON IS COMBINED WITH ONE OR MORE ELEMENTS, INCLUDING HYDROGEN, OXYGEN, NITROGEN, CHLORINE, AND FLUORIDE. THESE PRODUCTS ARE USUALLY CALLED SYNTHETIC RESINS BECAUSE IN SOME ASPECTS THEY ARE SIMILAR TO NATURAL SUBSTANCES CALLED RESINS; THESE INCLUDE GUMLAC, COLOPHONY, AND AMBER WHICH ARE NOTED FOR THE LARGE SIZE OF THEIR MOLECULES. AS THESE SYNTHETIC RESINS ARE PREPARED IT IS NECESSARY TO COMBINE SMALLER MOLECULES IN ORDER TO OBTAIN POLYMERS, IN CAREFULLY CONTROLLED CONDITIONS, FOR EXAMPLE: THOSE THAT ARE ALCHIDES, PHENOLIC RESINS, AND VINYLS. OTHER PLASTICS ARE OBTAINED FROM NATURAL ORGANIC SUBSTANCES THAT ARE CHEMICALLY MODIFIED IN ORDER TO PRODUCE THE DESIRED PLASTIC MATERIAL. CELLULOIDS, FOR EXAMPLE, ARE DERIVED FROM CELLULOSE, A CARBOHYDRATE WHICH IS FOUND IN PLANTS AND IS EASILY OBTAINED FROM COTTON OR WOOD PULP. THE

CASEINIC

[0032] PLASTICS ARE DERIVED FROM CASEIN, A PROTEIN THAT IS FORMED WHEN MILK SOLIDIFIES. THE BASIC MOLECULES OF THESE NATURAL ORGANIC SUBSTANCES ARE POLYMERS. IT MAY BE NECESSARY TO REDUCE THE SIZE OF THESE GIANT MOLECULES IN ORDER TO PRODUCE A MATERIAL THAT IS EASY TO MOLD ON AN INDUSTRIAL SCALE. PLASTICS ARE DIVIDED INTO TWO MAIN GROUPS: THERMOPLASTIC AND THERMOSTABLE, WHICH DIFFER IN HOW THEY ARE AFFECTED BY HEAT. THE FIRST SOFTEN WHEN THEY ARE HEATED AND HARDEN WHEN THEY ARE COOLED, IF THEY ARE HEATED AGAIN, THEY BECOME SOFT AGAIN, THEY CAN BE MOLDED INTO THE SAME SHAPE OR INTO A DIFFERENT ONE. ONLY A PHYSICAL CHANGE IS PRODUCED, NOT A CHEMICAL ONE. DIFFERENT SUBSTANCES WHICH ARE NOT PLASTICS ALSO BEHAVE IN THE SAME MANNER SUCH AS PARAFFIN WAX WHICH IS A WELL KNOWN EXAMPLE. CELLULOSE ACETATE AND POLYSTYRENE ARE INCLUDED IN THE THERMOPLASTIC GROUP.

[0033] THERMOSTABLE PLASTICS ARE AFFECTED IN A VERY DIFFERENT WAY WHEN HEAT IS APPLIED, FIRST THEY BECOME SOFT, THEN HARD AND THEN THEY CAN NO LONGER BE SOFTENED AGAIN BY APPLYING HEAT. THIS PERMANENT HARDENING, CALLED CURING, IS A CHEMICAL CHANGE COMPARABLE TO THE HARDENING OF AN EGG IN BOILING WATER. THERMOSTABLE PLASTICS INCLUDE PHENOLICS AND EPOXICS (NYLON AMONG OTHERS).

[0034] PIONEERS IN PLASTICS -- THE FIRST COMMERCIAL PLASTIC WAS CELLULOID, A CELLULOSE NITRATE WHICH WAS CREATED IN 1868 BY JOHN HYATT, AN AMERICAN PRINTER. HE HAD ENTERED A CONTEST THAT OFFERED A 10,000 DOLLAR PRIZE TO THE PERSON WHO CAME UP WITH THE BEST SUBSTITUTE FOR IVORY TO MAKE BILLIARD BALLS, HYATT DECIDED TO EXPERIMENT WITH PYROXYLIN, A CELLULOID NITRATE, TO REPLACE IVORY. THE ENGLISH CHEMIST, ALEXANDER PARKES HAD PUT OUT THE INFORMATION THAT IF PYROXYLIN, A BRITTLE AND NON-MALLEABLE SUBSTANCE WERE MIXED WITH CAMPHOR, THE RESULTING SUBSTANCE WOULD BE MALLEABLE; HOWEVER IT WOULD NOT WITHSTAND AN INTENSE USE, HYATT IMPROVED THE MIXING PROCESS BY USING HEAT AND PRESSURE AND PRODUCED A PLASTIC MATERIAL THAT HE CALLED CELLULOID WHICH COULD BE WORKED WITH MACHINERY AND LAMINATED. HOWEVER, IT WAS NOT ADEQUATE FOR BILLIARD BALLS AND HYATT DID NOT WIN THE PRIZE. NEVERTHELESS, HE DISCOVERED THAT CELLULOID WAS A GOOD SUBSTITUTE FOR IVORY IN MANY OTHER PRODUCTS.

[0035] AT FIRST IT WAS USED TO MAKE FALSE TEETH, SHIRT - FRONTS AND COLLARS, THEN FOR PHOTOGRAPHIC FILM, AUTOMOBILE CAR WINDOW CURTAINS, ETC. FOR YEARS NOTHING WAS ABLE TO REPLACE IT BUT IT LOST GROUND RAPIDLY IN THIS CENTURY, WHEN NEWER AND BETTER PLASTIC MATERIALS WERE DEVELOPED. DURING THE LAST YEARS OF THE NINETEENTH CENTURY THE GERMAN SCIENTISTS WILHELM KRISCHE AND ADOLPH SPITTELER BEGAN TO LOOK FOR A MATERIAL WHICH WOULD REPLACE SLATE IN THE MANUFACTURING OF OILSKIN. THEY DISCOVERED THAT THE EFFECT OF FORMALDEHYDE ON CASEIN PRODUCED A SUBSTANCE WITH A HORNED ASPECT; A SUBSTANCE APPROPRIATE FOR MANY USES. THE COMMERCIAL PRODUCTION OF CASEINIC PLASTIC BEGAN IN GERMANY AND FRANCE AROUND 1900. THE PRODUCT RECEIVED THE COMMERCIAL NAME OF GALALITE "SOFT STONE" FROM THE GREEK "MILK" AND LITHOS "STONE". DOCTOR LEO BAEKELAND, A BELGIAN-AMERICAN CHEMIST IS ANOTHER IMPORTANT MAN IN THE HISTORY OF PLASTIC.

[0036] IN 1872 THE EMINENT GERMAN CHEMIST ADOLPH VON BAEYER HAD OBSERVED THAT WHEN DIVERSE PHENOLS AND ALDEHYDES REACTED, THEY FORMED RESINOUS MASSES WHEN MIXED TOGETHER. THESE WERE NOT PUT TO INDUSTRIAL USE UNTIL 1909; THAT YEAR BAEKELAND MANAGED TO CONTROL THE REACTION BETWEEN PHENOL AND FORMALDEHYDE, THEREBY PRODUCING A USEFUL PHENOLIC PLASTIC PRODUCT, WHICH WAS CALLED BY THE COMMERCIAL NAME OF BAKELITE. IT COULD BE SHAPED BY WAY OF MOLDING OR CASTING WITH HEAT OR PRESSURE, IN LIQUID FORM IT WAS USED AS AN ADHESIVE TO BOND LAYERS OF WOOD, CLOTH, PAPER, AND OTHER MATERIALS.

[0037] BAKELITE WAS THE FIRST COMMERCIAL SYNTHETIC RESIN.

[0038] SINCE 1909 MANY OTHER PLASTICS HAVE BEEN DEVELOPED AND COMMERCIALLY PRODUCED. THIS INDUSTRY HAS GROWN CEASELESSLY, INVADING ONE FIELD AFTER ANOTHER. EACH YEAR MILLIONS OF KILOGRAMS OF PLASTIC MATERIAL DESTINED FOR VARIOUS USES ARE PRODUCED IN THE UNITED STATES ALONE.

[0039] A TYPICAL PREPARATION PROCESS -- IN GENERAL THE CHEMICAL SUBSTANCES USED TO PRODUCE PLASTICS DO NOT EXIST AS NATURAL PRODUCTS, THEY ARE PRODUCED WITH THE RESOURCES AT OUR DISPOSAL, SUCH AS, PETROLEUM, NATURAL GAS, CARBON, CHALK, FLUOR SPAR, SULPHUR, WATER, AND AIR TO MENTION THE MOST IMPORTANT ONES. BECAUSE THE MATERIALS REQUIRED FOR THE MANUFACTURING OF PLASTICS ARE SO BASIC, IT IS SAID THAT "NYLON IS MADE OUT OF CARBON, AIR, AND WATER" THAT POLYVINYL CHLORIDE "IS MADE OUT OF

CARBON, CHALK, LIME, AND WATER". NATURALLY THESE STATEMENTS ARE EXTREME SIMPLIFICATIONS. THEY BRING TO MIND A MAGICIAN BREAKING EGGS INTO A TOP HAT AND PULLING OUT AN OMELETTE.

[0040] ACTUALLY, IT IS NOT EASY TO TRANSFORM AND ALTER THESE BASIC NATURAL MATERIALS TO TURN THEM INTO PLASTIC. YOU NEED COMPLICATED EQUIPMENT, SCIENTISTS, ENGINEERS, AND EXPERT TECHNICIANS. FOR EXAMPLE, LET US OUTLINE THE MANUFACTURING PROCESSES REQUIRED TO PRODUCE SYNTHETIC RESIN, MELAMINE, FORMALDEHYDES, WHICH IS A COMBINATION OF THE LAST TWO.

[0041] THE BASIC MATERIALS ARE MELAMINE WITH CARBON, CHALK, AND AIR. WE DO NOT USE ACTUAL CARBON AS AN INGREDIENT; WE RESORT TO COKE, WHICH IS A DERIVATIVE OF CARBON AND IS OBTAINED AS A SUBPRODUCT TOGETHER WITH GAS AND TAR WHEN BITUMINOUS CARBON IS HEATED IN AN OVEN, THE CHALK IS ALSO NOT USED AS AN INGREDIENT IN THE MANUFACTURING OF MELAMINE, INSTEAD THE LIME OBTAINED WITH CARBON BIOXIDE, WHEN THE CHALK IS HEATED IN AN OVEN IS USED. FINALLY, NEITHER DO WE USE AIR. INSTEAD, WE USE THE NITROGEN IN THE AIR WHICH WE OBTAIN BY COMPRESSING, EXPANDING AND COOLING THE AIR WHICH BECOMES LIQUIFIED DURING THE PROCESS. THEN THE LIQUID AIR IS DISTILLED IN ORDER TO SEPARATE ITS COMPONENTS. THE CHEMIST WORKS WITH THE THREE INGREDIENTS; COKE, LIME, AND NITROGEN. A MIXTURE OF LIME AND COKE IS HEATED IN AN ELECTRIC OVEN AT A HIGH TEMPERATURE AND FORMS CALCIUM CARBIDE AND CARBON MONOXIDE. THE CALCIUM CARBIDE IS THEN HEATED WITH THE NITROGEN ALSO IN AN ELECTRIC OVEN AND PRODUCES CALCIUM CYANAMIDE. THIS CHEMICAL SUBSTANCE THEN REACTS WITH WATER AND ACID TO FORM CYANAMIDE FROM WHICH DICYAMINIDE IS OBTAINED BY TREATING IT WITH ALKALIS. FINALLY, THE DICYAMINIDE IS HEATED WITH AMMONIA AND METHANOL. THIS PRODUCES MELAMINE, WHICH IS HOW WE NOW HAVE THE COMPONENT MELAMINE FORMALDEHYDE.

[0042] THE MATERIALS THAT WE START WITH FOR THE MANUFACTURING OF FORMALDEHYDE ARE CARBON, WATER, AND AIR. FIRST THE CARBON MUST BE CONVERTED TO COKE BY WAY OF THE PROCESS PREVIOUSLY DESCRIBED, THEN THE COKE IS MADE TO REACT WITH STEAM IN ORDER TO PRODUCE HYDROGEN AND CARBON MONOXIDE. WHEN THESE TWO GASES ARE HEATED AT HIGH PRESSURE WITH CHROMIC OXIDE AND ZINC OXIDE OR ANOTHER CATALYST WE OBTAIN METHANOL AND MIX ITS STEAM WITH THE OXYGEN IN THE AIR WITH THE HELP OF A CATALYST, THE RESULTING PRODUCT IS FORMALDEHYDE.

[0043] NOW WE HAVE MELAMINE AND FORMALDEHYDE WHICH MUST BE COMBINED IN ORDER TO FORM MELAMINE-FORMALDEHYDE RESIN. FOR THIS OPERATION, THE CHEMIST USES A REACTION VAT MADE OUT OF A STAINLESS STEEL CALLED MARTITE. THIS HAS A MIXER, A STEAM SHIRT FOR HEATING AND AN ELECTRIC INSTRUMENT FOR REGISTERING TEMPERATURES. FIRST THE FORMALDEHYDE IS INTRODUCED INTO THE MARTITE, THEN THE MELAMINE AND THE NECESSARY CATALYSTS; ONCE THE COMPOUND IS HEATED AND STIRRED BY THE MIXER, THE RESIN IS REMOVED AND PUMPED THROUGH A FILTERDAM IN ORDER TO ELIMINATE THE SOLID IMPURITIES; THEN THE FILTERED LIQUID RESIN IS COMBINED WITH SULPHITE PULP OBTAINED FROM WOOD BY MEANS OF A CHEMICAL AND MECHANICAL TREATMENT IN A DOUBLE BLADED STAINLESS STEEL MIXER. THEN THE MIXED RESIN AND THE SULPHITE PULP ARE DRIED OUT, CUT WITH A SHEAR, AND MIXED WITH DIVERSE MODIFIERS, THAT IS, SUBSTANCES ADDED DURING THE GRINDING IN A PELLET MILL.

[0044] THESE MODIFIERS INCLUDE DYES, LUBRICANTS AND CATALYSTS. PART OF THE GROUND MIXTURE IS FILTERED IN ORDER TO SEPARATE THE FINE PARTICLES WHICH ARE PACKAGED IN DRUMS AND SOLD AS PLASTIC POWDER FOR MOLDING, THE REST OF THE MIXTURE IS COMPACTED (THAT IS COMPRESSED) AND RUN THROUGH A CUTTING MACHINE TO PRODUCE PELETS OF THE DESIRED SIZE, AFTER SIFTING IT IS PACKAGED IN DRUMS AND IS SOLD UNDER THE NAME OF GRANULATED MOLDING COMPOUND. THIS IS A BRIEF SKETCH OF THE MANY CHEMICAL AND PHYSICAL PROCESSES NEEDED FOR THE TRANSFORMATION OF CARBON, CHALK, WATER, AND AIR INTO A TYPICAL PLASTIC MATERIAL SUCH AS MELAMINE-FORMALDEHYDE.

[0045] MODIFIERS -- MANY OTHER PROCESSES ARE USED IN THE MANUFACTURING OF PLASTICS. THE ADDITION OF MODIFIERS IS OF GREAT IMPORTANCE I IN PRACTICALLY ALL CASES SINCE USUALLY SYNTHETIC RESINS BY THEMSELVES ARE NOT APPROPRIATE FOR MOLDING PURPOSES. DYES -- ARE ALMOST ALWAYS ADDED, THESE ARE MADE OF RED CADMIUM, YELLOW CADMIUM, AND WHITE TITANIUM BIOXIDE DYES AND PIGMENTS. LUBRICANTS -- THEY ARE GENERALLY ALSO INCLUDED AND THEY FACILITATE THE FILLING OF A MOLD WHEN THE MOLDING POWDER IS CONVERTED INTO A FINISHED OR SEMIFINISHED PRODUCT.

[0046] SOME PLASTICS ACQUIRE A CHARGE OF STATIC ELECTRICITY, WHICH IS WHY DUST ADHERES TO ITS SURFACE, IN ORDER TO OVER-

COME THIS PROBLEM, DESTATIFYERS ARE ADDED TO THE PLASTIC MIXTURE. ONE TYPE OF THESE INCREASES THE ELECTRIC CONDUCTION ON THE SURFACE, THEREBY PERMITTING THE STATIC CHARGE TO ESCAPE.

[0047] EXPOSURE TO SUNLIGHT DETERIORATES SOME PLASTICS, THIS CAN BE AVOIDED BY ADDING STABILIZING SUBSTANCES WHICH ARE COMPRISED OF ORGANIC BARIUM ACIDS, CADMIUM, CALCIUM, AND ZINC.

[0048] OTHER MODIFIERS ACT AS FLAME RETARDANTS, AMONG THESE ARE ORGANIC PHOSPHOROUS COMPOUNDS THAT ARE CHEMICALLY COMBINED WITH BROMINE OR CHLORINE. WHEN MIXED WITH PLASTICS PRODUCTS ADEQUATE FOR FILLERS SUCH AS SMOKE BLACK, CLAY, COTTON FLUFF, MICA, AND SAWDUST ADD VOLUME AND THE MATERIAL IS MADE LESS POROUS THEREBY REDUCING THE TOTAL COST. PLASTICIZERS ARE ANOTHER IMPORTANT MODIFIER, THEY COME IN LIQUID OR SOLID FORM AND ARE ADDED TO THE PLASTIC POWDER IN ORDER TO IMPROVE FLEXIBILITY AND ADD OTHER QUALITIES; THERE HAVE BEEN SOME 400 ORGANIC COMPOUNDS EMPLOYED AS PLASTICIZERS.

[0049] ONCE THE NECESSARY MODIFIERS HAVE BEEN ADDED, THE PLASTIC MATERIAL IS CONVERTED INTO POWDER, OR IT CAN BE PREPARED IN GRANULATED FORM, AS WITH MELAMINE-FORMALDEHYDE RESIN WHICH HAS BEEN PREVIOUSLY DESCRIBED. IT CAN ALSO BE SOLD AS PELLETS OR CHIPS. IT IS NOW READY TO BE MADE INTO FINISHED OR SEMIFINISHED PRODUCTS.

[0050] IMPORTANT GROUPS -- TODAY THERE ARE THOUSANDS OF DIFFERENT PLASTIC MATERIALS WHICH ARE COMMERCIALIZED UNDER A PROFUSION OF BRAND NAMES SUCH AS: HERCULOID, NITRON, AND ROWLAND CN, FOR EXAMPLE: ARE TRADEMARKS OF CELLULOID NITRATE, BEETLE, PLASKON, AND CATALIN ARE TRADEMARKS OF UREA-FORMALDEHYDE, STYRON, LUSTREX AND BAKELITE POLYSTYRENE ARE TRADEMARKS OF POLYSTYRENE, OBVIOUSLY IT WOULD BE IMPOSSIBLE TO NAME EACH OF THE AVAILABLE PLASTIC PRODUCTS IN THIS BRIEF LIST, NOT TO MENTION THE STILL NUMEROUS TRADEMARKS BY WHICH THEY ARE KNOWN. IN THE FOLLOWING PARAGRAPHS I WILL ENUMERATE THE MOST IMPORTANT GROUPS OF PLASTICS ALONG WITH A BRIEF DESCRIPTION OF THE CHARACTERISTICS AND USES OF EACH ONE.

[0051] ACRYLIC RESINS -- ARE THERMOPLASTIC MATERIALS WHICH ARE KNOWN FOR THEIR STRENGTH, RESISTANCE TO THE OUTDOORS, AND TRANSPARENCY. POLYMETACRYLATES THE MOST IMPORTANT RESIN IN THIS GROUP AND IS BETTER KNOWN BY ITS COMMERCIAL NAMES OF PLEXIGLASS AND LUCITE.

[0052] IT REMAINS TRANSPARENT IN SPITE OF DIFFERENT CLIMATIC CONDITIONS, IT RESISTS BLOWS, IT BURNS SLOWLY AND DOES NOT BECOME BRITTLE WHEN COOLED: IT IS USEFUL FOR SIGNS, AUTOMOBILE TAILLIGHTS, HAIR-BRUSH HANDLES, COMBS, AND JEWELRY, IT ADAPTS VERY WELL TO MATERIALS THAT IMITATE GLASS, ITS USED IN AEROPLANES DUE TO ITS TRANSPARENCY AND RESISTANCE TO METEOROLOGICAL CONDITIONS.

[0053] ALCHIDIC RESINS -- THESE ARE THERMOSTABLE, THEY MAKE GOOD ELECTRIC ISOLATORS AND ARE RESISTANT TO HEAT; IT IS USED IN PAINTS, ENAMELS, GLOSS PAINTS, ADHESIVES AND PRINTING INKS. ALCHIDIC PLASTIC MATERIALS ARE USED IN ELECTRIC SWITCHES, FUSES, AUTOMOBILE IGNITIONS AND BASEBOARDS FOR ELECTRIC TUBES.

