CLAIMS

1. **PROCESS FOR RECYCLING BY SEPARATING THE CONSTITUENTS OF ALUMINIZED AND PLASTIFIED PACKAGING, CARTONED OR NOT**, characterized by, separating the constituents of polyethylene or polypropylene plastic film with aluminum by solubilizing the polymer in a compatible primary solvent, operation performed below the polymer softening temperature and under pressure followed by insolubilization via reduction of temperature, separation of the solvent from the polymer and finally filtration and reuse of the solvent in the step of solubilization, in the following sequence:

A) Feeding of small shreds of film or equivalent in an intermittent way, through a film doser (A01), passing through a locking valve (U01) at an inlet of an intermittent feeder (B01) and from it through another locking valve (U02) at an inlet of a continuous feeder (B01A);

B) Dosing of a predetermined quantity of film from a intermittent feeder (B01) with a valve (U01) blocked and a valve (U02) open, transferring a film to a continuous feeder (B01A); a valve (U02) is blocked and a valve (U01) is unlocked and film is re-fed from a doser (A01) into a intermittent feeder (B01), and so on;

C) Film from a continuous feeder (B01A) is fed through its internal conveyor thread, concomitant with a solvent inlet, into a suspension tank (B02) with a valve (U02) blocked, with continuous volumetric feed of solvent through a solvent feeding pump (Z01) in a ratio of 8 to 15 parts of solvent to one part of film, so as to cover the entire film content in a suspension tank (B02) and formation of a suspension of the polymer/aluminum film in solvent;

D) Feeding of the suspension in a dissolver tank (C01) where the suspension is rotated by a profile in the shape of an internal helical pitch and heating at 100 to 105 ºC in an indirect way and with greater circulation, agitation and consequent movement for better convection, with a residence time of 2 to 5 seconds;

E) At the end of the dissolution, the liquid stream with the solution of polymer and aluminum in suspension, enters a special screen filter (D01) carried by a

helical thread, which conducts the aluminum through the filtration operation and separates the concentrated solution;

F) The concentrated solution crosses the walls of the screen maintaining a counter pressure to the fluid in the solution outlets to keep a dissolver tank (C01) pressurized and is collected in a concentrated solution tank (F01) and the aluminum with residual polymer flows, pushed by the thread of a filter (D01), to another contiguous compartment, the residual polymer washing tank (E01) and immediately before and after the wall communicating the two compartments, the duct no longer allows passage through its surface and by using different speed the aluminum is driven to a special aluminum output device (G10) out of the system;

G) In a residual polymer washer tank (E01), filtered and condensed solvent is injected from a solvent tank (X01), through the inside of the helical screw thread of a tank (E01), to remove residual polymer solution from aluminum and the diluted solution crosses the screen maintaining a counter pressure to the fluid in the solution outlets to maintain pressurized a dissolver tank (C01) and is collected in a diluted solution tank (F02);

H) The concentrated solution, after reaching the steady state, is collected in a concentrated solution tank (F01) and transferred continuously by the concentrated solution pump (Z02) for cooling between 50 and 70 ºC, initially in a heat recovering unit (LM01) to yield heat to the filtered and condensed solvent, and additionally to the concentrated solution cooler (L01) in order to precipitate and insolubilize the polymer, then to filtrate into a slurry filter (I01), from which the filtered solvent is accumulated, together with solvent from a condenser (J01) into a solvent tank (X01) and returning through a heat recovery unit (LM01), a solvent pump (Z03), a solvent heater (M01) and the shaft of helical thread of a residual polymer washing tank (E01);

I) The diluted solution from the washing of the aluminum in a residual polymer washing tank (E01) is collected in a diluted solution tank (F02) and return to the beginning of the process continuously through a washing solvent feeding pump (Z01);

J) The cake after filtration goes to drying in a polymer dryer (H01) and the solvent vapors proceed to a condenser (J01) and the resulting condensed solvent is mixed with the condensed solvent coming from a aluminum dryer (K01);

