To all whom it may concern:

Be it known that I, Eugène Drouilly, of Paris, Republic of France, have invented processes for Cutting and Piling Up Thin Aluminium Sheets, of which the following is a full, clear, and exact description.

The cutting up according to predetermined sizes and the piling up of thin aluminium sheets, particularly adapted to be used, instead of tin sheets, for wrapping alimentary products, present great difficulties by reason of the fact that the aluminium sheets solder very readily together and at a relatively low temperature, under the influence of a certain pressure.

The thin aluminium sheets put on the market are obtained either by beating or by rolling; these sheets, piled up on one another are cut up according to the required sizes in the form of blocks.

Now, the action of shocks or of high pressures, or the action of the cutting tool, determines the production of heat sufficient for causing the aluminium sheets to solder together.

For the purpose of avoiding this soldering, it has been proposed to interpose between the aluminium sheets insulating materials such as talc, oil, fat, . . . or air when embossing said sheets, but the result obtained is unsatisfactory; the sheets still solder together, particularly at their edges; moreover, said insulating materials are often not easy to remove and render the sheets unsuitable for wrapping alimentary products.

On the other hand, the packs of aluminium sheets can be easily sawed only if they present a small thickness, that is to say if they comprise only a restricted number of sheets; consequently, the blocks of sheets put on the market are necessarily composed of a number of these packs, but as the latter can never have rigorously the same dimensions, the sheets of certain of these packs project beyond others, their projecting edges are folded, deteriorated and it is not possible, in these conditions, to obtain blocks with perfectly neat edges. Furthermore, the separation of the sheets always presents a certain difficulty, by reason of their adherence the one upon the other.

and can often be effected only by means of a paper-cutter and very often, during this operation, there is a risk of injuring said sheets by reason of their small resistance.

Finally, the sheets obtained by beating or rolling never have rigorously the same thickness; these variations are due not only to the effect of the expansion of the rolling cylinders but especially to the fact that the aluminium becoming highly springy during the rolling operation must be frequently annealed during said rolling operation and that the slightest modifications in the degree of annealing (temperature or duration) produce very different conditions of ductility; the variations of surface yield may reach up to 20%; in these conditions the customer who buys the blocks of aluminium sheets by weight never knows exactly the number of sheets contained in the latter, which is a great inconvenience in checking.

The present invention has for its object a process for cutting up and piling up thin aluminium sheets, combined for the purpose of obviating the various above mentioned disadvantages.

By means of the present process the aluminium sheets are cut up and offered to the customer, without any possible soldering or adherence between them, according to predetermined sizes, in the form of packs or bundles containing always exactly the same number of sheets, and these sheets are very easily taken hold of.

In the accompanying drawings Figure 1 is a cross section showing two cylinders or mandrels for cutting aluminium sheets according to my invention, and Fig. 2 is a diagrammatic side elevation showing one pair of such cylinders or mandrels in conjunction with a plurality of (five) rolls from which a number of aluminium bands or strips (webs) are supplied to said cylinders or mandrels. Fig. 3 and Fig. 4 are diagrammatic views representing two other arrangements for carrying out my improved process.

My improved process consists essentially (a) in simultaneously winding upon one and the same mandrel one or more aluminium bands or strips and paper strips, so that the paper coils are interposed between the aluminium coils;
in constituting reams of aluminium sheets placed flatwise and lined with paper, which reams are cut up from this roll formed of aluminium strips and interposed paper strips.

(c) in cutting up from these reams, according to the required size, packs composed of aluminium sheets and of intervening paper sheets.

The paper sheets thus interposed between the aluminium sheets constitute a non adhering insulation for said aluminium sheets, entirely protecting the surface of the latter and allowing the cutting of the whole without any possible soldering of the aluminium sheets between them, by the means ordinarily used for cutting paper.

The manufacture of aluminium in thin sheets by rolling enables me to obtain aluminium strips of a very great length in the form of bobbins.

For putting the present process into practice, an aluminium strip and a separating paper strip coming from two separate spoons A and B respectively (Fig. 3) are wound upon a mandrel C having a diameter of 12 inches for instance; preferably one of the spoons, say, A will be mounted upon a movable carrier E guided at F so as to allow of adjusting the respective positions of both spoons and also the perfect superposition of the two aluminium and paper strips.

A counter D indicates the number of revolutions effected by the mandrel and, consequently, the number of windings or coils of the aluminium strip.

If the roll of aluminium and paper thus obtained is then cut up according to one of its generating lines (that is, in an axial plane) and if this roll is developed, a pack is obtained containing a number of sheets equal to the number of revolutions effected by the mandrel during the winding of the aluminium and paper strips.

Finally this pack of sheets is brought to a trimmer for cutting it according to the size required by the customers.