[0054] ALILIC RESINS -- ARE THERMOSTABLE PLASTICS THAT MAKE EXCELLENT ELECTRIC ISOLATORS AND HAVE A LOW LEVEL OF WATER ABSORPTION AS WELL AS LITTLE CONTRACTION DURING AND AFTER THE MOLDING PROCESS. THEY ARE USED IN THE MANUFACTURING OF AUTOMOBILE IGNITIONS AND DISTRIBUTOR CAPS SWITCHBOARDS, BASEBOARDS FOR ELECTRIC AND ELECTRONIC TUBES, AND OTHER ELECTRIC AND ELECTRONIC COMPONENTS. THE ALILIC RESIN CALLED DYALIFTHALYDE PROVIDES A SAFE ISOLATOR IN THE MOST ADVERSE CONDITIONS OF TEMPERATURE AND HUMIDITY, IT IS FORT THIS REASON THAT IT WAS EMPLOYED IN THE TERMINAL EQUIPMENT OF THE FIRST TRANSOCEANIC TELEPHONE CABLE.

[0055] AMINORESINS -- MAKE UP A GROUP OF THERMOSTABLE PLASTICS THAT INCLUDES MELAMINE FORMALDEHYDE RESIN. MOLDED AMINIC PRODUCTS ARE TRANSLUCENT OR OPAQUE, THEY ARE ALSO SHINY. DYES TAKE WELL TO THEM AND THEY ARE TOTALLY DEVOID OF ANY SMELL OR TASTE. MELAMINE-FORMALDEHYDE RESIN HAS A LOW HUMIDITY ABSORPTION COEFFICIENT AND PROVIDES A HARD SMOOTH SURFACE. AS A RESULT IT IS GREATLY EMPLOYED FOR TABLEWARE, BUTTONS, BOXES FOR HEADPHONES AND DISTRIBUTOR CAP HEADS. UREA-FORMALDEHYDE RESIN IS USEFUL FOR AMONG OTHER THINGS TO MAKE RADIO BOXES AND OTHER ELECTRIC DEVICES.

[0056] CASEINIC PLASTICS -- ARE CREATED BY THE REACTION. OF FORMALDEHYDE TO CASEIN, WHICH RESULTS IN A MATERIAL THAT IS THERMOSTABLE, HARD AND HAS A HORNED ASPECT.

[0057] THESE PLASTICS HAVE A SHINY SURFACE POLISH AND COME IN A WIDE RANGE OF COLORS, THEY ARE USED TO MANUFACTURE BUTTONS, BEADS, GAME BOARDS, PUSH BUTTONS FOR MACHINES, KNITTING NEEDLES, AND TOYS.

[0058] CELLULOSICS -- THESE ARE CELLULOSE DERIVATIVES THAT FORM A GROUP THAT INCLUDES CELLULOSE ACETATE, THEY ARE THERMOPLASTIC, RESISTANT AND COME IN A VARIETY OF COLORS, CELLULOSE ACETATE IS THE MOST WIDELY USED OF THE CELLULOSICS; IT IS USED TO MAKE FIBRES (RAYON ACETATE), PHOTOGRAPHIC FILM, BUTTONS, COMBS, EYEGLASS FRAMES, LAMPSHADES, VACUUM CLEANERS, AND FLOOR POLISHERS. THE PRODUCTS THAT ARE MOLDED WITH THIS MATERIAL ARE SOFT TO THE TOUCH AND RESIST DETERIORATION; FINGERPRINTS ARE EASILY REMOVED.

[0059] BUTYRATE OF CELLULOSE ACETATE IS MORE RESISTANT THAN CELLULOSE ACETATE AND ABSORBS LESS HUMIDITY, IT IS RESISTANT TO THE BEHAVIOUR OF ATMOSPHERIC AGENTS AND IS EASILY CLEANED, IT IS IDEAL FOR AUTOMOBILE STEERING WHEELS , PORTABLE RADIO BOXES, TOOL HANDLES, AND TELEPHONE RECEIVERS.

[0060] EPOXIC RESINS -- ARE THERMOSTABLE CHEMICALLY RESISTANT, DURABLE, FLEXIBLE, AND STRONG PLASTICS. THEY PROVIDE EXCELLENT PROTECTIVE COVERINGS, ARE USEFUL AS PRIMERS, FINAL PAINTS, AND VARNISHES SUCH AS, COATINGS AND LININGS FOR CANS, DRUMS, PIPES, RECIPIENTS, AND TANKER TRUCKS. THESE RESINS MAKE EXCELLENT ADHESIVES, THEY ARE ALSO BEING USED MORE AND MORE FOR MOLDING AND CASTING AND LAMINATING. THE LAMINATES OR COMBINED LAYERS OF EPOXIC RESINS AND PRODUCTS MADE WITH FIBERGLASS HAVE BEEN WIDELY USED IN ELECTRICAL CIRCUITS, PRINTINGS, AVIATION, MACHINERY HOUSINGS, TANKS, AND TOOLS.

[0061] FLOUROCARBONS -- OUTSTANDING FOR THEIR DURABILITY, THEY RESIST CHEMICAL SUBSTANCES, FLAME, HEAT, AND OUTDOOR CONDITIONS. THESE THERMOPLASTICS ARE FLEXIBLE AT LOW TEMPERATURES, ARE GOOD ELECTRIC ISOLATORS, THEY ARE USED FOR MANUFACTURING VALVES, PUMPING EQUIPMENT DIAPHRAGMS, PACKAGING, NON-LUBRICATING RODS, ELECTRICAL COMPONENTS, WIRE AND PIPE COVERINGS.

[0062] PHENOLIC RESINS -- ARE THERMOSTABLE PLASTICS THAT ARE SOLID, RIGID, AND HAVE ANTITHERMIC RESISTANCE. THEY HAVE A NATURALLY DARK COLOR AND USUALLY DO NOT COME IN THE RANGE OF BRIGHT COLORS WHICH THE PUBLIC GENERALLY ASSOCIATES WITH PLASTICS. PHENOLICS ARE USED FOR PARTS OR ITEMS THAT REQUIRE SPECIAL MECHANICAL OR ELECTRIC QUALITIES MORE THAN AN ABILITY TO COLOR WELL. AMONG OTHER THINGS THEY ARE USED FOR CAMERA CASINGS, DISTRIBUTOR CAPS, ELECTRIC IRON HANDLES, SWITCHES, TELEPHONES, BASEBOARDS, TELEPHONES, AND WASHING MACHINE PADDLES, IN LIQUID FORM THEY ARE USED AS PROTECTIVE COATINGS AND ADHESIVES AS WELL AS FOR THE MANUFACTURING OF LAMINATES.

[0063] POLYAMIDIC RESINS -- NYLON IS THE MOST WIDELY KNOWN OF THESE. IT IS NOT ONE PLASTIC BUT A GROUP OF PLASTICS IN WHICH EACH ONE HAS ITS OWN PHYSICAL CHARACTERISTICS AND SPECIAL USES. THE WORD NYLON SUGGESTS FABRICS, PANTYHOSE, OR BRISTLES FOR BRUSHES TO THE GENERAL PUBLIC BUT THESE ARE ONLY A FEW OF ITS MULTIPLE USES. SINCE NYLON BASED PRODUCTS ARE STRONG AND CAN WITHSTAND ABRASION, HEAT, AND CHEMICAL MATERIALS, THEY ARE SHAPED TO MAKE. GEARS, BEARINGS, SPEEDOMETER CAMS, PARTS FOR COMMERCIAL MACHINERY AND DOMESTIC APPLIANCES, THEY ARE ALSO USED TO MAKE RIFLE BUTTS, ROTATING SWITCHES, SILVERWARE HANDLES, AND ZIPPERS. POLYCARBONATE RESINS -- IT RESISTS CHEMICAL SUBSTANCES, HEAT, BLOWS AND INTEMPERATE WEATHER CONDITIONS. THIS THERMOPLASTIC IS USED TO MAKE DIFFERENT AEROPLANE PARTS, CARS, AND COMMERCIAL CALCULATORS AND HAS A LOT OF USES IN THE MANUFACTURING OF ELECTRONIC AND ELECTRIC DEVICES THE SAME AS WITH ALUMINUM, TIN, AND COPPER, BUT DIFFERENT FROM OTHER PLASTICS IT CAN BE WORKED COLD (THAT IS IT CAN BE MOLDED WITHOUT HEAT), THROUGH LAMINATING, PRESSURE, AND STRETCHING IN ORDER TO MANUFACTURE RECORDS AND PIPES.

[0064] POLYESTER RESIN -- ITS COMPONENTS ARE THERMOSTABLE, EXCELLENT ELECTRICAL ISOLATORS, THEY PRESENT A LOW INDEX OF HUMIDITY ABSORPTION AND ARE RESISTANT AGAINST HEAT. THEY ARE WIDELY USED FOR COATINGS. POLYESTER MADE OUT OF FIBERS COMMONLY KNOWN AS DACRON HAS BECOME VERY IMPORTANT IN THE TEXTILE INDUSTRY, WHEN THEY ARE REINFORCED WITH FIBERGLASS, SYNTHETIC FIBERS AND OTHER MATERIALS, POLYESTER RESINS CAN BE MOLDED TO MAKE DIFFERENT PRODUCTS WHICH HAVE OUTSTANDING ELECTRIC CHARACTERISTICS AND ARE LIGHT AND STRONG AND CAPABLE OF WITHSTANDING BLOWS.

[0065] THESE REINFORCED MATERIALS ARE USED IN THE MANUFACTURING OF PANELS FOR CONSTRUCTION, ELECTRICAL COMPONENTS, AND MANY OTHER PRODUCTS.

[0066] POLYETHILENE -- IS AMONG THE MOST USED PLASTICS, AMONG THERMOPLASTIC MATERIAL IT IS STRONG AND CAN BE MADE RIGID OR FLEXIBLE, RESISTANT TO HEAT AND COLD AND IS AN EXCELLENT ELECTRIC ISOLATOR. ITS MANY USES INCLUDE FAUCETS AND PIPES, WRAPPING

FOR ELECTRIC CABLES, BUCKETS, RIGID AND SQUEEZABLE BOTTLES, GLASSES, PLASTICS FOR DRINKING OUT OF, PLATES, BRUSH HANDLES, AND TOYS AND IN FILM AND LAMINATE FORM IT IS USED FOR BAGS OF CANDY AND OTHER FOODS, RAIN RESISTANT CLOTHING, WEATHER BALLOONS, FREEZER BAGS AND PROTECTION AGAINST HUMIDITY UNDER CEMENT AND INSIDE WALLS. HIGH DENSITY POLYETHYLENE IS RIGID, WATER RESISTANT, CLIMATE RESISTANT, WITHSTANDS ACIDS FROM FOODS, AND ABRASIONS AND IS EASILY CLEANED WHICH IS WHY IT IS WIDELY USED TO MAKE GARBAGE CANS.

[0067] POLYPROPYLENE -- IS A THERMOPLASTIC THAT HAS MANY VALUABLE QUALITIES. IT IS LIGHT, STRONG, RESISTS CHEMICAL PRODUCTS, BOILING WATER, AND CRACKING. IT IS A GOOD ELECTRICAL ISOLATOR; IT IS USED TO MAKE PLATES, FAUCETS, PIPES, VALVES, BOTTLES, ACCUMULATOR HOUSINGS, REFRIGERATOR PARTS, TEXTILE MACHINERY COMPONENTS, DOMESTIC ARTICLES, AND WIRE AND CABLE ISOLATION. LABORATORY EQUIPMENT MADE FROM POLYPROPYLENE WITHSTANDS BLOWS, TEMPERATURES OF UP TO 140 DEGREES C. AND WITHSTANDS CHEMICAL PRODUCTS AND CRACKING.

[0068] POLYSTYRENES -- ARE THERMOPLASTICS THAT ARE NOTED FOR THEIR TRANSPARENCE, HARDNESS, SHININESS, AND ELECTRICAL QUALITIES AND CAN BE MANUFACTURED IN A WIDE VARIETY OF COLORS, ITS USES ARE, KITCHEN UTENSILS, RECIPIENTS FOR REFRIGERATING FOOD, DASHBOARDS, TILES, PORTABLE RADIO HOUSINGS, PACKAGING BOXES, HANDLES, AND TOYS.

[0069] RIGID POLYSTYRENE FOAM CAN BE COMMERCIALLY OBTAINED IN THE FORM OF SLABS, BLOCKS, AND AS PELLETS THAT CAN BE CRUSHED AND MADE INTO PLASTIC FOAM. IT IS USED FOR PACKAGING AND AS INTERMEDIATE PANELS IN BUILDINGS.

[0070] SILICONS -- ARE RESISTANT TO CHEMICAL PRODUCTS, HEAT, WATER, AND INTEMPERATE CONDITIONS AND ARE VERY GOOD ELECTRICAL ISOLATORS. THESE THERMOSTABLE PLASTICS ARE USED IN AVIATION, IN MISSILES, CONNECTORS, PLUGS, ISOLATORS FOR GENERATORS, SWITCHBOARD PARTS AND CONTROL PANELS FOR TERMINALS.

[0071] URETHANE RESINS -- ARE THERMOPLASTIC MATERIALS THAT MAKE UP FLEXIBLE AND RIGID FOAMS THAT ARE STRONG, LIGHT, AND RESIST HUMIDITY. THE FLEXIBLE ONES HAVE PROVEN TO BE USEFUL IN CAR SEATS AND AEROPLANES, MATTRESSES, CRASH PILLOWS, FURNITURE STUFFING, CLOTHING, PROTECTIVE PACKAGINGS AND THERMIC ISOLATION FOR TANKS. THE RIGID FOAM IS USEFUL AS INSULATION AGAINST COLD WEATHER AND FOR PACKAGING. THESE RESINS ARE ALSO USED AS ADHESIVES, BRUSH BRISTLES, AND SOLID PLASTIC PRODUCTS.

[0072] VYNILIC RESINS -- OR VINYLS, ARE STRONG THERMOPLASTICS, GOOD ELECTRICAL ISOLATORS, RESISTANT TO CHEMICAL PRODUCTS AND THEY COME IN MANY COLORS; THEY ARE USED FOR TILES, PURSES, RECORDS, RAINCOATS, SHOWER CURTAINS, UPHOLSTERY, HOSES, ELECTRIC PLUGS, AND ISOLATION FOR WIRES AND CABLES.

[0073] THROUGH THIS ESSAY, WE HAVE ATTEMPTED TO CREATE AN IDEA OF WHAT THE TECHNOLOGICAL ADVANCES IN HIGH ENGINEERING IN PLASTICS REPRESENT FOR AND OFFER TO MANKIND UP TO TODAY.

DESCRIPTION OF THE INVENTION

[0074] THE CHARACTERISTIC DETAILS OF THIS MAINTENANCE FREE SLIDING FLOODGATE SYSTEM WITH AND WITHOUT THE OPERATING MECHANISM, MADE OF PLASTIC MATERIAL. IS SHOWN IN THE 22 DRAWINGS THAT ARE ATTACHED, IN WHICH THE PARTS THAT MAKE IT UP ARE DETAILED.

FIGURE 1 IS AN OVERVIEW OF A SQUARE OR RECTANGULAR FLOODGATE. IN ONE PIECE WITHOUT THE MECHANISM SHAPED, LIKE A MANUAL SHOVEL HANDLE.

FIGURE 2 IS THE FRAME OF A SQUARE OR RECTANGULAR FLOODGATE, IN ONE PIECE WITHOUT THE MECHANISM, SHAPED LIKE A MANUAL SHOVEL HANDLE.

FIGURE 3 IS AN OVERVIEW OF A SQUARE OR RECTANGULAR FLOODGATE IN ONE PIECE WITHOUT THE MECHANISM, WITH A STRAIGHT PLATE HANDLE.

FIGURE 4 IS THE FRAME OF A SQUARE OR RECTANGULAR FLOODGATE, IN ONE PIECE WITHOUT THE MECHANISM WITH A STRAIGHT PLATE HANDLE.

FIGURE 5 REFERS TO AN ENTIRE FLOODGATE WITHOUT THE MECHANISM BUT WITH TWO OR MORE PARTS, WITH A MECHANICAL JOINT, SHAPED LIKE A STRAIGHT SHOVEL HANDLE.

FIGURE 6 IS AN ENTIRE FLOODGATE WITHOUT THE MECHANISM, WITH TWO OR MORE PARTS, WITH A MECHANICAL JOINT AND A STRAIGHT PLATE HANDLE.

FIGURE 7 IS AN ENTIRE FLOODGATE SYSTEM WITH THE MECHANISM, SHAPED LIKE A MANUAL SHOVEL HANDLE.

FIGURE 8 IS AN COMPLETE FLOODGATE SYSTEM WITH THE MECHANISM SHAPED LIKE A STRAIGHT PLATE HANDLE.

FIGURE 9 SHOWS US AN OVERVIEW OF A MAN-

UALLY OPERATED SQUARE OR RECTANGULAR FLOODGATE.

FIGURE 10 REFERS TO A MANUALLY OPERATED TRAPEZOIDAL FLOODGATE.

FIGURE 11 IS A SQUARE OR RECTANGULAR FLOODGATE WITH THE MECHANISM.

FIGURE 12 IS A FLAT FLOODGATE SHEET FROM THE FLOODGATE WITH A MECHANISM.

FIGURE 13 REFERS TO THE SHEET'S GUIDE FRAMES ON THE FLOODGATE WITH THE MECHANISM.

FIGURE 14 REFERS TO THE SEAT PLATE ON THE FLOODGATE WITH THE MECHANISM.

FIGURE 15 SHOWS THE LIFT SCREW OF THE ON THE FLOODGATE WITH THE MECHANISM.

FIGURE 16 SHOWS THE LIFT NUT ON THE FLOODGATE WITH THE MECHANISM.

FIGURE 17 IS AN OVERVIEW OF THE LOCK ON THE FLOODGATE WITH THE MECHANISM.

FIGURE 18 REFERS TO THE OPERATING HANDWHEEL ON THE FLOODGATE WITH THE MECHANISM.

FIGURE 19 SHOWS A RECTANGULAR OR SQUARE FLOODGATE SYSTEM, WITH THE MECHANISM THAT IS OPERATED BY A CRANK.

FIGURE 20 REFERS TO A RECTANGULAR OR SQUARE FLOODGATE SYSTEM WITH AN OPERATING HANDWHEEL SYSTEM PARALLEL TO THE FLOODGATE BLADE.

FIGURE 21 IS AN OVERVIEW OF A CONCAVE FLOODGATE WITH RADIAL MOTION, IN ONE PIECE, WHICH IS OPERATED BY BEARINGS OR PELLETS ON THE RIBBING LOCATED ON THE FLOODGATE BLADE.

FIGURE 22 REFERS TO A FLOODGATE SYSTEM WITH RADIAL MOTION, IN TWO OR MORE PARTS, WHICH FUNCTIONS BY AN OPERATING HANDWHEEL, GEARS AND RODS, OR LIFT SCREWS ALL SYNCHRONIZED IN ORDER NOT ITS RADIAL TRAJECTORY.

[0075] BY THE SAME TOKEN, WE WILL PROCEED TO DESCRIBE EACH ONE OF THE PARTS THAT MAKES EACH SYSTEM OR EACH FIGURE.

[0076] ACCORDING TO FIGURE 1 THE SYSTEM CONSISTS OF A ONE PIECE FLOODGATE SHEET, SHAPED LIKE A SHOVEL, WHICH IS A SQUARE OR RECTANGULAR PLATE AT THE BOTTOM (1). IT IS THE AREA USED TO OBSTRUCT THE WATER FLOW, IT CONTINUES UPWARD FROM THE UPPER MIDDLE SECTION OF THE PLATE SHAPED LIKE A SQUARE BAR (2); AND HAS BOREHOLES (3) AT CERTAIN INTERVALS ALONG THE LENGTH OF THE BAR, AND FINALLY ENDS IN THE SHAPE OF A MANUAL SHOVEL HANDLE (4) WHICH ALLOWS THE FLOODGATE TO BE RAISED.

[0077] FIGURE 2 SHOWS THE COMPLEMENT TO THE SYSTEM, WHICH IS A U-SHAPED FRAME THAT FUNCTIONS AS A GUIDE WHICH PREVENTS THE FLOODGATE SHEET FROM DERAILING AS IT SLIDES VERTICALLY, ITS SIDE BARS, WHICH HAVE TRACKS (1), AS WELL AS THE LOWER BAR (2) ARE SUBMERGED IN AND ANCHORED TO THE CANAL'S CONCRETE FLOOR RESPECTIVELY, WHILE THE UPPER BAR OF THE FRAME (3) IS SLOTTED ALONG ITS ENTIRE LENGTH IN ORDER TO ALLOW THE FLOODGATE SHEET TO BE RAISED. THE MIDDLE PART OF SAID BAR IS ALSO SLOTTED ALONG ITS WIDTH (4) SO THAT IT CAN BE ATTACHED TO THE DIFFERENT BOREHOLES ON THE BAR OF THE FLOODGATE PLATE.