L) All solvent vapor streams, after condensate, proceed to a solvent tank (X01), are reused for washing the aluminum and from there to the beginning of the process;

M) Aluminum is intermittently removed through a special intermittent, rotating and reciprocating vertical opening and closing aluminum output device (G10) in order to also keep the pressure inside a dissolver tank (C01) and the aluminum from which the polymer was removed is conducted for drying in a dryer (K01), the solvent vapors being separated to a condenser (J01), where its stream is mixed with the condensed solvent from a polymer dryer (H01);

O) Dry aluminum containing small amounts of cellulosic fibers and pieces of unremoved lids, as well as polypropylene tapes, in batch process, are fed into a crusher tank (P01), kerosene is added at room temperature and shear crushing is carried out, not only removing the polymer residual, but also loosing all the residual cellulosic fibers;

P) The agitation is then turned off and the aluminum suspension is transferred to a flotation tank (Q01), air is sprayed through the device contained in the bottom of a crushing tank (P01), occurring the formation of foam which carries fibers and shreds of polypropylene and cellulosic fibers;

Q) This foam is continuously removed by the draining of the supernatant liquid stream, foam passing through a screen basket (R01), where the light particulates of polypropylene and fiber will be retained, then returning the kerosene to the tank, by pumping through a recirculation pump (T01) to the tank bottom; and

R) The aluminum suspension, after the impurities are eliminated, is drained by a filter (Y01), the kerosene is pumped by a return pump (V01) and returns to the kerosene tank (O01) which will feed the next batch and the aluminum goes for pressing in a press (S01) to remove most of the kerosene, which goes to the melting stage, where evaporation of the remainder of retained kerosene takes place.

2. **PROCESS FOR RECYCLING BY SEPARATING THE CONSTITUENTS OF ALUMINIZED AND PLASTIFIED PACKAGING, CARTONED OR NOT**, according to claim 1, characterized by, alternatively, the insolubilization of the polymer taking place by incorporating a secondary solvent with affinity with the primary solvent, and not solvent of the polymer.

3. **PROCESS FOR RECYCLING BY SEPARATING THE CONSTITUENTS OF ALUMINIZED AND PLASTIFIED PACKAGING, CARTONED OR NOT**, according to claim 1, characterized by, alternatively, the process being intermittent and realized according to the following steps:

A) Feeding of small shreds of film or equivalent in an intermittent way through a film doser (A01), passing through a locking valve (U01) at an inlet of the intermittent feeder (B01) and from it through another locking valve (U02) at an inlet of a suspension tank (B02);

B) Once a valve (U01) is blocked between a film doser (A01) and an intermittent feeder (B01), the film is dosed concomitantly with the solvent feed in a suspension tank (B02) and with each intermediate tank feed (B01), a valve (U02) between it and a suspension tank (B02) is held closed;

C) Intermittent volumetric feed of concentrated solution through a concentrated solution feeder (N01) and washing solvent through a return solvent feeder (N02) effected by positive displacement, the first working only until entry into steady state, in a ratio of 8 to 15 parts of solvent to one part of film, so as to cover the entire film content in a suspension tank (B02) and formation of a suspension of the polymer/aluminum film in solvent;

H) The concentrated solution, after reaching the steady state, is collected in a concentrated solution tank (F01) and transferred intermittently by a concentrated soution feeder (N03) for cooling between 50 and 70 ºC, initially in a heat recovery unit (LM01) to give heat to the filtered and condensed solvent, and is further cooled in a concentrated solution cooler (L01) in order to precipitate and insolubilize the polymer, then goes to filtrate in the slurry filter (I01), from which the filtered solvent is accumulated together with solvent coming from a condenser (J01) into a solvent tank (X01) and returns through a heat recovery unit (LM01), through a solvent feeder (N04) intermittently, through a solvent heater (M01) and by the shaft of the helical thread of a residual polymer washer tank (E01); and

I) The diluted solution from the washing of the aluminum in a residual polymer washing tank (E01) is collected in a diluted solution tank (F02) and returned to the beginning of the process intermittently through a return solvent feeder (NO2).