The present process may also be carried out in the following manner:

An aluminium sheet and a separating paper sheet are wound upon a shaft which need not have a large diameter as in the case of the mandrel mentioned above; when the roll is formed, the aluminium sheet and the paper sheet are unwound together and both these sheets are cut together according to a predetermined length by any suitable means, for instance by a machine of the type used for cutting and piling up newspapers when issuing from the printing machine and comprising substantially, as diagrammatically illustrated in Fig. 1 of the accompanying drawing, two cylinders a, b of the same diameter, one of which carries a cutter c; said cutter, at every revolution, comes into a notch d provided in the other cylinder and cuts up the two sheets which are presented to it.

At every revolution of these cylinders the two sheets which are cut and fall have a length equal to the circumference of said cylinders.

A conveyer will place these sheets in piles and a revolution counter provided with a bell and actuated by one of the cylinders will warn the operator when the pile will comprise a predetermined number of double or backed sheets and will thus allow of constituting packs containing 500 or 1000 backed sheets for instance which afterward will be cut to the required size by the trimmer, as above set forth.

In order to obtain a greater output, a number of double sheets (that is, each double sheet comprises an aluminium sheet and a paper sheet in contact therewith) can be conveyed to the cutting cylinders, as illustrated in Fig. 2.

The cutting of the double sheets can also be effected by a rotary cutter to the action of which said sheets can be brought by feeding rollers. By varying the speed of rotation either of the feeding rollers relatively to the cutter or reversely, it will be possible to cut double sheets according to lengths which can be adjusted at will, so as to reduce waste to the minimum when the packs of sheets are cut by the trimmer according to the sizes to be obtained.

The present process gives the following advantages:

The interposed paper sheets insure the complete separation of the aluminium sheets between them. The packs obtained are in the form of a regular parallelepipedon and can be turned over like the leaves of a book. These packs contain a number of sheets absolutely determined and thus can be sold to customers with guaranty of the number of sheets contained in each of them.

The intervening paper sheet enables the operator, without any special care, to take only one aluminium sheet at a time and prevents therefore the workwomen who effect the wrapping operations from using two sheets instead of one; moreover, the aluminium sheet can be taken hold of and detached from the pack very easily and the workwoman no longer risks injuring said sheet when taking it.

By reason of the simultaneous winding of the aluminium strip and of the paper strip, the strain or pull comes on the wrapping operations from using two sheets instead of one; moreover, the aluminium strip is not subjected to any strain capable of tearing it.

In case the aluminium is to be put on the market in the form of rolls or bobbins, for instance for wrapping operations effected mechanically, it will also be advantageous to use the present process, that is to say to
wind a separating strip at the same time as the aluminium strip. This separating strip will not only prevent mutual contact of the several convolutions or layers of aluminium, but will also permit exact measurement of the length of the aluminium strip H (Fig. 4) delivered; this measurement may be effected by causing the paper strip J to pass between cylinders G G' provided with a revolution counter D' and the length of the aluminium strip is obtained by the measuring of the paper band; it is to be noted that it would be impossible to obtain directly the measuring of the aluminium strip by causing the latter to pass between cylinders provided with a revolution counter, because this feeding between cylinders would cause the aluminium to become springy and would consequently render it unsuitable for the use for which it is intended.

For carrying out the present process, use can be made of any kind of suitable machines for winding the paper and aluminium strips and then cutting the coiled strips.

By way of example, the machine may comprise two paper bobbins, an aluminium bobbin mounted relatively to the two paper bobbins in such a manner that the aluminium strip will be placed between the two paper strips unwound from the first two bobbins, and a mandrel upon which will be wound the three strips.

The machine may also comprise several aluminium bobbins and several paper bobbins mounted and arranged in such a manner that each aluminium strip will always be placed between two paper strips. It will be understood that in each case the paper which intervenes as a separating layer, between adjacent layers of aluminium, must be of proper width to accomplish this purpose, that is to say, a width at least equal to that of the aluminium sheets; this rule as to relative width of the sheets or bands of paper and aluminium applies also to the case illustrated by Figs. 1 and 2.

I claim as my invention:

The process of cutting sheet aluminium which consists in assembling such sheets with sheets of paper of a dimension at least equal to the dimension of the aluminium sheet, arranging the paper sheets and aluminium sheets so that each sheet of aluminium is held out of contact with the adjacent sheet of aluminium by a sheet of paper, and cutting the combined aluminium and paper sheets.

The foregoing specification of my process for cutting and piling up thin aluminium sheets, signed by me this 8th day of April, 1914.

EUGÈNE DROUILLY.

Witnesses:

CHAR. P. PRESSLY,
RENÉ THIRIOT.