[0078] THIS SYSTEM IS OPERATED MANUALLY AND FUNCTIONS IN THE FOLLOWING MANNER: THE FLOODGATE PLATE SLIDES UPWARD VERTICALLY BY WAY OF ITS HANDLE, AND ACCORDING TO THE BOREHOLES ON THE BAR OF THE FLOODGATE PLATE CAN BE STOPPED AT ANY ONE OF THEM WITH A BIT MADE OUT OF THE SAME OR ANOTHER MATERIAL IN THE BOREHOLE IN THE UPPER BAR OF THE FRAME, DEPENDING THE WATER FLOW TO BE MANAGED.

[0079] THIS WAY, THE FLOODGATE SHEET CREATES A SEAL WITH THE LOWER BAR OF THE FRAME WHICH FUNCTIONS AS A SEAT WHILE IT IS IN THE CLOSED POSITION.

[0080] IN FIGURE 3, THE SYSTEM IS MADE UP OF A ONE PIECE FLOODGATE SHEET SHAPED LIKE A PADDLE IN WHICH THE PLATE IS SQUARE.OR RECTANGULAR AT THE BOTTOM (1), WHICH IS THE PART USED TO OBSTRUCT THE WATER FLOW, AND CONTINUES UPWARD FROM THE UPPER MIDDLE PART OF THE SHEET SHAPED LIKE A NARROWER SHEET (2), AND WHICH HAS BOREHOLES (3) AT CERTAIN DISTANCES ALONG THE LENGTH OF THE SHEET, FINALLY ENDING IN AN OPENING IN ITS UPPER SECTION (4), SO THAT IT CAN BE OPERATED MANUALLY WHICH, PERMITS RAISING OF THE FLOODGATE.

[0081] FIGURE 4 SHOWS THE COMPLEMENT TO THE SYSTEM WHICH IS A U-SHAPED FRAME WHICH FUNCTIONS AS A GUIDE SO THAT THE FLOODGATE PLATE DOES NOT DERAIL AS IT IS MOVING VERTICALLY.

[0082] IN SAID FRAME ITS SIDE BARS (1) AS WELL AS ITS LOWER BARS (2) ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE, FLOOR RESPECTIVELY, WHILE THE TOP BAR (3) OF THE FRAME IS SLOTTED ALONG ITS LENGTH IN ORDER TO ALLOW THE FLOODGATE SHEET TO BE RAISED. THE CENTER OF SAID BAR ALSO HAS BOREHOLES SO THAT IT CAN BE ATTACHED TO THE DIFFERENT BOREHOLES IN THE FLOODGATE'S NARROWER SHEET.

[0083] THE SYSTEM IS OPERATED MANUALLY AND WORKS THE FOLLOWING WAY: THE FLOODGATE SHEET SLIDES UPWARD VERTICALLY FROM

THE OPENING IN THE NARROWER SHEET, AND DEPENDING ON THE BOREHOLES IN THE UPPER BAR OF THE FLOODGATE PLATE CAN BE STOPPED AT ANY ONE OF THESE WITH A BIT MADE OF THE SAME OR ANOTHER MATERIAL IN THE BOREHOLE IN THE UPPER PART OF THE FRAME, DEPENDING ON THE WATER FLOW TO BE MANAGED.

[0084] THIS WAY THE FLOODGATE SHEET IS SEALED TO THE LOWER BAR OF THE FRAME THAT FUNCTIONS AS A SEAT WHEN IT IS IN THE CLOSED POSITION. IN FIGURE 5, THE SYSTEM IS MADE UP OF A SINGLE FLOODGATE SHEET WHICH IS SHAPED LIKE A PADDLE THAT HAS A SQUARE OR RECTANGULAR SHEET AT THE BOTTOM (1) WHICH IS THE AREA USED TO OBSTRUCT THE WATER FLOW, IT CONTINUES UPWARD FROM THE UPPER MIDDLE SECTION OF THE SHEET IN THE FORM OF A SQUARE BAR (2); AND WHICH HAS BOREHOLES (3) AT SET INTERVALS ALONG THE LENGTH OF THE BAR, ENDING IN THE SHAPE OF A MANUAL SHOVEL HANDLE (4), WHICH PERMITS THE FLOODGATE TO BE RAISED. IT CONTAINS A MECHANICAL JOINT THAT CONNECT THE FLOODGATE SHEET TO THE LIFT BAR, IT ALSO HAS A U-SHAPED FRAME WHICH FUNCTIONS AS A GUIDE THAT PREVENTS THE FLOODGATE SHEET FROM DERAILING WHILE SLIDING VERTICALLY.

[0085] IN SAID FRAME, THE SIDE BARS WHICH ARE GROOVED (6), AS WELL AS THE LOWER BAR (7), ARE SUBMERGED IN AND ANCHORED TO THE CANAL'S CONCRETE FLOOR RESPECTIVELY, WHILE THE UPPER BAR (8), IS SLOTTED ALONG ITS LENGTH IN ORDER TO ALLOW THE FLOODGATE SHEET TO BE RAISED. THE MIDDLE PART OF SAID BAR IS ALSO SLOTTED ALONG ITS WIDTH (9) SO THAT IT MATCHES THE DIFFERENT BOREHOLES IN THE BAR ON THE FLOODGATE SHEET.

[0086] THIS SYSTEM IS OPERATED MANUALLY AND WORKS THE FOLLOWING WAY: THE FLOODGATE SHEET SLIDES UPWARD VERTICALLY BY ITS HANDLE, AND DEPENDING ON THE BOREHOLES IN THE BAR OF THE FLOODGATE SHEET IT CAN BE STOPPED AT ANY ONE OF THEM WITH A BIT MADE OF THE SAME OR ANOTHER MATERIAL, IN THE BOREHOLE AT THE TOP OF THE FRAME, DEPENDING ON THE WATER FLOW MANAGEMENT REQUIRED.

[0087] IN THIS WAY THE FLOODGATE SHEET ADHERES TO THE LOWER BAR OF THE FRAME THAT SERVES AS A SEAT WHEN IT IS IN THE CLOSED POSITION.

[0088] IN FIGURE 6 THE SYSTEM IS MADE UP OF A PADDLE SHAPED FLOODGATE IN ONE PIECE WHICH HAS A SQUARE OR RECTANGULAR SHAPED SHEET AT THE BOTTOM (1), WHICH IS THE PART USED TO OBSTRUCT THE WATER FLOW, IT CONTINUES UPWARD FROM THE UPPER MIDDLE PART OF THE SHEET IN THE FORM OF A NARROWER SHEET (2); AND HAS BOREHOLES (3) AT CERTAIN INTERVALS ALONG ITS LENGTH, FINALLY ENDING IN AN OPENING AT ITS UPPER END (4) SO THAT IT CAN BE MANUALLY OPERATED WHICH PERMITS THE FLOODGATE TO BE RAISED. IT HAS A MECHANICAL JOINT (5) WHICH JOINS THE FLOODGATE SHEET TO THE SHEET. THE COMPLEMENT TO THE SYSTEM IS A U-SHAPED FRAME WHICH FUNCTIONS AS A GUIDE TO PREVENT THE FLOODGATE SHEET FROM DERAILING AS IT SLIDES VERTICALLY.

[0089] IN SAID FRAME, ITS SIDE BARS (6), AS WELL AS ITS BOTTOM BAR (7) ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE FLOOR RESPECTIVELY, WHILE THE UPPER BAR (8) OF THE FRAME IS SLOTTED ALONG ITS ENTIRE LENGTH IN ORDER TO PERMIT THE PASSAGE OF THE FLOODGATE SHEET THE CENTER PART OF SAID BAR IS ALSO SLOTTED ALONG ITS WIDTH (9) SO THAT IT CAN MATCH THE DIFFERENT BOREHOLES IN THE NARROWER SHEET OF THE FLOODGATE SHEET.

[0090] THIS SYSTEM IS OPERATED MANUALLY AND WORKS THE FOLLOWING WAY: THE FLOODGATE SHEET SLIDES UPWARD VERTICALLY, OPERATED FROM THE OPENING IN THE NARROWER SHEET AND IN DEPENDING ON THE BOREHOLES IN THE BAR OF THE FLOODGATE SHEET CAN BE STOPPED AT ANY ONE OF THEM USING A BIT MADE FROM THE SAME OR ANOTHER MATERIAL, DEPENDING ON THE WATER FLOW TO BE HANDLED.

[0091] IN THE SAME WAY, THE FLOODGATE SHEET IS SEALED TO THE LOWER BAR OF THE FRAME WHICH FUNCTIONS AS A SEAT WHEN IT IS IN THE CLOSED POSITION.

[0092] IN FIGURE 7, THE SYSTEM IS MADE UP OF A FLOODGATE SHEET IN ONE PIECE OR WITH A MECHANICAL JOINT. THE SHEET IS PADDLE SHAPËD, AND HAS SQUARE OR RECTANGULAR SHEET AT THE BOTTOM (1) WHICH IS THE PART USED TO OBSTRUCT THE WATER FLOW, IT CONTINUES TOWARDS THE TOP FROM THE UPPER MIDDLE PART OF THE SHEET IN THE FORM OF A ZIPPER (2) FINALLY ENDING IN THE SHAPE OF A MANUAL SHOVEL HANDLE (3).

[0093] THE COMPLEMENT TO THE SYSTEM IS A U-SHAPED FRAME (4), WHICH SERVES AS A GUIDE SO THAT THE FLOODGATE SHEET DOES NOT DERAIL AS IT SLIDES VERTICALLY.

[0094] IN THIS FRAME, THE TRACKED SIDE BARS (5), AS WELL AS THE LOWER BAR (6) ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE FLOOR AND WALLS, RESPECTIVELY. THE UPPER BAR (7) OF THE FRAME IS SLOTTED ALONG ITS ENTIRE LENGTH IN ORDER TO ALLOW THE FLOOD-GATE SHEET TO BE RAISED. THERE IS ALSO A RAISING MECHANISM IN THE CENTER OF THIS BAR WHICH IS MADE UP OF A GEAR (8), DRIV-

EN BY A CRANK OR A WHEEL (9) WITH A GEAR AT ITS BASE. THE SYSTEM FUNCTIONS THE FOLLOWING WAY: THE FLOODGATE SHEET SLIDES VERTICALLY UPWARD THROUGH ITS RAISING MECHANISM DEPENDING ON THE TEETH IN THE ZIPPER ON THE FLOODGATE SHEET AND CAN BE STOPPED AT THE LEVEL OF ANY ONE OF THESE USING THE GEAR ON THE MECHANISM, WHEEL, OR WYNCH, DEPENDING ON THE WATER FLOW TO BE HANDLED.

[0095] BY THE SAME PRINCIPLE, THE FLOODGATE SHEET SEALS TO THE LOWER BAR OF THE FRAME WHICH SERVES AS A SEAT WHEN IT IS IN THE CLOSED POSITION.

[0096] IN FIGURE 8, THE SYSTEM HAS A ONE PIECE FLOODGATE SHEET OR A SHEET WITH A MECHANICAL JOINT, SHAPED LIKE A PADDLE THAT IS A SQUARE OR RECTANGULAR SHEET AT THE BOTTOM (1), THE PART USED TO OBSTRUCT THE WATER FLOW, IT CONTINUES UPWARD FROM THE UPPER MIDDLE SECTION OF THE SQUARE SHAPED SHEET IN THE SHAPE OF A NARROWER SHEET (2), AND IN A ZIPPER FORM (3), TO END IN AN OPENING AT THE TOP (4).

[0097] THE COMPLEMENT TO THE SYSTEM IS A U-SHAPED FRAME THAT FUNCTIONS AS A GUIDE SO THAT THE FLOODGATE SHEET DOES NOT DERAIL AS IT IS SLIDING VERTICALLY.

[0098] IN SAID FRAME, THE SIDE BARS (5), AS WELL AS THE BOTTOM BAR (6) ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE WALLS AND FLOOR RESPECTIVELY, WHILE THE UPPER BAR (7) OF THE FRAME IS SLOTTED ALONG ITS ENTIRE LENGTH SO THAT THE FLOODGATE PLATE CAN GO THROUGH IT. THE CENTER OF THE BAR HAS A RAISING MECHANISM THAT IS MADE UP OF A GEAR (8) THAT WORKS BY MEANS OF A WYNCH OR A WHEEL (9) WITH A GEAR AT ITS BASE. THIS SYSTEM FUNCTIONS THE FOLLOWING WAY:

[0099] THE FLOODGATE SHEET SLIDES UPWARD VERTICALLY THROUGH ITS RAISING MECHANISM. DEPENDING ON THE TEETH IN THE SHEET WITH THE ZIPPER FORM ON THE FLOODGATE SHEET IT CAN BE STOPPED AT ANY ONE OF THESE USING THE GEAR ON THE MECHANISM, THE WHEEL, OR WYNCH, DEPENDING ON THE WATER FLOW TO BE HANDLED. THIS WAY, THE FLOODGATE SHEET SEALS TO THE LOWER BAR OF THE FRAME, WHICH FUNCTIONS AS A SEAT WHEN IT IS IN THE CLOSED POSITION.

[0100] WITH RESPECT TO FIGURE 9, WE OBSERVE THAT THIS SYSTEM CONTAINS ONE FLAT SQUARE OR RECTANGULAR FLOODGATE SHEET WHICH IS IN ONE PIECE AND LARGER THAN THE UPPER LIMIT OF THE FRAME OF THE FLOOD GATE. THIS FLOODGATE SHEET HAS TWO OVAL SHAPED BOREHOLES (2) AT THE TOP AND HAS TWO CIRCULAR BOREHOLES (3) AT EACH SIDE IN THE UPPER PART OF THE FLOODGATE SHEET.

[0101] THE SYSTEM IS COMPLEMENTED BY A FRAME THAT FUNCTIONS AS A GUIDE FOR THE MOVEMENT OF THE FLOODGATE SHEET THE SIDE BARS OF THE FRAME (4) ARE GROOVED AND ARE ANCHORED AND SUBMERGED IN THE CANAL'S CEMENT FLOOR; THE LOWER BAR OF THE FRAME (5) IS NOT GROOVED SO THAT IT CAN FUNCTION AS A SEAT FOR THE FLOODGATE D SHEET, AND THE UPPER BAR OF THE FRAME IS SLOTTED ALONG ITS LENGTH IN ORDER TO PERMIT THE FLOODGATE SHEET TO SLIDE.

[0102] THE OPERATION OF THE SYSTEM IS MANUALLY BASED, THE FLOODGATE SHEET IS LIFTED MANUALLY USING THE OVAL SHAPED BOREHOLES WHICH ARE AN INTEGRAL PART OF THE FLOODGATE SHEET WHICH FACILITATES ITS VERTICAL MOVEMENT. IN ORDER TO REGULATE THE NECESSARY USAGE, THE FLOODGATE SHEET IS HELD BY THE TWO CIRCULAR BOREHOLES AT THE TOP WITH BOREHOLES THAT ARE PLACED IN THE CONCRETE CANAL COLUMNS OR WALLS THAT ARE PLACED AT CERTAIN DISTANCES AND IS HELD UP BY BITS MADE OF THE SAME OR ANOTHER MATERIAL.

[0103] THE FLOODGATE SHEET CREATES A SEAL WITH THE LOWER BAR OF THE FRAME WHICH FUNCTIONS AS A SEAT WHEN IT IS IN THE CLOSED POSITION. THE FLOODGATE SHEET CONTINUES TO BE THE PART USED TO OBSTRUCT THE FLOW OF THE WATER.

[0104] IN FIGURE 10 WE OBSERVE THAT THIS SYSTEM IS MADE UP OF A FLAT TRAPEZOID SHAPED FLOODGATE SHEET (1) WHICH CONTAINS A CRESCENT SHAPED SHEET (2) IN ITS UPPER MIDDLE PART WHICH FORMS AN INTEGRAL PART OF THE FLOODGATE SHEET, THIS SHEET HAS A SLOT ALSO SHAPED LIKE A SMALLER CRESCENT (3) IN THE MIDDLE SO THAT IT CAN BE MANUALLY OPERATED.

[0105] THE FLOODGATE SHEET MOVES OSCILLATORILY FROM RIGHT TO LEFT OR VICEVERSA, THROUGH THE FRAME WHICH FUNCTIONS AS A GUIDE SO THAT THE FLOODGATE SHEET DOES NOT DERAIL. THIS FLOODGATE SHEET IS SLOTTED AT THE SIDES (4) AT DETERMINED DISTANCES.

[0106] THE FRAME OPERATES ON THE SAME PRINCIPLE AS WITH THE OTHER FLOODGATES. IT HAS U-SHAPED GROOVES IN ITS SIDE BARS (5), EXCEPT THAT THE FRAME IS TRAPEZOIDAL (6) AND THE LOWER BAR (7) THAT SERVES AS A SEAT ISN'T GROOVED. AT THE TOP OF THE FRAME (8), IT HAS TWO JOINED SHEETS (9) SO THAT THE FLOODGATE SHEET CAN MOVE, AND BOTH SHEETS ARE SLOTTED ALONG THEIR WIDTHS (10) AT CERTAIN DISTANCES IN ORDER TO FUNCTION AS A GUIDE WHILE THE SHEET IS EXITING THE

FLOODGATE.

[0107] BOTH SIDES OF THE FRAME ARE JOINED TO THE UPPER PLATES OF THE FRAME A LITTLE BIT LOWER THAN ITS UPPER LIMITS (11), IN ORDER TO PERMIT THE OSCILLATORY MOVEMENT OF THE OF THE FLOODGATE SHEET AT EITHER ONE OF ITS EXTREMES.

[0108] THE SYSTEM'S PERFORMANCE FOUNDED ON ITS MANUAL OPERATION. THE FLOODGATE SHEET IS RAISED OSCILLATORILY MANUALLY TOWARD EITHER ONE OF ITS SIDES DEPENDING ON WHAT IS REQUIRED, THE BOREHOLES AT THE EDGES OF THE SHEET AS WELL AS THOSE IN THE UPPER PLATES OF THE FRAME ARE HELD OR JOINED BY BITS OF THE SAME OR ANOTHER MATERIAL, DEPENDING ON THE AREA NEEDED AND ACCORDING TO THE USAGE TO BE HANDLED.

[0109] THE EDGES OF THE FRAME ARE SUBMERGED IN AND ANCHORED TO THE CANAL'S CONCRETE WALLS AND FUNCTION AS A GUIDE FOR THE FLOODGATE SHEET'S MOVEMENT; WHILE THE LOWER BAR OF THE FRAME WHICH ALSO IS SUBMERGED IN AND ANCHORED TO THE CANAL'S CEMENT FLOOR, FUNCTIONS AS A SEAT SO THAT THE FLOODGATE SHEET SEALS IN ITS CLOSED POSITION.

[0110] FIGURES 11 AND 12 SHOW A RECTANGULAR OR SQUARE SHEET (1) WHICH HAS A CRESCENT INTEGRATED TO ITS BODY (2) IF IT IS MOLDED. THIS CRESCENT CAN ALSO BE SCREWED (3) ONTO THE SHEET IF IT IS MADE OF A COMMERCIAL MATERIAL.

[0111] IT ALSO FUNCTIONS AS A COUPLING WITH THE LIFT SCREW USING A BOREHOLE (4).

[0112] FIGURE 13 REFERS TO GUIDE FRAMES FOR THE PLATES. IT IS A PIECE SHAPED LIKE A RECTANGULAR PRISM (1) THAT HAS A GROOVE (2) IN THE MIDDLE OF ONE OF ITS SURFACES WHICH SERVES AS A GUIDE SO THE FLOODGATE SHEET CAN SLIDE, IT IS ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE WALLS (4).

[0113] IN FIGURE 14 WE SEE THE BASE PLATE.

[0114] IT IS A FLAT PLATE (1) WHICH FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET (2). THIS CAN BE STRAIGHT (3) OR NOT DEPENDING ON THE SHAPE, WHICH IS ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE (5).

[0115] FIGURE 15 SHOWS THE LIFT SCREW.

[0116] IT IS AN ARROW (1) THAT CONNECTS THE CRESCENT (2) ON THE FLOODGATE SHEET TO THE LIFT SCREW, WHICH HAS AN ACME WASHER ON TOP (3), DEPENDING ON THE COURSE OF THE SHEET (4) AND SMOOTH AT THE BOTTOM (5) TO PROVIDE THE TOTAL LENGTH FOR THE COUPLING WITH THE PLATE.

[0117] FIGURE 16 SHOWS THE LIFT NUT.

[0118] IN THIS DRAWING, WE CAN SEE THAT THE LIFT NUT IS CYLINDER SHAPED AND HAS A BOREHOLE IN THE CENTER (2), WHICH IS LAKED WITH ACME THREAD (3) OR IS MOLDED DEPENDING ON THE DIMENSIONS REQUIRED FOR THE ARROW. IN THE CUT WE CAN SEE THE MACHINING (4) OR THE MOLDING NEEDED FOR THE LOCK.