4. **EQUIPMENT**, in order to carry out the process for recycling by separating the constituents of aluminized and plastified packaging, cartoned or not, according to claim 1, characterized by, film doser (A01), volumetric, of the rotary valve type or similar, intermittent feeder (B01) of cylindrical shape and conical bottom, placed between a continuous feeder (B01A) and a film doser (A01) and with a diaphragm type locking valve (U01) at an inlet; Continuous feeder (B01A) of cylindrical shape and conical bottom with internal conveyor thread, with diaphragm-type locking valve (U02) at an inlet and with tangential solvent feed connection; dissolver tank (C01) with cylindrical section and heating jacket, having in its interior, along its vertical section, a fixed helical pitch involving all the circular transverse section; special screening filter (D01) conical-shaped, fitted with a conical helical thread adjusted to the wall of the screen and check valve at an outlet to a concentrated solution tank (F01) and communicating with a residual polymer washer tank (E01) through non-screening duct leading to the other compartment; residual polymer washer tank (E01) of screened duct of cylindrical configuration and with a larger cross-section and containing inside it a cylindrical helical thread with perforations on its shaft and check valve at the outlet to a diluted solution tank (F02); concentrated solution tank (F01); diluted solution tank (F02); special aluminum output device (G10) rotating and pulsatile with plunger (G11) which moves inside a cylindrical jacket (G12) with top opening (G12A) connecting to the pressurized system, and another bottom opening (G12B) located below, said bottom opening (G12B) distant from the top opening (G12A) by a length a little larger than the height of the top opening and 180 degrees out of the top opening and in communication with external means, a plunger (G11) has a cavity (G11A) of semi-cylindrical shape with the lower cut inclined at 45 degrees and delimited by three top sealing rings and three other equidistant rings below, situated at a distance a little larger than the corresponding height of the cavity; Polymer dryer (H01) of conveyor thread type with indirect heating; aluminum dryer (K01) of the conveyor thread type with indirect heating jacket; concentrated solution cooler (L01) of the heat exchanger type; continuous

pressurized slurry filter (I01); solvent tank (X01); solvent vapor condenser (J01) of the heat exchanger type; heat recovery unit (LM01) of the heat exchanger type; Washing solvent feeding pump (Z01) of the pump type; Concentrated solution pump (Z02); solvent pump (Z03); solvent heater (M01); kerosene tank (O01); aluminum crusher (P01), of the cylindrical shear type and with cutting propellers and baffles; flotation tank (Q01) of elongated cylindrical shape and with an air spraying device at the bottom of the tank; screen basket (R01); press (S01) of the piston type; recirculation pump (T01); return pump (V01); and a basket-type drain filter (Y01).

5. **EQUIPMENT**, in order to carry out the process for recycling by separating the constituents of aluminized and plastified packaging, cartoned or not, in an intermittent way, according to claims 3 And 4, characterized by, suspension tank (B02) of cylindrical shape with conical bottom positioned between an intermittent feeder (B01) and dissolver tank (C01); concentrated solution feeder (N01) and return solvent feeder (N02), both feeder being volumetric of the reciprocating piston type.

6. **PROCESS FOR RECYCLING BY SEPARATING THE CONSTITUENTS OF ALUMINIZED AND PLASTIFIED PACKAGING**, with separation of the constituents of aluminized and plastified packaging where the aluminum is isolated in the form of pigment, according to claim 1, characterized by, filtration and washing of the aluminum with elements having well-closed ceramic pores and executed at the dissolution temperature and the filtrate after cooling undergoing precipitation of the polymer and being conducted to a new filtration with porous element in a slurry filter (I01).

7. EQUIPMENT, in order to carry out the process for recycling by separating the constituents of aluminized and plastified packaging, where the aluminum is isolated in the form of pigment, according to claim 6, characterized by, a filter (I01) being in ceramic.