[0119] ON ITS UPPER SURFACE IT HAS 4 GROOVES (5) EITHER MACHINED OR MOLDED WHICH RECEIVE THE OPERATING WHEEL. THIS SCREW IS AUTO-LUBRICATED DUE TO THE QUALITIES OF THE MATERIAL THAT IS USED, BY ADDING MOLYBDENUM BISULPHATE TO THE NYLON WHICH GIVES IT THIS QUALITY.

[0120] FIGURE 17 REFERS TO THE LOCK.

[0121] THIS FIGURE IS ALSO CYLINDRICAL (1) AND CAN BE MANUFACTURED EITHER BY MOLDING OR WITH TWO MACHININGS, A MINOR MACHINING AT THE CENTER (2) THAT SERVES TO CREATE A SPACE FOR THE LIFT SCREW AND A MAJOR ONE (3) WHICH SERVES TO COUPLE WITH THE LIFT NUT. THE BOREHOLES (4) THAT CAN BE SEEN IN THE FIGURE ARE USED TO ANCHOR THIS PIECE TO THE UPPER CONCRETE STRUCTURE (5) AS WELL AS TO HOLD AND TO PERMIT THE ROTATING MOVEMENT OF THE NUT.

[0122] FINALLY, IN FIGURE 18, WE OBSERVE THE OPERATING HAND WHEEL.

[0123] IT IS A CYLINDRICAL PLATE (1), MACHINED OR MOLDED WHICH IS COUPLED TO THE ELEVATING SCREW. IT FOLLOWS THE PARALLEL FLANK COUPLING PRINCIPLE (2) BY PRESSURE, HELD IN PLACE BY SCREWS (3). THE PLATE IS THICK ENOUGH TO BE EASILY HELD BY THE OPERATOR OF THE EQUIPMENT.

[0124] THE SYSTEM WORKS THE FOLLOWING WAY:

[0125] THIS FLOODGATE CONSISTS OF A RECTANGULAR, SQUARE, OR CURVED OBSTRUCTING PLATE, WHICH IS USED TO REGULATE THE WATER FLOW, WITH DIFFERENT THICKNESSES AND DIMENSIONS DEPENDING ON THE LOAD AND THE USAGE TO BE HANDLED. THIS PLATE SLIDES VERTICALLY THROUGH SIDE FRAMES THAT ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE SIDEWALLS.

[0126] THE FLOODGATE IS ACTIVATED BY A MANUAL OPERATING MECHANISM WHICH IS BASED ON THE PRINCIPLE OF SCREW LIFTING.

[0127] IT IS MADE UP OF AN AUTO-LUBRICATING CYLINDRICAL LIFT NUT, THAT HAS INTERIOR THREADING WHICH IS USED TO CONNECT THE THREADED ARROW WHICH IN TURN CONNECTS THE FLOODGATE SHEET TO THE THREADS ON THE NUT, WHICH WHEN IT IS TURNED BY THE HAND WHEEL COUPLED TO THE NUT, GENERATES THE LIFTING MOVEMENT OF THE FLOODGATE SHEET. THE GYRATING THREADED NUT IS CONNECTED TO THE TO THE UPPER CONCRETE STRUCTURE BY A CYLINDRICAL LOCK THAT IS

LARGER IN DIAMETER THAN THE NUT, WHICH ONLY ALLOWS THE NUT TO SPIN ON ITS AXIS IN ORDER TO OPERATE.

[0128] THE BOTTOM OF THE OPERATING ARROW IS CONNECTED TO THE FLOODGATE SHEET THROUGH A SCREWED-ON CRESCENT WHICH CAN BE AN INTEGRAL PART OF THE SHEET (THROUGH MOLDING) OR CAN BE SCREWED ONTO THE SHEET.

[0129] THE SEALING OF THIS FLOODGATE IS BASED ON THE SYSTEM BEING LIGHT ENOUGH THAT WHEN IT RECEIVES THE WATER FLOW PERPENDICULAR TO ITS SURFACE IT HERMETICALLY SEALS AND NO LEAKS PENETRATE.

[0130] THIS SYSTEM, BECAUSE OF ITS SHAPE AND CONSTRUCTION, CAN BE USED WITHOUT ANY KIND OF ANTICORROSIVE MAINTENANCE OR LUBRICATION OF ITS PARTS.

[0131] FIGURE 19 SHOWS THAT THIS SYSTEM IS MADE UP OF A RECTANGULAR OR SQUARE FLAT FLOODGATE SHEET PLATE (1) WHICH REGULATES THE WATER FLOW. THIS PLATE IS JOINED TO A ZIPPER (2) IN ITS UPPER MIDDLE PART BY WAY OF THE TWO SMALLER PLATES (3) AT ITS BOTTOM THAT HAVE BOREHOLES (4) SO THAT THEY CAN BE CONNECTED BY A BIT MADE OF THE SAME OR ANOTHER MATERIAL, OR BY A SCREW (5).

[0132] THIS FLOODGATE SHEET SLIDES THROUGH A FRAME WITH GROOVED SIDES SO THAT THEY FUNCTION AS A GUIDE AND PREVENT THE FLOODGATE SHEET FROM DERAILING. THE FRAME HAS A LOWER BAR WITHOUT GROOVES (7) AT THE BOTTOM THAT FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET; AT THE TOP OF THE FRAME (8) THE BAR IS SLOTTED ALONG ITS LENGTH SO THAT THE FLOODGATE SHEET AND ZIPPER CAN BE RAISED. THIS TOP BAR CARRIES A FLOODGATE LIFT MECHANISM (9) WHICH IS A GEAR JOINED TO THE BAR BY A WYNCH (10) IN THE MIDDLE, WHICH, AS IT PRODUCES A CIRCULAR MOVEMENT, TURNS THE GEAR WHICH MOVES THE ZIPPER SO THAT THE FLOODGATE SHEET SLIDES VERTICALLY.

[0133] THE SYSTEM WORKS THE FOLLOWING WAY:

[0134] THE FLOODGATE SHEET SLIDES VERTICALLY THROUGH THE GROOVED BARS OF THE FRAME WHICH FUNCTION AS A GUIDE SO THAT THE SHEET DOES NOT DERAIL, SAID BARS ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE SIDE WALLS.

[0135] THE LOWER BAR OF THE FRAME WHICH IS ALSO ANCHORED TO AND SUBMERGED IN THE CONCRETE FLOOR OF THE CANAL, FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET SO THAT IT CREATES A SEAL IN ITS CLOSED POSITION.

[0136] FIGURE 20 SHOWS THAT THIS SYSTEM IS MADE UP OF A RECTANGULAR OR SQUARE FLAT FLOODGATE SHEET PLATE (1) WHICH REGULATES THE WATER FLOW. THIS PLATE IS JOINED TO A ZIPPER (2) IN ITS UPPER MIDDLE PART BY WAY OF THE TWO SMALLER PLATES (3) AT ITS BOTTOM THAT HAVE BOREHOLES (4) SO THAT THEY.CAN BE CONNECTED BY A BIT MADE OF THE SAME OR ANOTHER MATERIAL, OR BY A SCREW (5). THIS FLOODGATE SHEET SLIDES THROUGH A FRAME WHOSE SIDE ENDS (6) ARE GROOVED SO THAT THEY FUNCTION AS A GUIDE AND PREVENT THE FLOODGATE SHEET FROM DERAILING. THE FRAME HAS A LOWER BAR WITHOUT GROOVES (7) AT THE BOTTOM THAT FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET; AT THE TOP OF THE FRAME (8) THE BAR IS SLOTTED ALONG ITS LENGTH SO THAT THE FLOODGATE SHEET AND ZIPPER CAN GO THROUGH IT. THIS TOP BAR CARRIES A FLOODGATE LIFT MECHANISM (9) WHICH IS A GEAR JOINED TO THE BAR BY A WHEEL (10) IN THE MIDDLE, PARALLEL TO THE GEAR. WHEN THE WHEEL PRODUCES A CIRCULAR MOVEMENT, IT TURNS THE GEAR WHICH MOVES THE ZIPPER SO THAT THE FLOODGATE SHEET SLIDES VERTICALLY.

[0137] THE SYSTEM WORKS THE FOLLOWING WAY:

[0138] THE FLOODGATE SHEET, WHICH IS USED TO OBSTRUCT THE WATER FLOW, AND IS JOINED TO THE ZIPPER IS RAISED VERTICALLY BY USING THE WHEEL THAT TURNS THE GEAR, WHICH MOVES THE ZIPPER AND RAISES THE FLOODGATE IN ORDER TO MANAGE THE REQUIRED WATER FLOW.

[0139] THE FLOODGATE SHEET SLIDES VERTICALLY THROUGH THE GROOVED BARS OF THE FRAME WHICH FUNCTION AS A GUIDE SO THAT THE SHEET DOES NOT DERAIL, SAID BARS ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE SIDE WALLS AND THE LOWER BAR OF THE FRAME WHICH IS ALSO ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE FLOOR, FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET SO THAT IT CREATES A SEAL IN ITS CLOSED POSITION.

[0140] FIGURE 21 SHOWS THAT THE SYSTEM IS MADE UP OF A CURVED FLOODGATE SHEET PLATE (1), THIS PLATE IS MOLDED AND HAS ANOTHER CURVED PLATE INSIDE THAT IS MUCH SMALLER BUT MUCH HEAVIER (2) IN ORDER TO AVOID FLEXING.

[0141] THIS FLOODGATE SHEET SLIDES FREELY ALONG THE FRAME WHICH FUNCTIONS AS A GUIDE. THE SYSTEM IS COMPLEMENTED BY A CURVED FRAME WHICH IS SIMILAR IN DESIGN TO A SOFT DRINK CASE (4), THIS FRAME IS SLOTTED (5) ALONG THE UPPER PLATE SO THAT THE FLOODGATE SHEET CAN GO THROUGH IT.

[0142] THE OPERATING MECHANISM ON THIS

TYPE OF FLOODGATE IS A SET OF GEARS (6) LIKE THAT OF A WATCH WHICH ARE JOINED WITH TWO LIFT SCREWS (7) WHICH ARE ANCHORED IN AXLE FORM (8) TO A CONCRETE BASE (9) IN THE FLOOR OF THE CANAL THEREBY OBTAINING JOINT MOVEMENT IN ALL ITS POINTS. THE LIFT MECHANISM ON THE FLOODGATE SHEET IS BY WAY OF A ROUND WHEEL WITH A TOOTHED BASE (10) THAT GIVES THE OTHER GEARS MOVEMENT.

[0143] THIS SYSTEM WORKS IN THE FOLLOWING MANNER:

[0144] THE FLOODGATE'S FRAME IS ANCHORED TO AND SUBMERGED IN THE CONCRETE AT ITS SIDES SO THAT IT FUNCTIONS AS A GUIDE AND PERMITS THE FLOODGATE SHEET TO SLIDE RADIALLY; THE HAND WHEEL INITIATES THE MOVEMENT AND ENTERS INTO CONTACT WITH THE OTHER GEARS WORKING IN SYNCHRONIZATION AND MOVING THE LIFT SCREWS AT BOTH ENDS WHICH ARE PARALLEL TO THE FRAME AND THE FLOODGATE SHEET. THE MOVEMENT OF THE LIFT SCREWS ALONG THE AXLE ALLOWS THE FLOODGATE SHEET TO SLIDE RADIALLY, AND LOCK IN PLACE DEPENDING ON THE WATER FLOW TO BE MANAGED.

[0145] THE LOWER BASE OF THE FRAME IS ALSO ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE BASE SO THAT IT FUNCTIONS AS A SEAT AND ALLOWS THE FLOODGATE SHEET TO CREATE A SEAL IN ITS CLOSED POSITION.

[0146] THIS SHAPE IS USED FOR LARGER WATER FLOWS WITHIN CANALS.

[0147] FIGURE 22 SHOWS THAT THIS SYSTEM IS MADE UP OF A CURVED FLOODGATE SHEET PLATE (1), THIS PLATE IS MOLDED AND IS RIBBED EITHER ALONG ITS LENGTH OR ALONG ITS WIDTH (2) AS A REINFORCEMENT AND HAS TWO OTHER RIBS SHAPED LIKE HALF OVALS (3) FOR MORE HYDRAULIC RESISTANCE.

[0148] THIS FLOODGATE SHEET IS JOINED TO THE FRAME (4) SO THAT IT LIFTS RADIALLY.

[0149] IT HAS A LIFT MECHANISM WITH EITHER WHEELS OR TURNING BEARINGS ALONG THE LENGTH OF THE RIBS WHICH ARE PERPENDICULAR TO THE FLOODGATE SHEET, AS WELL AS TWO MORE WHEELS AT ITS SIDES SO THAT THE FLOODGATE DOES NOT DERAIL.

[0150] THIS SYSTEM WORKS AS THE FLOODGATE SLIDES ALONG THE WHEELS IN THE RIBBINGS PERPENDICULAR TO THE FLOODGATE SHEET, THIS SLIDING IS RADIAL AND ALLOWS THE REQUIRED WATER FLOW TO BE MANAGED. IF NECESSARY, A CURVED SEAT PLATE IS PLACED AND ANCHORED TO AND SUBMERGED IN THE CANAL'S CEMENT FLOOR SO THAT THE FLOODGATE CREATES A SEAL IN ITS CLOSED POSITION. THIS SHAPE IS USED FOR LARGER WATER FLOWS WITHIN CANALS.

[0151] THIS INVENTION IS BASED ON A MAINTENANCE-FREE, PLASTIC, SLIDING FLOODGATE DESIGN WITH OR WITHOUT AN OPERATING SYSTEM. THIS INVENTION CONTEMPLATES THE MANUFACTURING OF FLOODGATES TO REGULATE WATER FLOW APPLICABLE TO AGRICULTURAL AND LIVESTOCK WATERING ZONES AND IN GENERAL WHEREVER IT IS NECESSARY TO CONTROL WATER FLOW IN SEWAGE, WASTES, WHITE WATERS, WATER WITH A HIGH ALKALINE CONTENT, WATER WITH A HIGH SALINE CONTENT, ETC. WHERE DUE TO THE PROPERTIES OF THE WATER TO BE HANDLED, THE TRADITIONAL FLOODGATES PRESENT MORE SERIOUS CORROSION, CAUSING DIFFICULTIES IN MAINTENANCE AND OPERATION. THESE FLOODGATES ARE ENGINEERED TO TAKE INTO ACCOUNT THE SIMPLICITY OF THE DESIGN THAT CONSISTS IN SOLVING THE SERIOUS PROBLEM OF MANUFACTURING, TRANSPORTATION, ASSEMBLY, OPERATION, PREVENTIVE AND CORRECTIVE MAINTENANCE, AS WELL AS EXPENSES. THIS INVENTION PRESENTS THE ADVANTAGES OF THE LIGHTNESS OF ITS DESIGNS IN ITS HANDLING IN MANUFACTURING AS WELL AS IN ITS TRANSPORTATION AND ASSEMBLY.

[0152] ALSO, GIVEN THE LOW FRICTION COEFFICIENT AND THE LOW SPECIFIC WEIGHT OF THE SELECTED MATERIAL (NYLON, POLYPROPILENE, ULTRA HIGH MOLECULAR WEIGHT POLYETHILENE, HIGH DENSITY POLYETHILENE, AND PVC) MAKE IT POSSIBLE TO SIMPLIFY ITS OPERATION AND WE ACHIEVE A HERMETIC SEAL WITHOUT IT BEING NECESSARY TO ADD ANY OTHER IMPLEMENT TO DO SO.

[0153] IN ADDITION, IT DOES NOT REQUIRE ANY KIND OF FINISHING, IT DOES NOT REQUIRE LUBRICATION FOR ITS OPERATION, IT DOES NOT REQUIRE ANY TYPE OF MAINTENANCE FOR ITS PRESERVATION, WHICH RESULTS IN MORE DURABILITY AND CONSIDERABLY REDUCES EXPENSES. SINCE NONE OF ITS COMPONENTS CORRODE, BETTER USE IS MADE OF THE WATER AND AVOIDING THE WASTES THAT COME WITH THE TRADITIONALLY USED ONES. THIS INVENTION CONSISTS IN THE SEALING OF THE PLASTIC FLOODGATES, WHICH CONSIDER THE MANUFACTURING OF ITS COMPONENTS WITH THE HIGH ENGINEERED PLASTIC MATERIAL MENTIONED BEFORE.

[0154] THE PARTS THAT MAKE UP THIS FLOODGATE SYSTEM CAN BE MANUFACTURED BY MOLDING OR THEY CAN BE MACHINED, USING COMMERCIAL PLASTIC PROFILES TO SIMPLIFY THEIR MASS PRODUCTION. THIS FLOODGATE CONSISTS OF A RECTANGULAR, CURVED, OR SQUARE OBSTRUCTION SHEET WHICH REGULATES THE WATER FLOW, WITH DIFFERING THICKNESSES AND MEASUREMENTS, DEPENDING ON THE WATER

FLOW TO BE HANDLED. THIS SHEET SLIDES VERTICALLY, RADIALLY, OR OSCILLATORILY ALONG SIDE FRAMES WHICH ARE ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE SIDE WALLS, IN A U-SHAPE WHICH FUNCTION AS GUIDES SO THAT THE SHEET DOES NOT DERAIL. IN THE SAME MANNER, THE LOWER PART OF THE FRAMES HAVE A PLATE THAT FUNCTIONS AS A SEAT TO SEAL THE FLOODGATE SHEET IN ITS CLOSED POSITION. THIS SEAT PLATE CAN BE CURVED OR STRAIGHT AND IS ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE FLOOR.

[0155] THIS FLOODGATE'S SEAL IS BASED ON THE LIGHTNESS OF THE SYSTEM AND THE MATERIALS USED SO THAT WHEN IT RECEIVES THE WATER FLOW PERPENDICULAR TO ITS SURFACE, IT WILL HERMETICALLY SEAL AND NOT PRESENT ANY LEAKS.

[0156] DUE TO THE FORM AND NATURE OF THIS SYSTEM, IT CAN BE USED WITHOUT ANY KIND OF ANTICORROSIVE MAINTENANCE OR LUBRICATION OF ITS COMPONENTS. IT IS FOR THIS REASON THAT IT DOES NOT CAUSE POLLUTION.

Claims

1. MAINTENANCE-FREE, PLASTIC MATERIAL SLIDING FLOODGATE SYSTEM, WITH AND WITHOUT AN OPERATING MECHANISM, WITH ONE OR MORE BODIES, WHICH IS MADE UP OF A RECTANGULAR, SQUARE, OR TRAPEZOID, FLAT OR CURVED FLOODGATE SHEET; STRAIGHT OR CURVED GUIDE FRAMES; LIFT SCREW; LIFT NUT; STRAIGHT OR CURVED SEAT PLATE; ZIPPER; WYNCH; LOCK, AND OPERATING HAND WHEEL.

THE SYSTEM WITHOUT THE MECHANISM IS MANUALLY OPERATED, FORMED BY ONE OR MORE BODIES.

WHEN THE SYSTEM IS FORMED BY ONE BODY, IT IS EITHER RECTANGULAR, SQUARE, OR TRAPEZOID.

THE RECTANGULAR OR SQUARE SYSTEM CONSISTS OF ONE ONE-PIECE FLOODGATE SHEET, SHAPED LIKE A SHOVEL, IN WHICH THERE IS ONE RECTANGULAR OR SQUARE SHEET AT ITS BOTTOM, WHICH IS THE PART USED TO OBSTRUCT THE WATER FLOW, IT CONTINUES UPWARD FROM THE UPPER MIDDLE PART OF THE SHEET EITHER IN THE SHAPE OF A SQUARE BAR THAT HAS BOREHOLES AT DETERMINED DISTANCES ALONG ITS LENGTH; ENDING IN A MANUAL SHOVEL SHAPE; OR SHAPED LIKE A NARROWER BUT STRAIGHT SHEET ALSO WITH BOREHOLES AT DETERMINED DISTANCES ALONG ITS LENGTH, ENDING WITH A BOREHOLE OR A SQUARE OPENING AT THE TOP WITH SUCH DIMENSIONS THAT IT CAN BE OPERATED MANUALLY. IT ALSO HAS A FRAME ON WHICH THE LATERAL EXTREMES ARE SQUARE OR RECTANGULAR PRISM-SHAPED BARS WITH U-SHAPED GROOVES ON ONE OF ITS SURFACES, DEPENDING ON THE THICKNESS OF THE FLOODGATE SHEET TO PREVENT THE SHEET FROM DERAILING.

THE BOTTOM OF THE FRAME HAS ANOTHER BAR WITHOUT A GROOVE WHICH FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET. BOTH THE SIDES AND THE BOTTOM OF THE FRAME ARE SUBMERGED IN AND ANCHORED TO THE CANAL'S CONCRETE WALLS AND FLOOR, RESPECTIVELY. IT ALSO HAS ANOTHER BAR AT THE TOP OF THE FRAME WHICH IS SLOTTED ALONG ITS ENTIRE LENGTH TO ALLOW THE FLOODGATE SHEET TO BE RAISED. THE MIDDLE OF THE BAR HAS BOREHOLES EITHER ALONG ITS WIDTH OR PERPENDICULAR TO THE BAR SO THAT IT CAN BE HELD BY BITS MADE OUT OF EITHER THE SAME OR ANOTHER MATERIAL. THE DIFFERENT BOREHOLES ON THE BAR BELONGING TO THE SHEET WITH SMALLER DIMENSIONS THAN THE FLOODGATE SHEET, ALLOW ITS VERTICAL MOVEMENT DEPENDING ON THE FLOW THAT NEEDS TO BE MANAGED.

THE RECTANGULAR OR SQUARE SYSTEM IS ALSO MADE UP OF A SQUARE OR RECTANGULAR FLOODGATE SHEET OR PLATE, WHICH IS ONE PIECE AND SMALLER THAN THE UPPER LIMIT OF THE FLOODGATE FRAME. THIS FLOODGATE SHEET HAS TWO OVAL-SHAPED BOREHOLES AT THE TOP WHICH ARE PLACED DEPENDING ON THE WIDTH OF THE FLOODGATE SHEET, AND BESIDES HAVE TWO CIRCULAR BOREHOLES AT BOTH LATERAL EXTREMES AT THE TOP OF THE FLOODGATE SHEET. THE SYSTEM IS COMPLEMENTED BY A GUIDE FRAME FOR THE VERTICAL MOVEMENT OF THE FLOODGATE SHEET IN ORDER TO PREVENT ITS DERAILMENT. THE SIDE BARS HAVE U-SHAPED GROOVES THAT DEPEND ON THE THICKNESS OF THE FLOODGATE SHEET AND ARE ANCHORED AND SUBMERGED IN THE CANAL'S CONCRETE WALLS; THE LOWER BAR OF THE FRAME IS NOT SLOTTED SO THAT IT FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET, AND THE UPPER BAR OF THE FRAME IS SLOTTED ALONG ITS LENGTH IN ORDER TO ALLOW THE FLOODGATE SHEET TO BE RAISED.

IN ORDER TO BE ABLE TO REGULATE THE FLOW TO BE HANDLED, THE FLOODGATE SHEET IS HELD UP WITH THE CIRCULAR BOREHOLES AT ITS SIDES WITH THE BORE-

HOLES MADE IN THE CANAL'S CONCRETE WALLS, WHICH ARE PLACED MUCH HIGHER THAN THE UPPER PART OF THE FLOODGATE'S FRAME. THESE BOREHOLES ARE MADE AT DETERMINED DISTANCES SO THAT DIFFERENT FLOWS CAN BE OBTAINED. THE FLOODGATE SHEET IS HELD UP BY BITS MADE OF THE SAME OR ANOTHER MATERIAL.

WHEN THE SYSTEM IS TRAPEZOIDAL, IT IS MADE UP OF A FLAT TRAPEZOIDAL FLOODGATE SHEET, WHICH HAS A CRESCENT-SHAPED PLATE IN ITS UPPER MIDDLE SECTION THAT IS AN INTEGRAL PART OF THE FLOODGATE SHEET. THIS CRESCENT IS HOLLOWED OUT IN THE SHAPE OF A SMALLER CRESCENT IN ITS CENTER, SO THAT THE SYSTEM CAN BE MANUALLY OPERATED.

THE FLOODGATE SHEET MOVES OSCILLATORILY FROM RIGHT TO LEFT OR VICEVERSA THROUGH THE FRAME WHICH FUNCTIONS AS A GUIDE TO PREVENT THE FLOODGATE SHEET FROM DERAILING. THIS FLOODGATE SHEET HAS BOREHOLES ALONG ITS SIDES AT DETERMINED DISTANCES.

THE FRAME IS TRAPEZOIDAL AND HAS U-SHAPED SLOTS IN ITS SIDE BARS; OR RECTANGULAR OR SQUARE SIDE PRISMS, WHICH ARE SUBMERGED IN OR ANCHORED TO THE CONCRETE WALLS OF THE CANAL. THE FRAME'S LOWER BAR OR PRISM IS NOT SLOTTED, IT IS ANCHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE FLOOR AND FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET THE TOP PART OF THE FRAME HAS TWO PLATES THAT ARE JOINED IN SUCH A WAY THAT PERMITS THE FLOODGATE SHEET TO GO THROUGH THEM. BOTH PLATES HAVE BOREHOLES ALONG THEIR WIDTH OR AT DETERMINED DISTANCES IN ORDER FOR THEM TO FUNCTION AS GUIDES WHEN THE FLOODGATE SHEET IS MOVING.

THE FLOODGATE SHEET LIFTS MANUALLY IN OSCILLATORY FORM TOWARDS EITHER ONE OF ITS EXTREMES, DEPENDING ON HOW YOU WISH TO OPERATE IT, THE BOREHOLES AT THE SIDES AS WELL AS THE ONES ON THE UPPER PLATES OF THE FRAME ARE JOINED BY A BIT MADE OF THE SAME OR ANOTHER MATERIAL, DEPENDING ON THE AREA NEEDED AND THE FLOW TO BE MANAGED.

BOTH SIDES OF THE FRAME ARE JOINED TO THE UPPER PLATES AT A POINT A LITTLE BELOW ITS UPPER LIMIT IN ORDER TO ALLOW FOR THE OSCILLATORY MOVEMENT OF THE FLOODGATE SHEET AT EITHER ONE OF ITS SIDES. WHEN THE SYSTEM HAS TWO OR MORE BODIES EITHER SQUARE OR RECTANGULAR, THE SAME TECHNICAL PRINCIPLES THAT APPLY TO THE FLOODGATE SYSTEMS WITH ONLY ONE BODY ARE APPLIED, EXCEPT THAT IN THIS SYSTEM, THE SQUARE OR RECTANGULAR FLOODGATE SHEET'S PLATE IS JOINED TO THE MANUAL SHOVEL-SHAPED SQUARE BAR AS WELL AS TO THE SMALLER PLATE, WHICH HAS A BOREHOLE AT THE BOTTOM, THROUGH A MECHANICAL JOINT WHICH CONSISTS OF TWO SQUARE OR RECTANGULAR PLATES THAT HAVE TWO OR MORE GROOVES DEPENDING UPON THEIR LENGTH WHICH ARE PLACED IN THE UPPER MIDDLE PART OF THE FLOODGATE SHEET, AND ARE HELD UP BY A BIT MADE OF THE SAME OR ANOTHER MATERIAL, OR EVEN WITH A SCREW IN THE BOREHOLE OF THE MANUAL SHOVEL-SHAPED BAR AS WELL AS IN THOSE OF THE SMALLER PLATE. BOTH THE ONE BODY SYSTEMS WITHOUT THE OPERATING MECHANISMS AND THE SYSTEMS WITH TWO OR MORE BODIES ARE MAINTENANCE FREE. SINCE THEY DO NOT REQUIRE ANTICORROSIVE TREATMENTS OR LUBRICATING OILS OR GREASES, BECAUSE THEY ARE MADE WITH HIGHLY ENGINEERED PLASTIC, NYLON, POLYPROPILENE, OR THEIR EQUIVALENTS. FURTHERMORE, THE PARTS WHICH MAKE UP THEIR SYSTEMS HAVE VARIABLE THICKNESSES AND DIMENSIONS DEPENDING ON THE HYDRAULIC CHARGE AND THE WATER FLOW TO BE HANDLED.

THE SYSTEM WITH THE OPERATING MECHANISM HAS A ONE-PIECE, CYLINDRICAL LIFT NUT WITH A VERTICAL BOREHOLE IN THE MIDDLE, WHICH HAS ACME THREADING TO CONNECT WITH THE LIFT SCREW OR THE ZIPPER, BESIDES IT ALSO HAS NOTCHES IN THE LOWER PART WHICH ARE USED TO JOIN WITH THE LOCK, AND IN THE UPPER PART TO COUPLE WITH THE MALE-FEMALE TYPE WHEEL OR THE WYNCH. THE NUT IS AUTO-LUBRICATED BECAUSE IT IS MADE WITH NYLON, POLYPROPILENE, ULTRA-HIGH MOLECULAR WEIGHT POLYETHILENE, HIGH-DENSITY POLYETHILENE, AND PVC. THE FLAT OR CURVED FLOODGATE SHEET, DEPENDING ON THE FLOW TO BE HANDLED, HAS HORIZONTAL AND VERTICAL RIBBING, DEPENDING, WHICH ADD MORE RESISTANCE. IT ALSO HAS A CRESCENT WITH A BOREHOLE INTEGRATED TO THE SHEET, USED TO CONNECT THE FLOODGATE SHEET TO THE LIFT NUT, IT ALSO HAS TWO GUIDE FRAMES WHICH FUNCTION TO PREVENT THE FLOODGATE SHEET FROM DERAILING. THESE ARE SHAPED LIKE A RECTANGULAR PRISM, WHICH HAVE U-SHAPED GROOVES, DEPENDING ON THE THICKNESS OF THE FLOODGATE SHEET, WHICH ARE AN-

CHORED TO AND SUBMERGED IN THE CANAL'S CONCRETE WALLS. ALL THE COMPONENTS OF THIS MAINTENANCE-FREE, PLASTIC SLIDING FLOOD-GATE SYSTEM, WITH AN OPERATING MECHANISM WHICH IS MADE UP OF A COMBINATION OF A FLAT OR CURVED FLOODGATE SHEET; GUIDE FRAMES; SEAT PLATE; LIFT SCREW; LIFT NUT; LOCK; AND OPERATING WHEEL IS FEATURED FOR BEING MAINTENANCE-FREE, THEY DON'T NEED ANTI-CORROSIVE TREATMENTS OR LUBRICATING OILS OR GREASES BECAUSE THEY ARE MADE OUT OF HIGH ENGINEERED NYLON, POLYPROPILENE, ULTRA-HIGH MOLECULAR WEIGHT POLYPROPILENE, HIGH-DENSITY POLYETHILENE, AND PVC.

2. MAINTENANCE-FREE, PLASTIC SLIDING FLOODGATE SYSTEM WITH OPERATING MECHANISM WHICH CONSISTS OF A COMBINATION OF A FLAT OR CURVED FLOODGATE SHEET; GUIDE FRAMES; LIFT SCREW; LIFT NUT; SEAT PLATE; LOCK; AND OPERATING WHEEL.

AS IN CLAUSE 1 IT IS **CHARACTERIZED BY** THE FACT THAT THE PARTS THAT MAKE UP THE SYSTEM HAVE VARIABLE THICKNESSES AND DIMENSIONS DEPENDING ON THE LOAD AND THE FLOW TO BE HANDLED. IT IS ALSO FEATURED BECAUSE THE LIFT SCREW OR ZIPPER IS AN ARROW THAT CONNECTS THE FLOODGATE SHEET TO THE LIFT NUT WITH A HIGH DEGREE OF FLEXIBILITY, WHICH ENABLE IT TO ABSORB MOMENTARY OVERLOADS THEREBY PREVENTING ITS PERMANENT DEFORMATION OR BREAKAGE, WHICH IS THREADED ON TOP TO GIVE THE NECESSARY LIFT TRAVEL TO THE FLOODGATE SHEET, AND IS SMOOTH AT THE BOTTOM TO ACCOMMODATE THE SYSTEM'S TOTAL HEIGHT CONNECTED TO THE SHEET'S CRESCENT. IT ALSO HAS A LOCK WHICH CONNECTS THE LIFT NUT TO THE UPPER CROSS FRAME WHICH CAN BE MADE OF CONCRETE OR THE MATERIAL THAT THE FLOODGATE SYSTEM IS MADE OF, USING ANCHOR SCREWS. IT ALSO HAS AN OPERATING WHEEL OR WYNCH AT THE TOP OF THE ONE-PIECE LIFT SCREW WHICH IS CONNECTED TO THE FORMER THROUGH THE NOTCHES ON THE LIFT NUT. THE BOTTOM OF THE FRAME CONTAINS A RECTANGULAR OR CURVED FLAT PLATE THAT IS SUBMERGED IN AND ANCHORED TO THE CANAL'S CONCRETE FLOOR THAT FUNCTIONS AS A SEAT FOR THE FLOODGATE SHEET IN ITS CLOSED POSITION.

3. AS IN THE TWO PREVIOUS CLAUSES, THE SYSTEMS WITH THE OPERATING MECHANISM AS WELL AS THE ONES WITHOUT THE OPERATING MECHANISM INCLUDE THE MANUFACTURING OF FLOODGATES TO REGULATE WATER FLOW APPLICABLE TO AGRICULTURAL AND LIVESTOCK WATERING ZONES AND IN GENERAL WHEREVER IT IS NECESSARY TO CONTROL WATER FLOW IN SEWAGE, WASTES, WHITE WATERS, WATER WITH A HIGH ALKALINE CONTENT, WATER WITH A HIGH SALINE CONTENT, ETC. ADDITIONALLY, IT PRESENTS LIGHTNESS OF DESIGN IN ORDER TO BE BETTER HANDLED IN MANUFACTURING, TRANSPORTATION, AND INSTALLATION ALSO, THE LOW FRICTION COEFFICIENT AND THE LOW SPECIFIC WEIGHT OF THE SELECTED MATERIAL (NYLON, POLYPROPILENE, ULTRA HIGH MOLECULAR WEIGHT POLYETHILENE, HIGH DENSITY POLYETHILENE, AND PVC) MAKE IT POSSIBLE TO SIMPLIFY ITS OPERATION AND WE ACHIEVE A HERMETIC SEAL WITHOUT IT BEING NECESSARY TO ADD ANY OTHER IMPLEMENT TO DO SO.

IN ADDITION, IT DOES NOT REQUIRE ANY KIND OF FINISHING, IT DOES NOT PRODUCE ANY KIND OF POLLUTION, IS MORE DURABLE AND THEREFORE CONSIDERABLY REDUCES EXPENSES. SINCE IT DOES NOT PRESENT CORROSION IN ANY OF ITS PARTS, MAKES A BETTER USAGE OF WATER FLOW POSSIBLE.

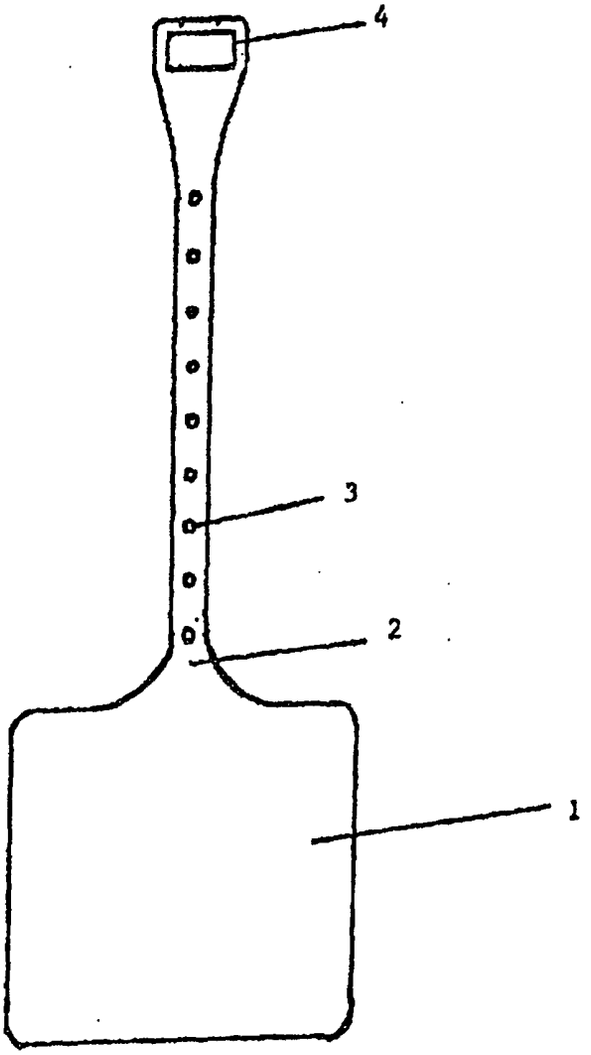

FIGURE 1

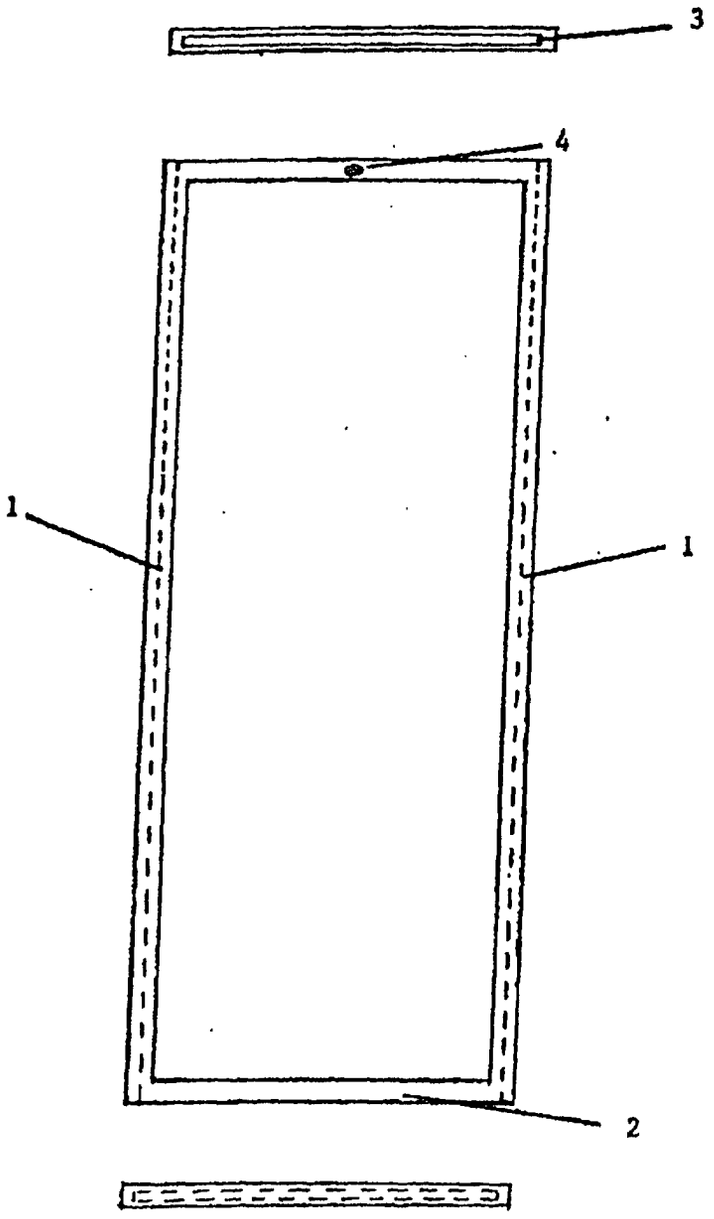

FIGURE 2

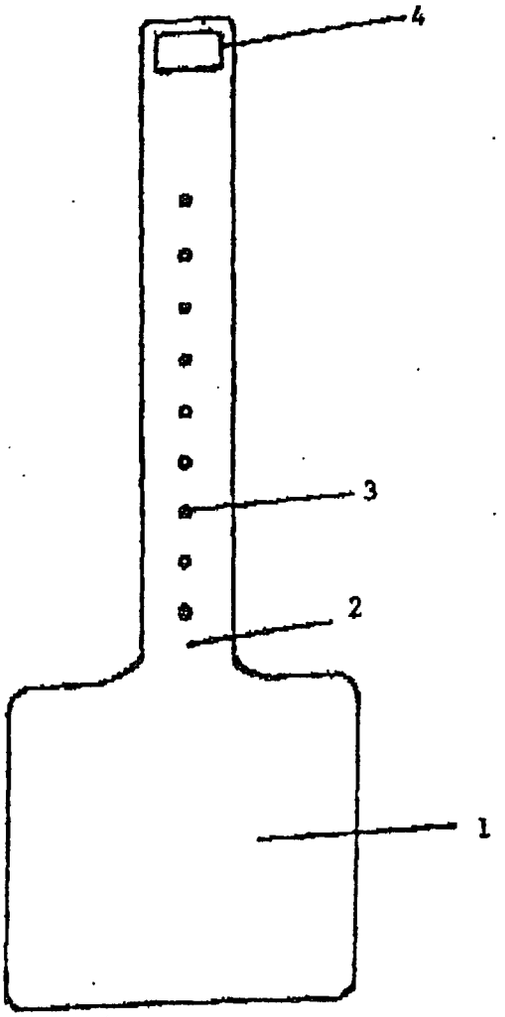

FIGURE 3

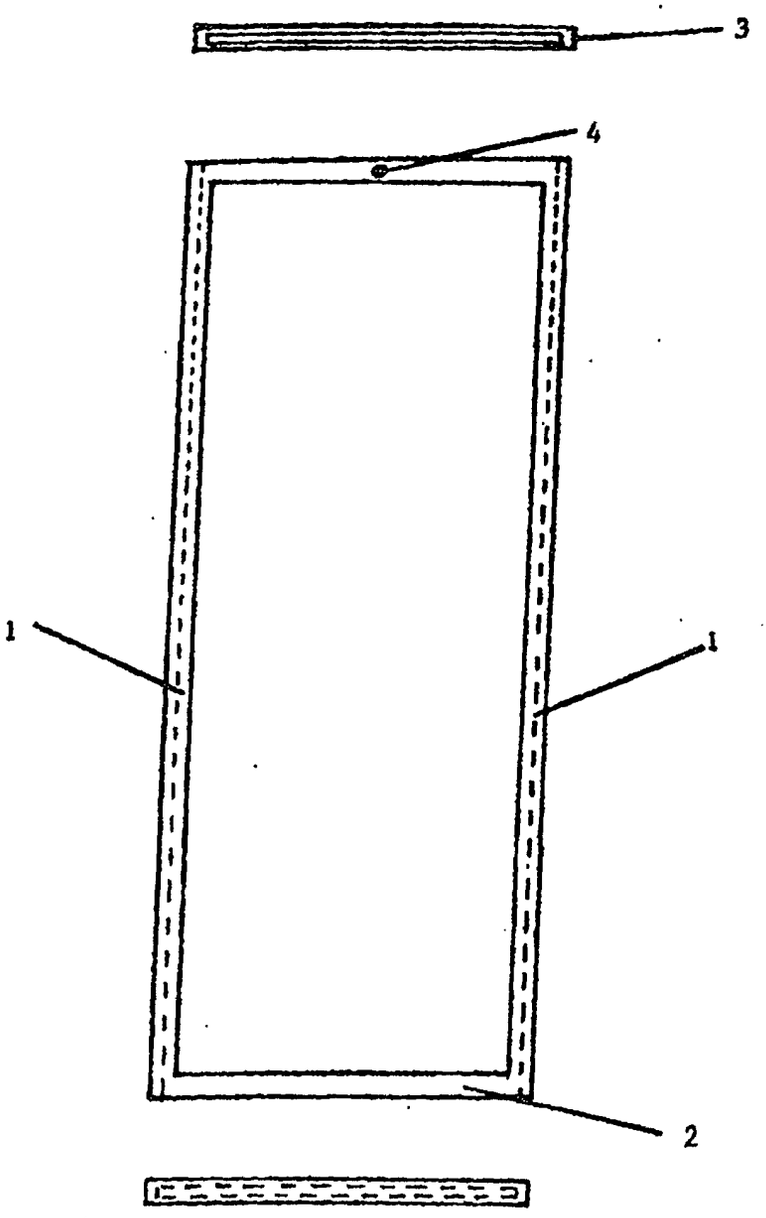

FIGURE 4

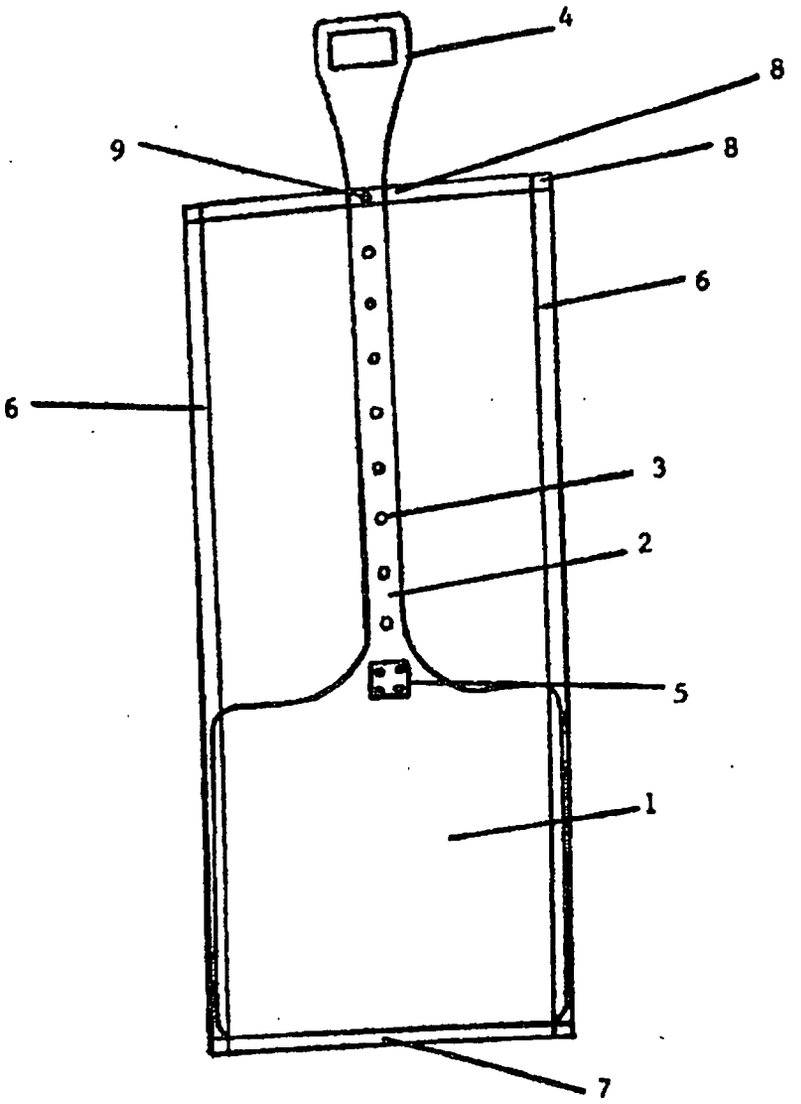

FIGURE 5

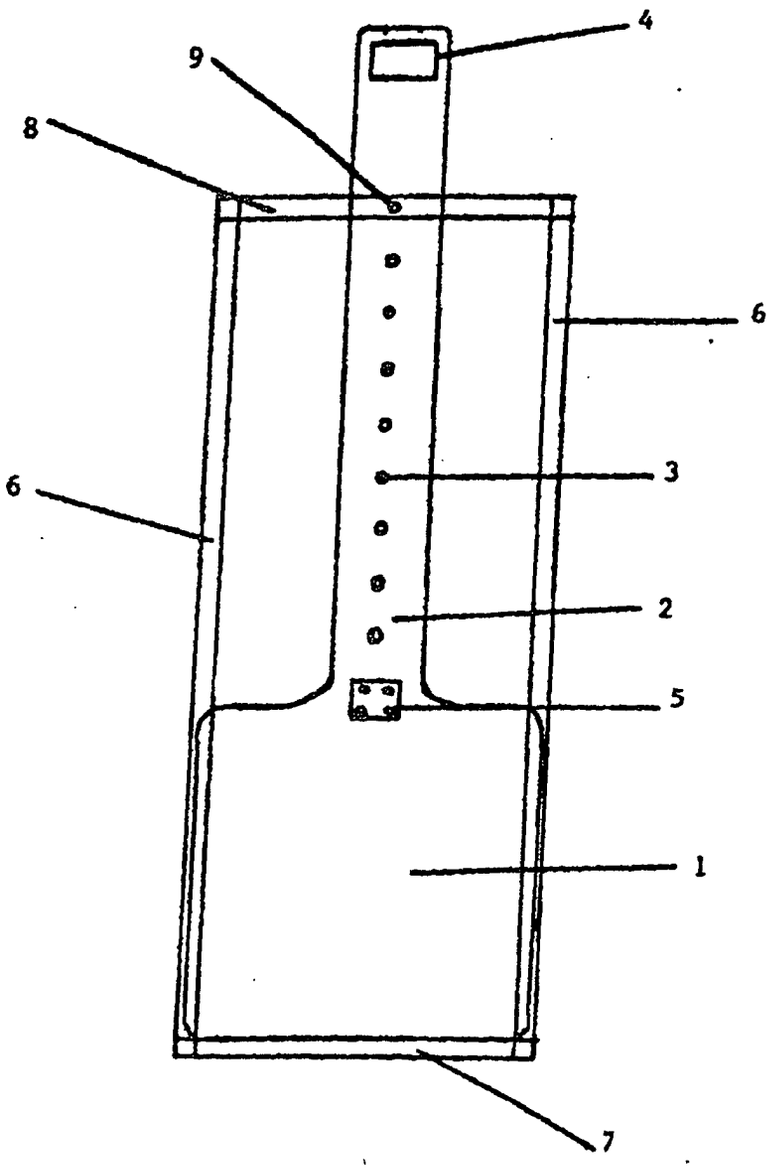

FIGURE 6

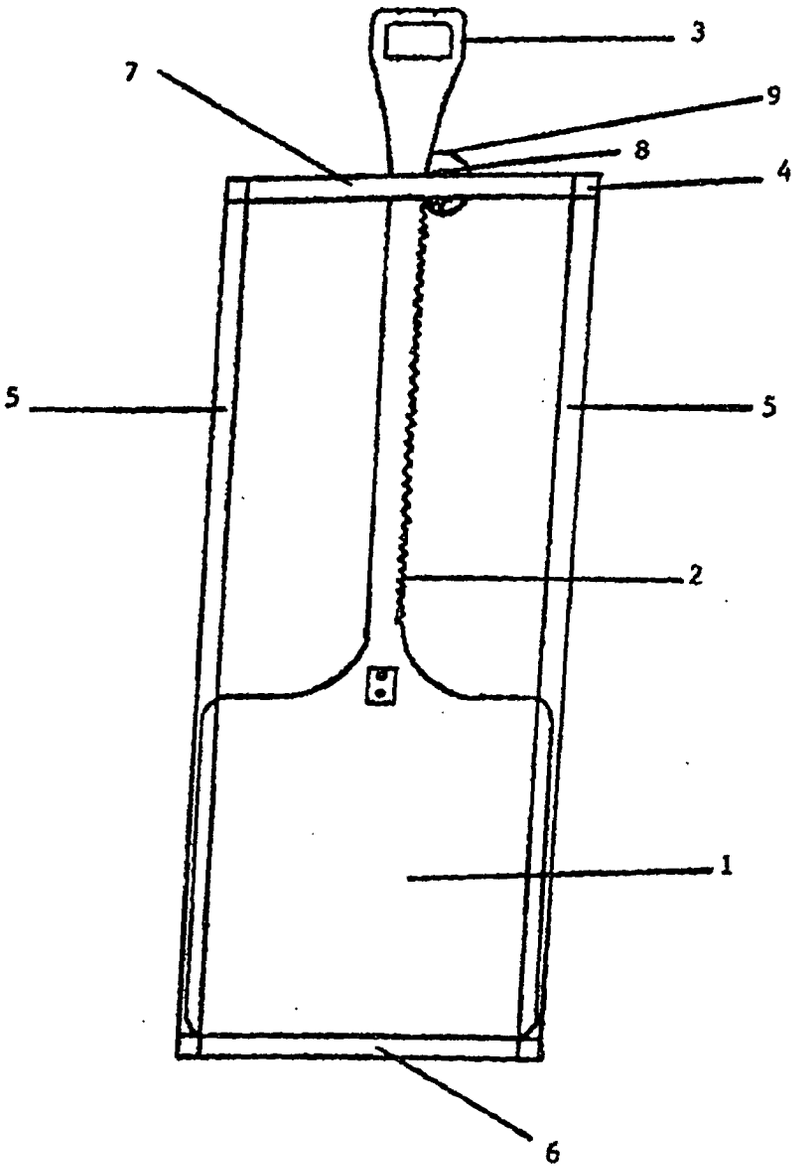

FIGURE 7

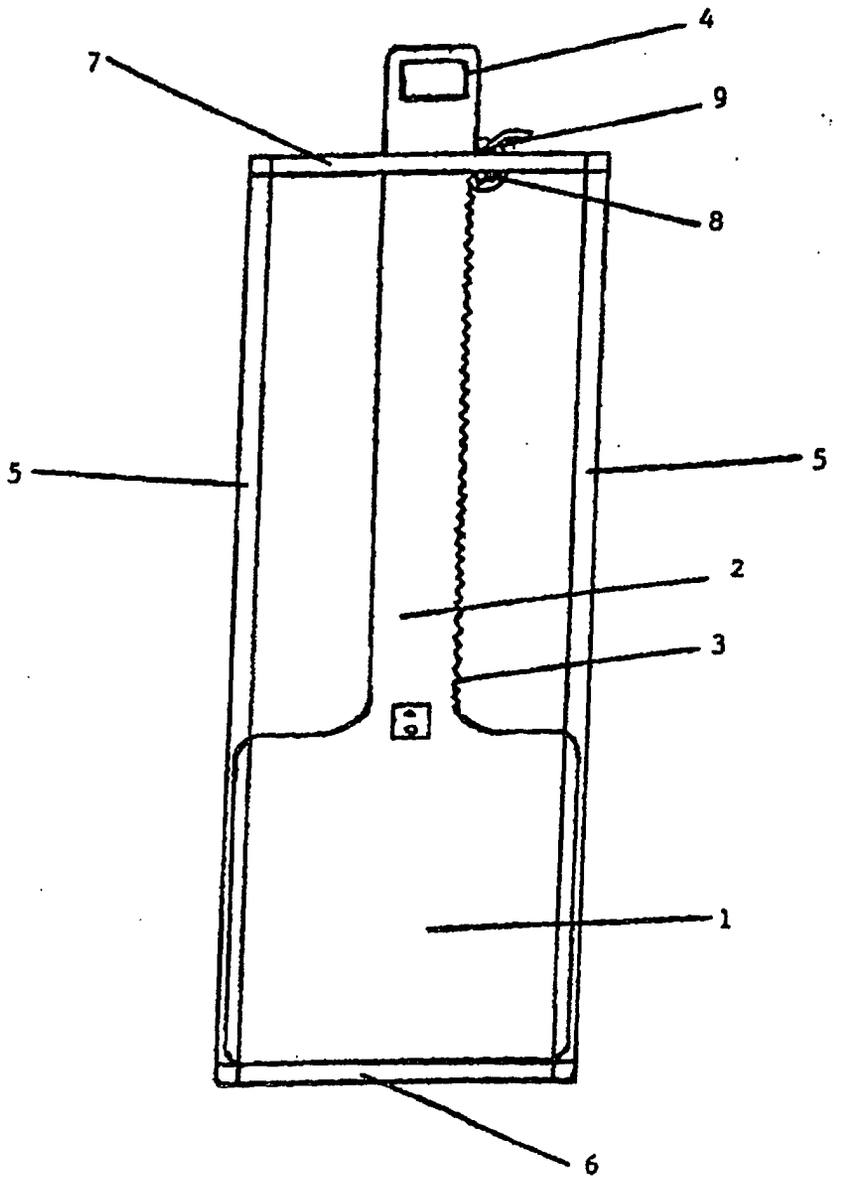

FIGURE 8

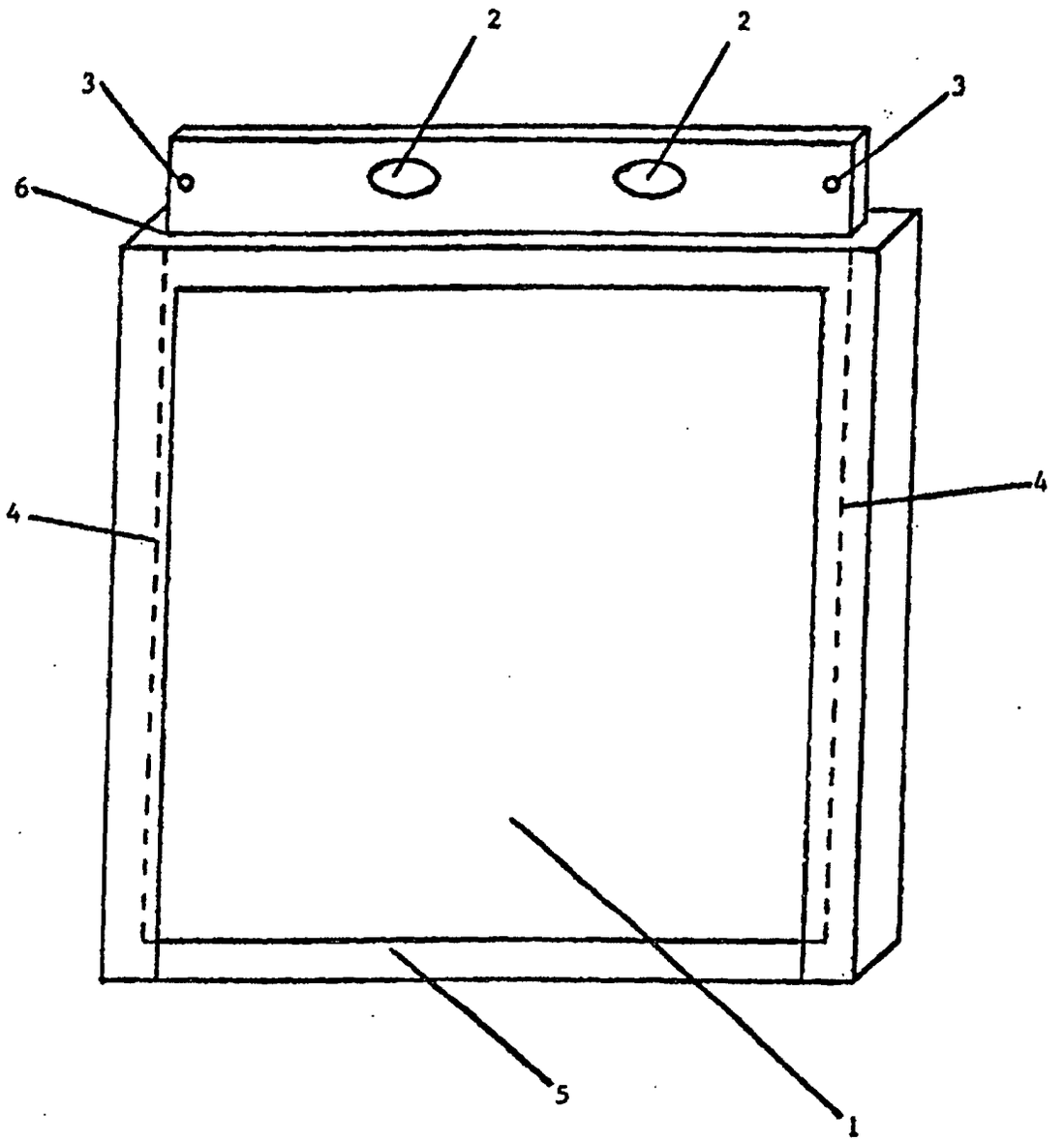

FIGURE 9

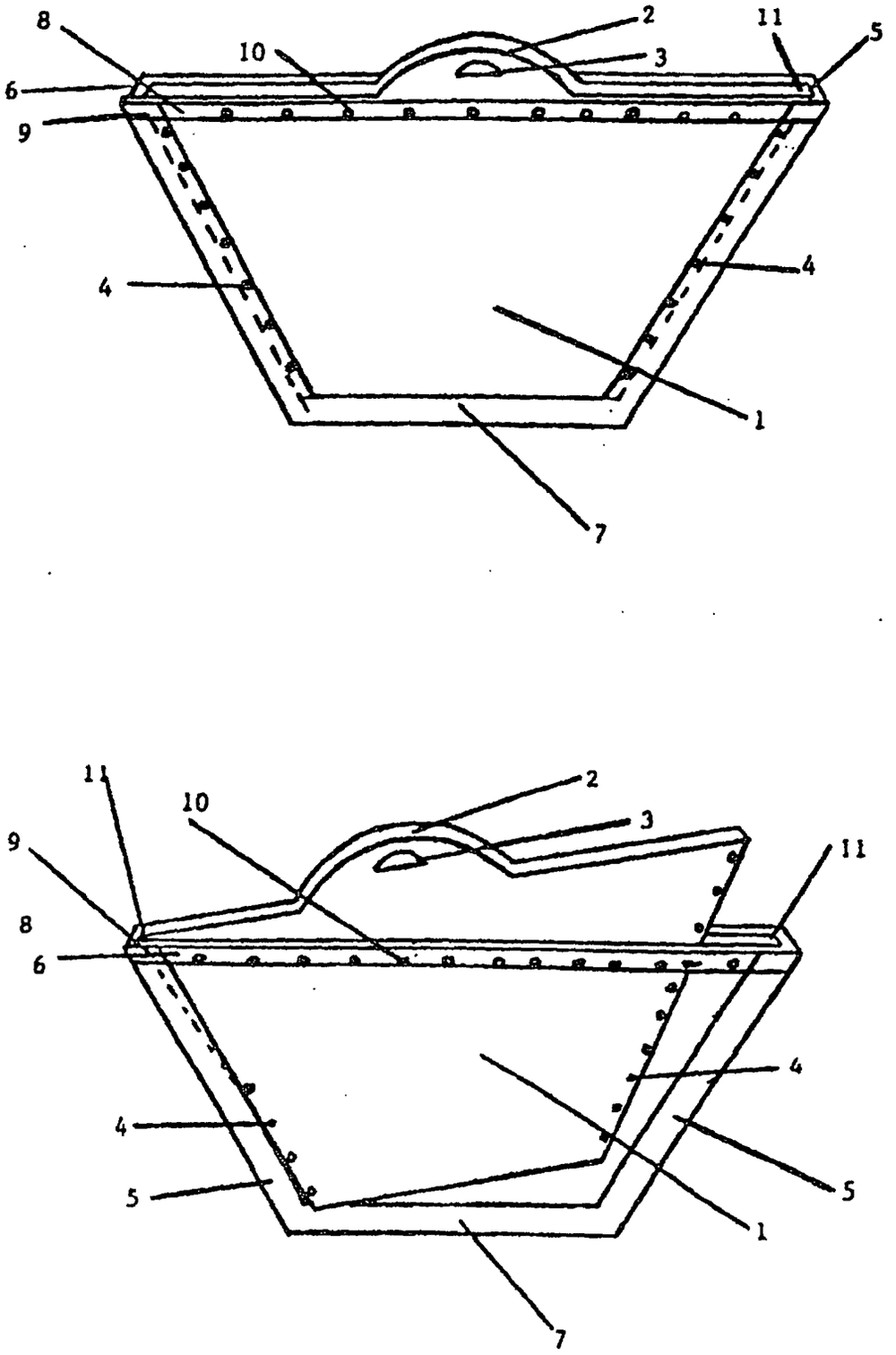

FIGURE 10

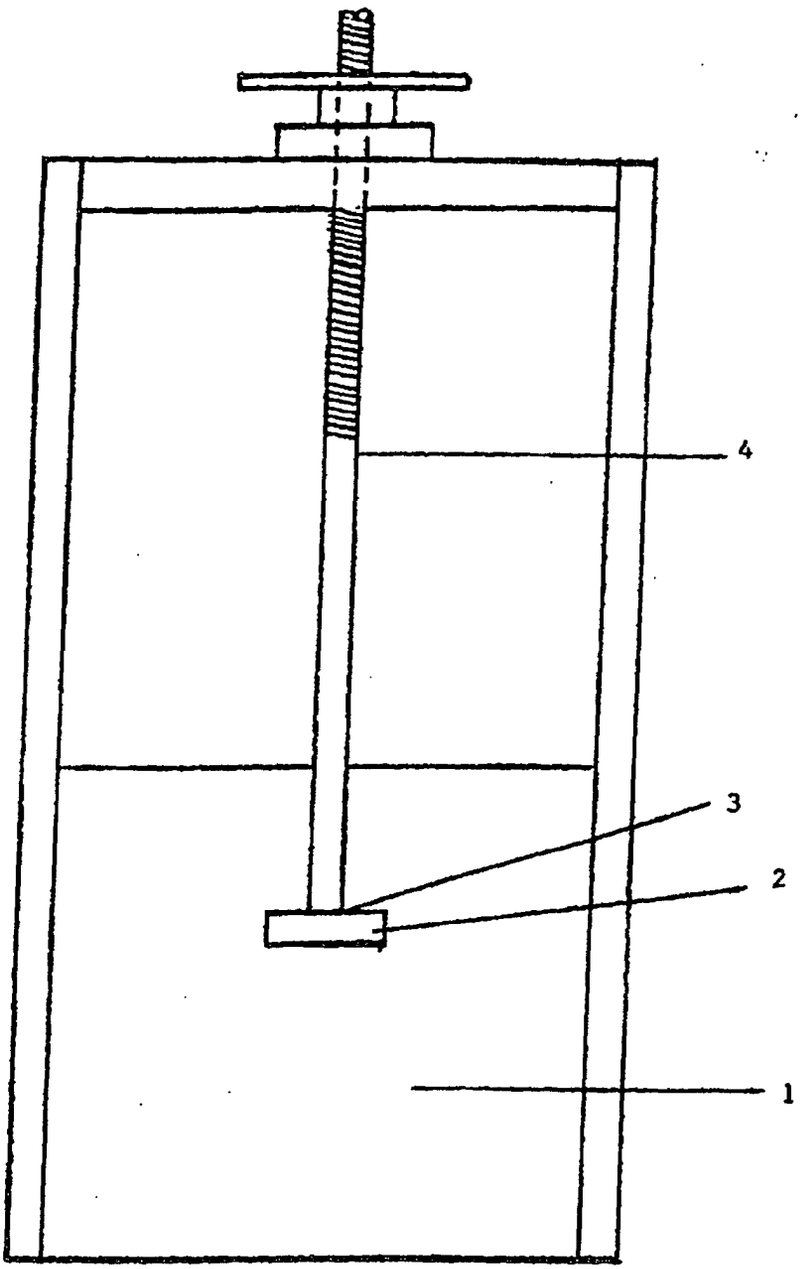

FIGURE 11

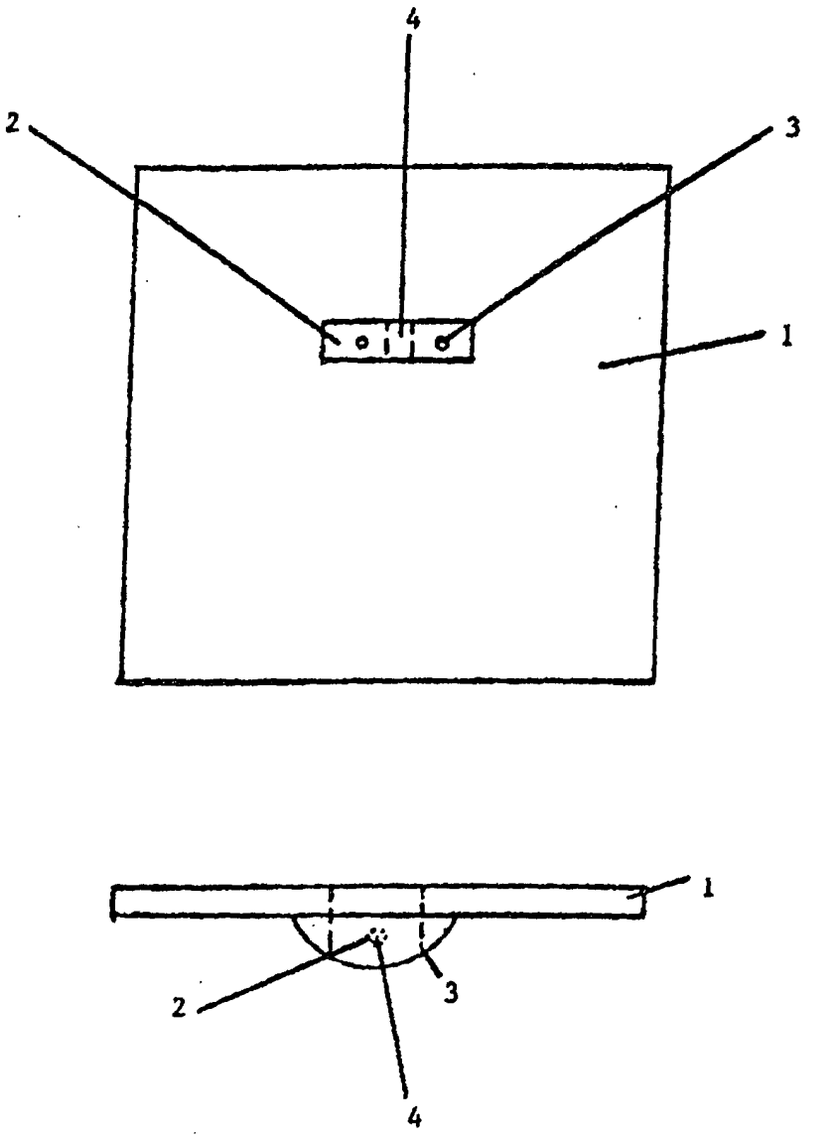

FIGURE 12

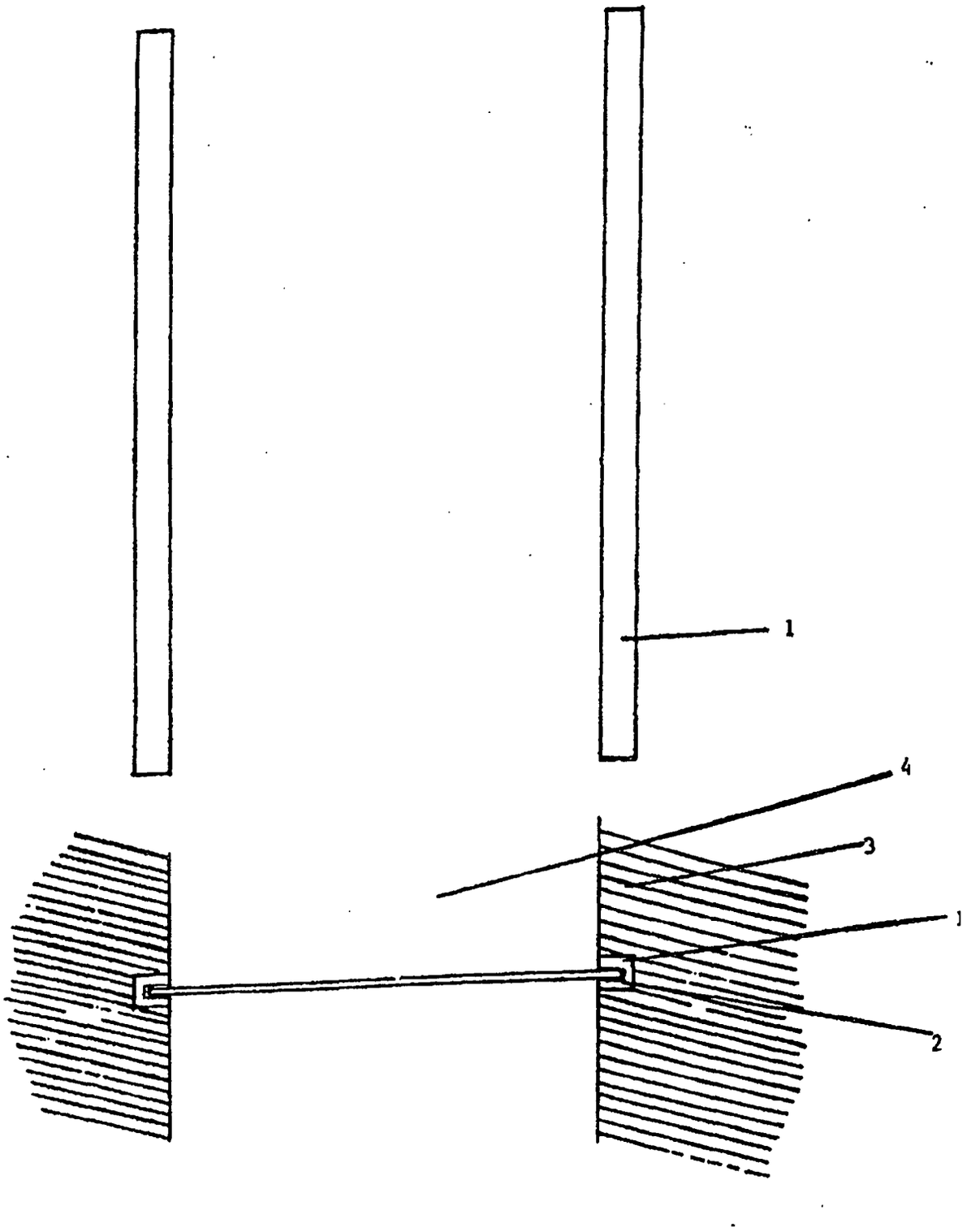

FIGURE 13

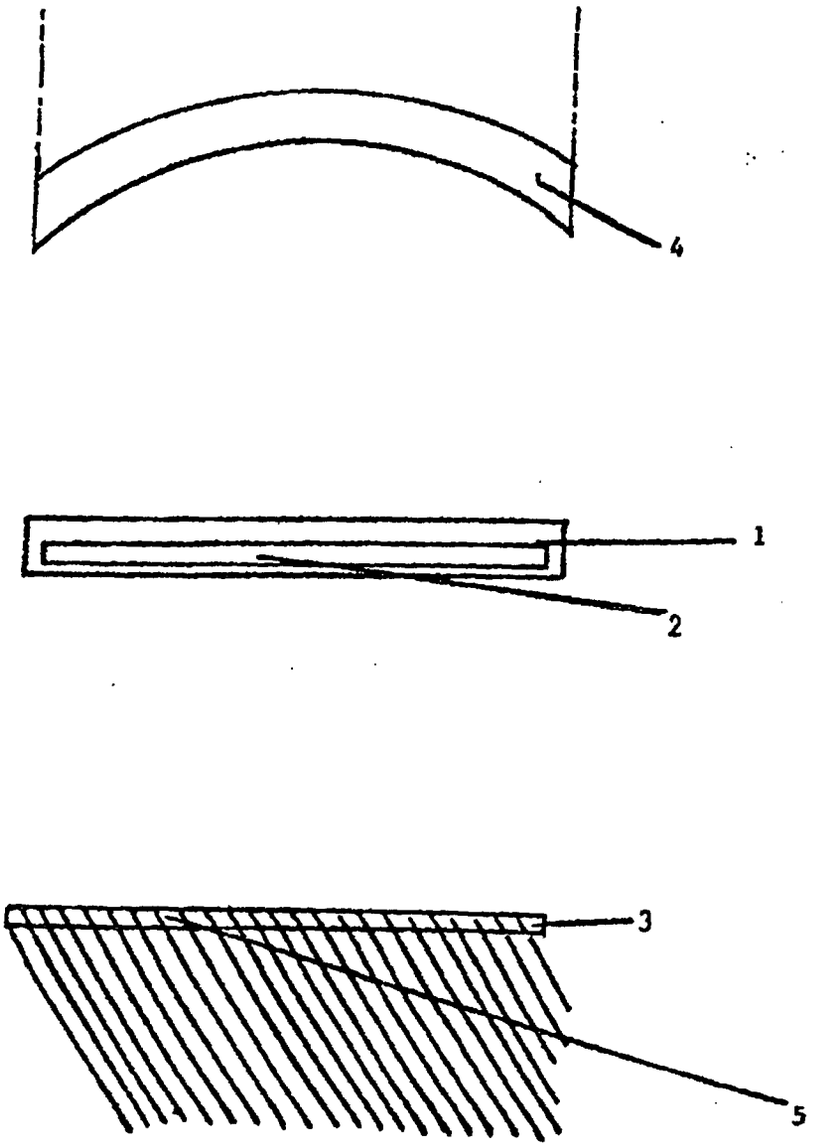

FIGURE 14

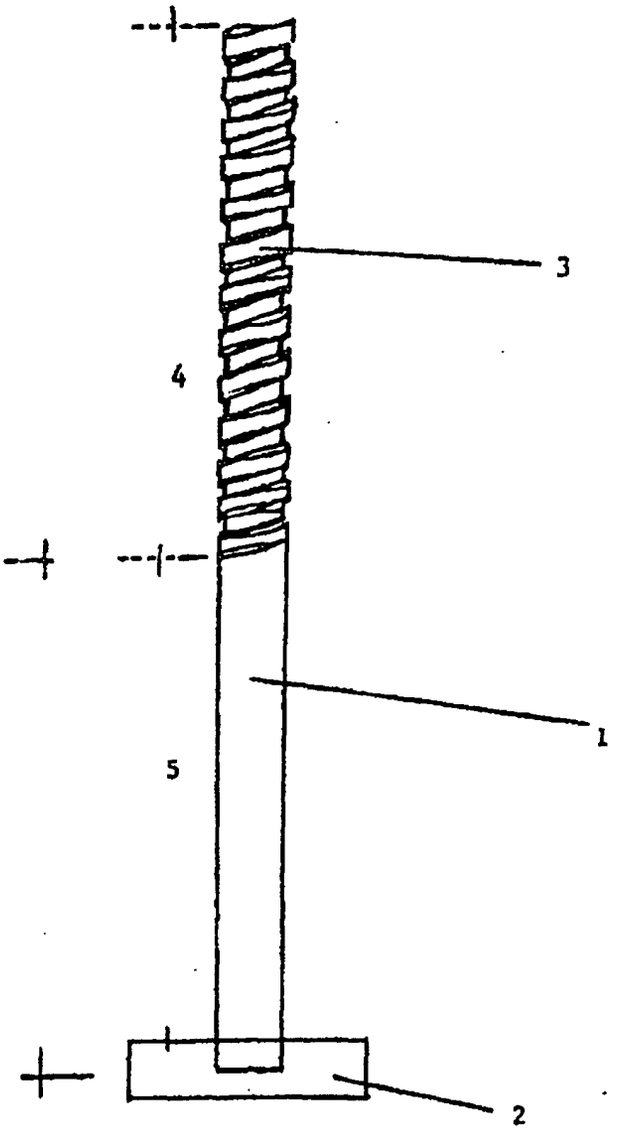

FIGURE 15

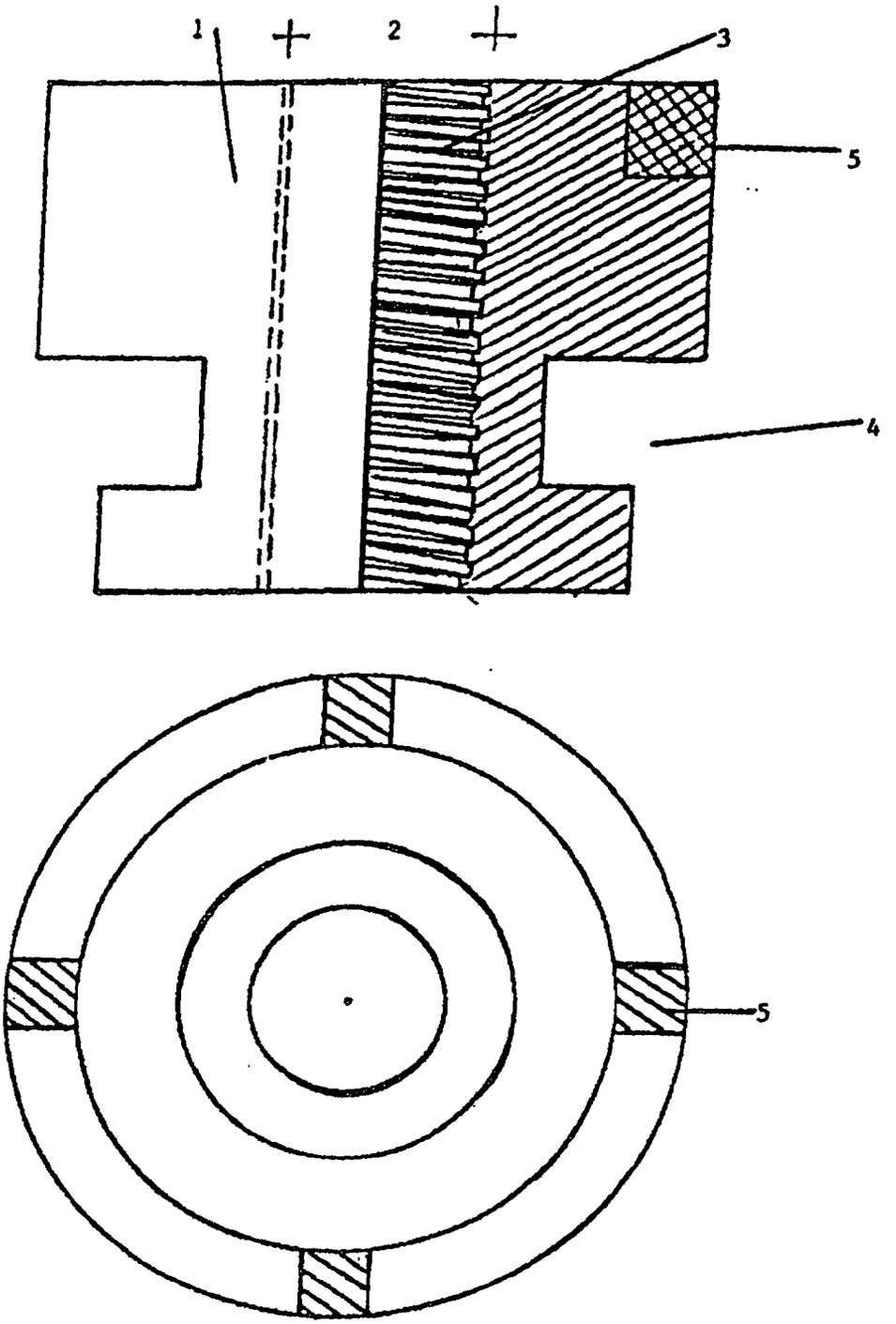

FIGURE 16

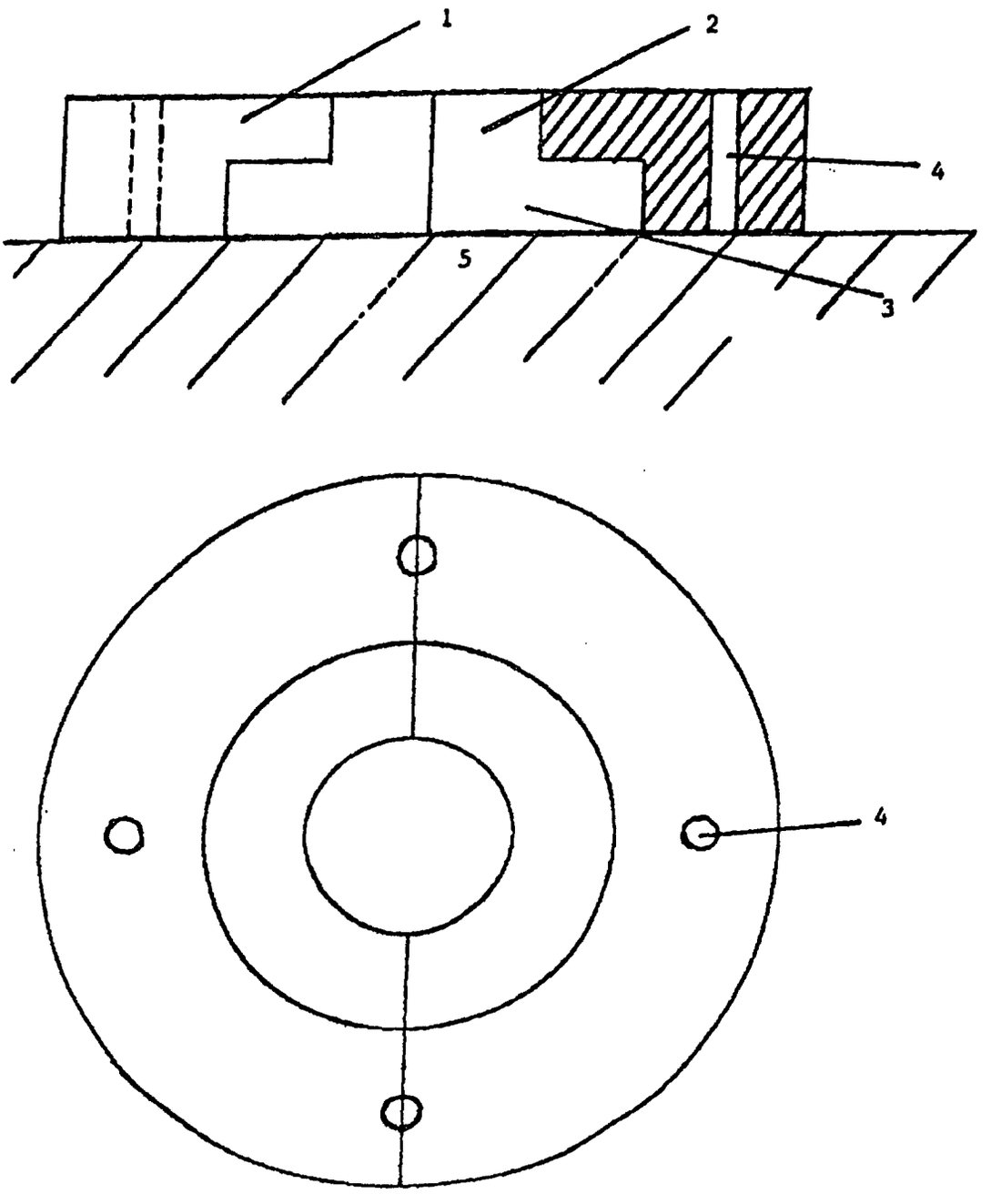

FIGURE 17

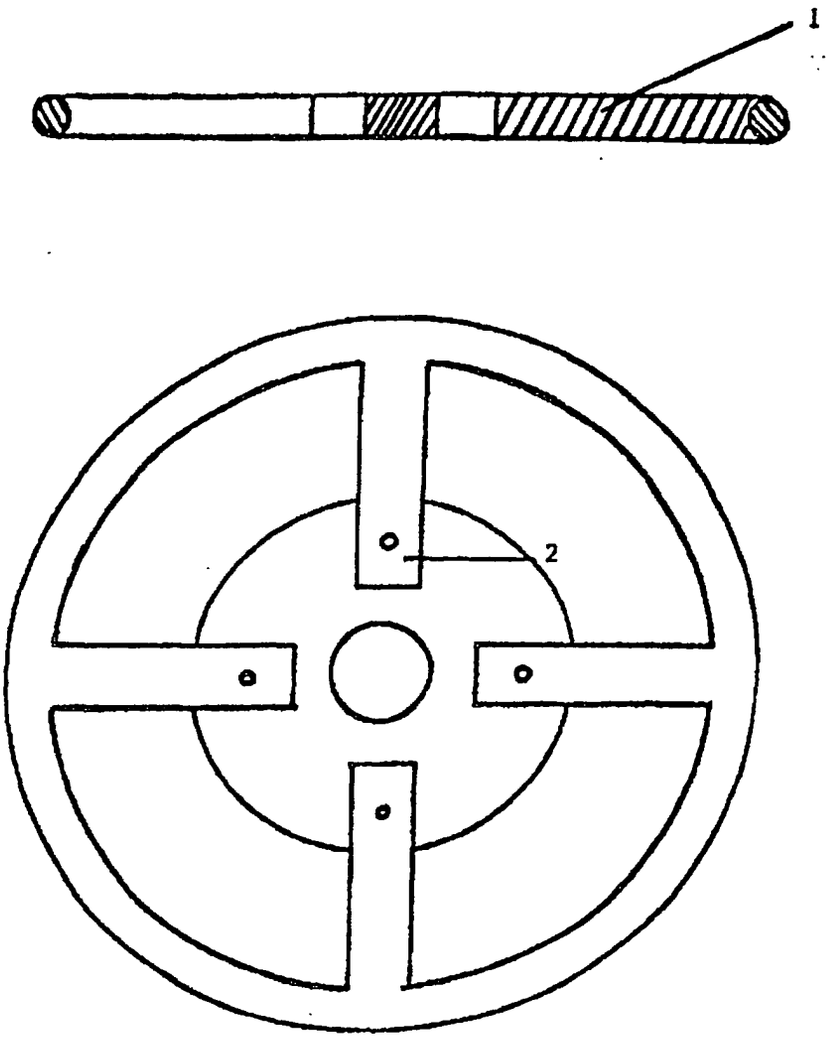

FIGURE 18

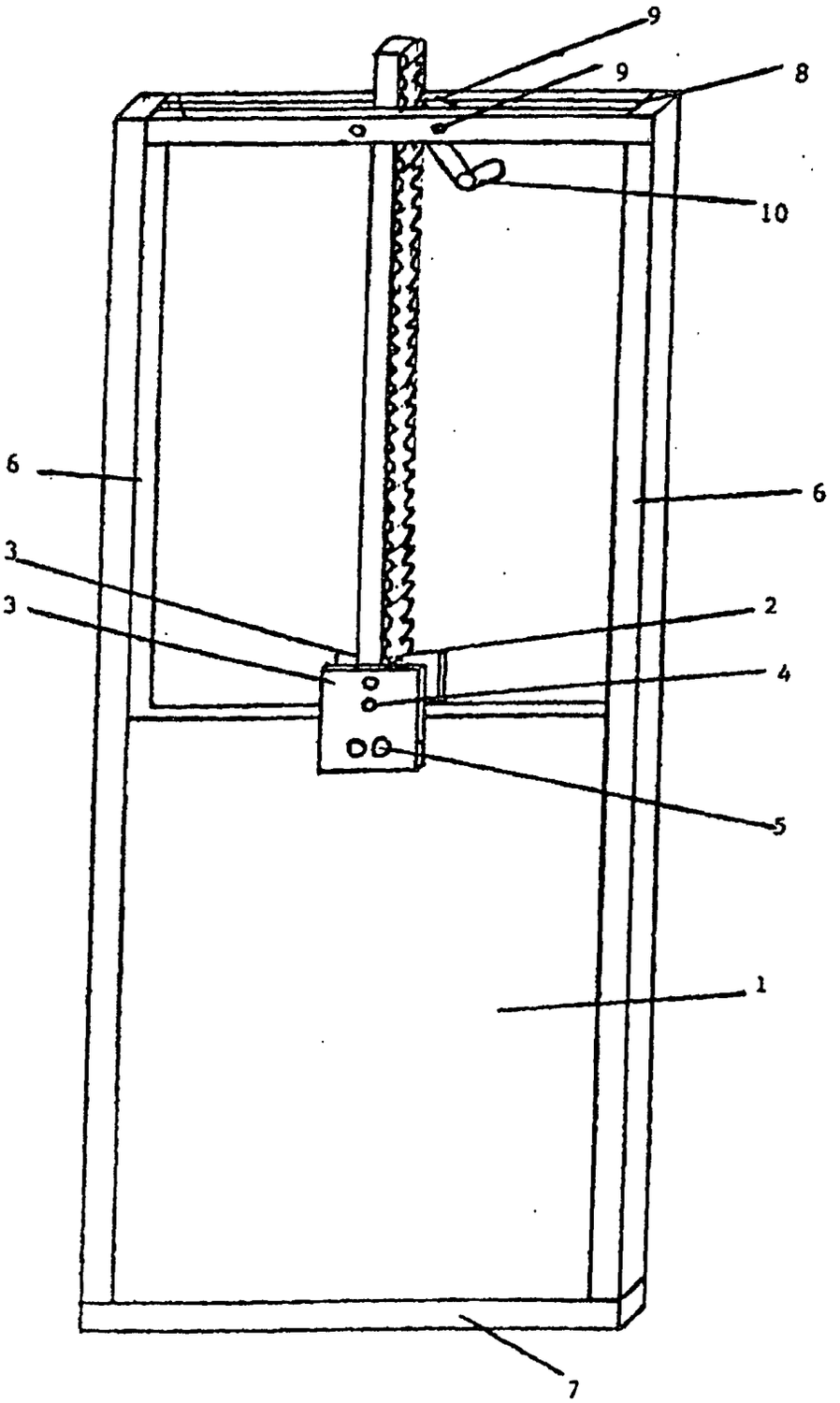

FIGURE 19

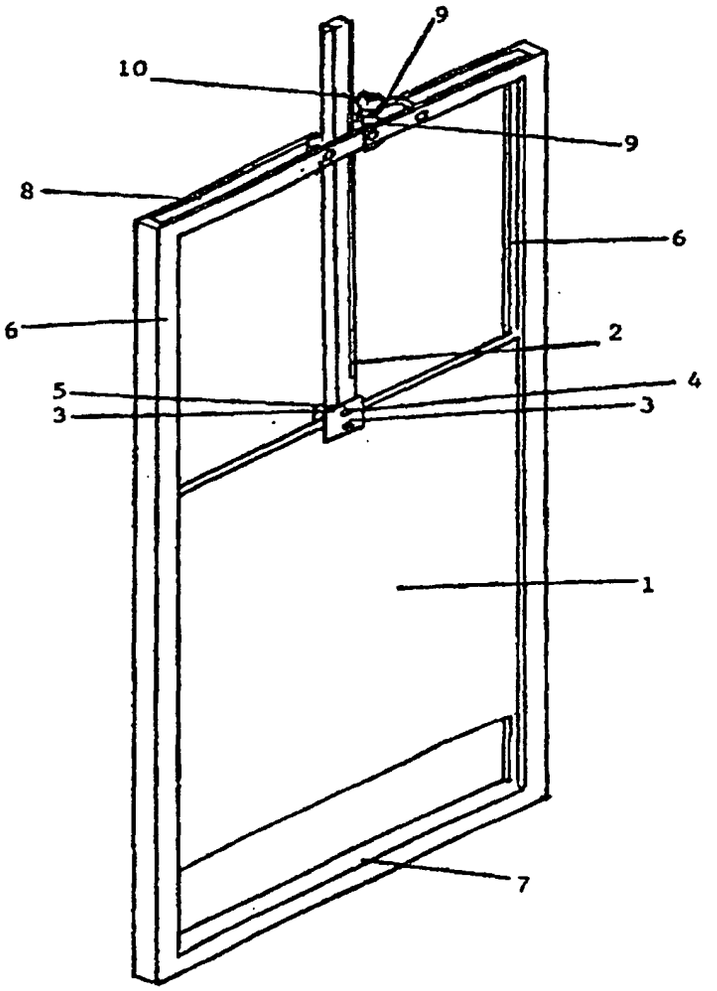

FIGURE 20

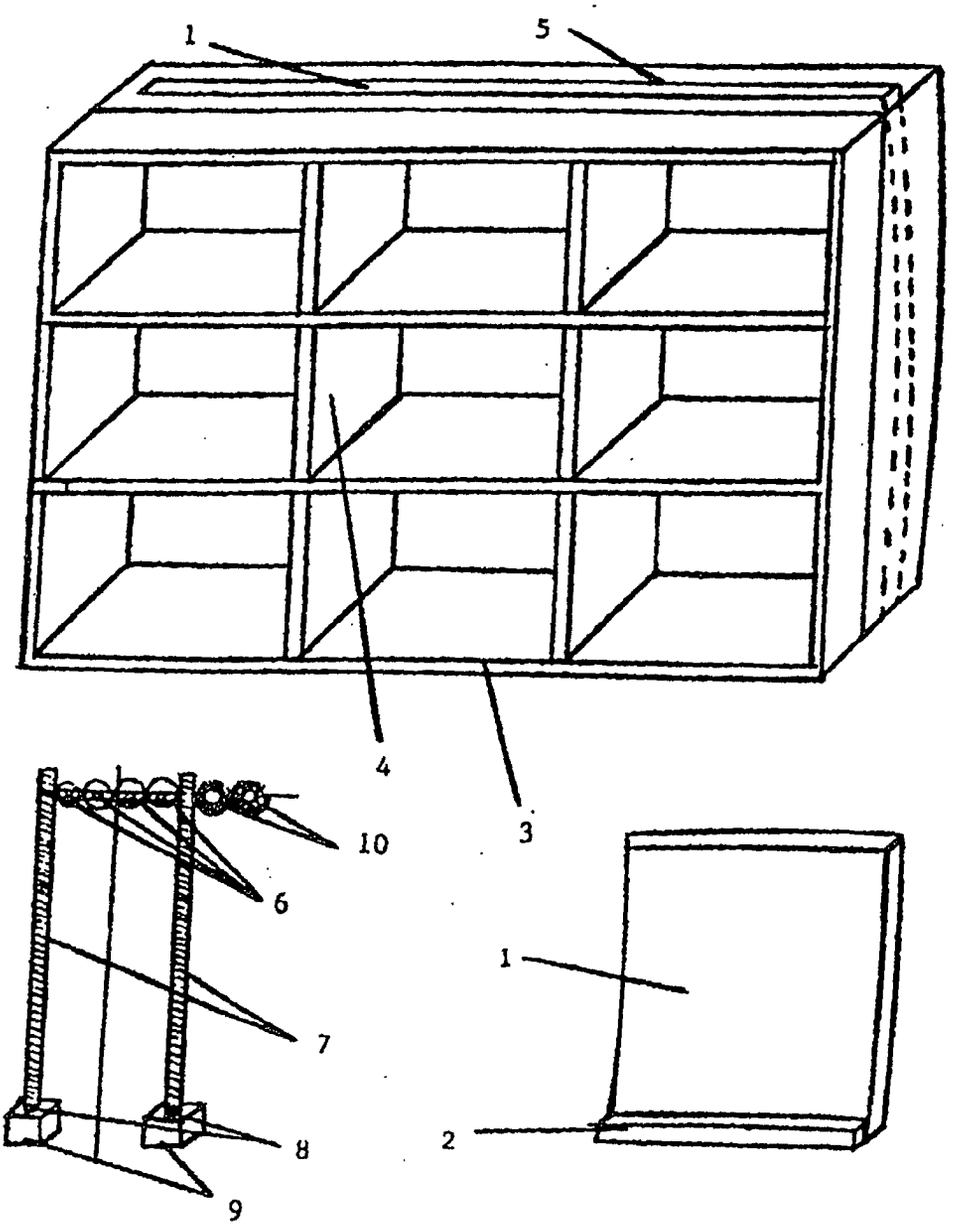

FIGURE 21

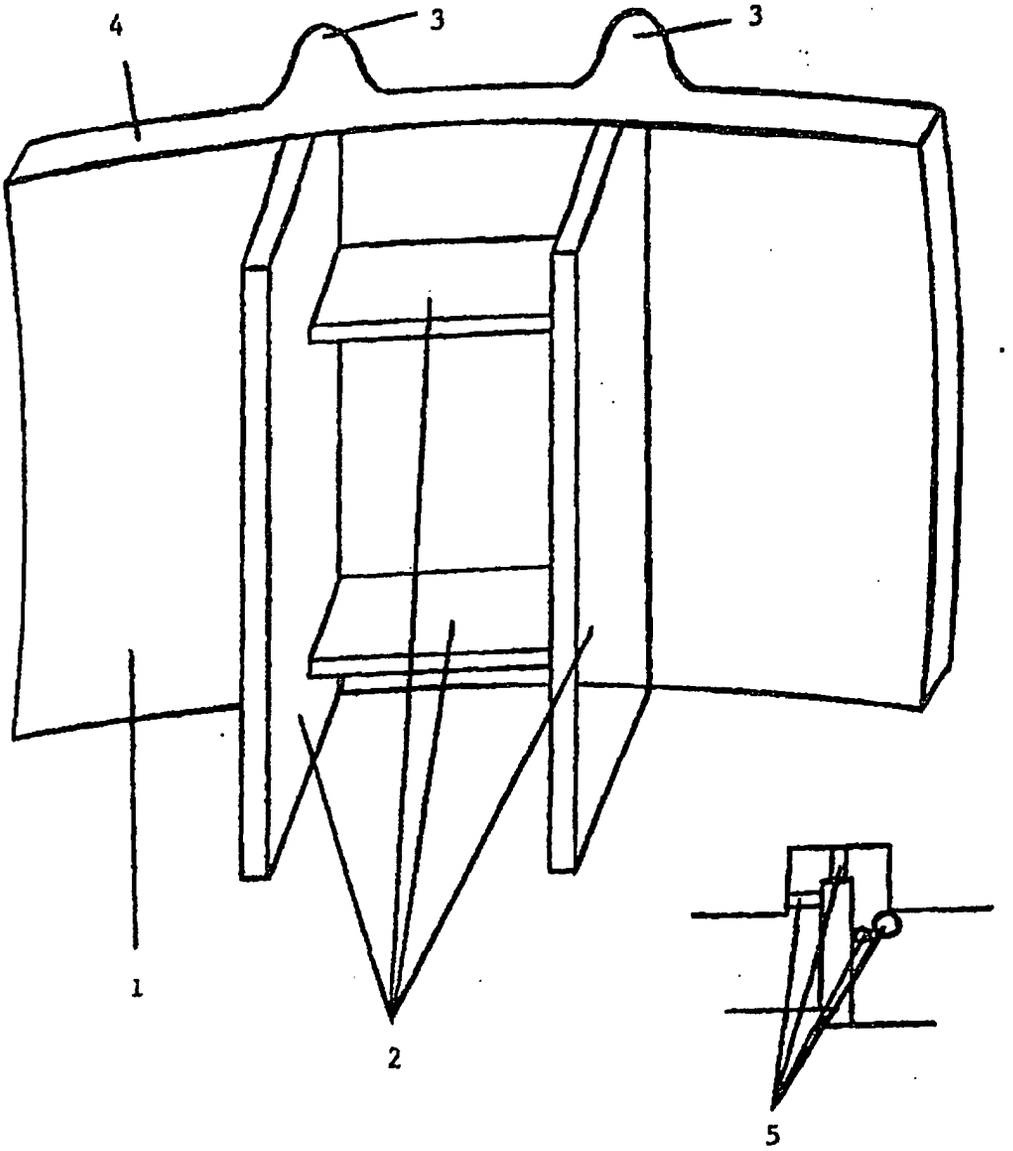

FIGURE 22

INTERNATIONAL SEARCH REPORT

Inter ..onal Application No
PCT/MX 98/00041

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E02B13/02 E02B7/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 E02B E03F F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 345 180 A (FONTAINE) 6 December 1989 see the whole document	1
A	US 4 726 709 A (LABELLE) 23 February 1988 see the whole document	1
A	EP 0 688 904 A (DUGUE) 27 December 1995 see column 1, line 26 - column 1, line 33; claim 8	1
A	DE 25 52 516 A (WEIKOPF) 26 May 1977 see figure 1	1
A	US 3 351 317 A (ROTHENBERGER) 7 November 1967 see the whole document	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 February 1999	03/03/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Hannaart, J

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte. onal Application No
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US 3351317 A	07-11-1967	NONE	

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