



Technology Description (TD) for Substrate Pre-Treatment Technologies

Contact Information:

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Technology Description:

NAME OF TECHNOLOGY	Device for mechanical grinding of plants substrates
ASSIGNMENT OF TECHNOLOGY	Biomass disintegration, pre-treatment before methane fermentation.
TECHNICAL READINESS LEVEL	<p>1 2 3 4 5 6 7 8 9</p>
<p>TRL 1 - basic principles observed TRL 2 - technology concept formulated TRL 3 - experimental proof of concept TRL 4 - technology validated in lab TRL 5 - technology validated in relevant environment (industrially relevant environment in case of key enabling technologies) TRL 6 - technology demonstrated in relevant environment (industrially relevant environment in case of key enabling technologies) TRL 7 - system prototype demonstration in an operational environment TRL 8 - system completed and qualified TRL 9 - actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)</p>	
What is the core innovation? (Please	Design solution with perforated drum as well



explain here what is innovative on this technology and which problem does the technology solve.)		as support process with the static magnetic field.
Vision of the innovation (Please describe here what impact you see for the future)		It can be used as a first degree of grinding of organic substrates, mainly lignocellulosic biomass.
What are the R&D needs for your technology? (Are there any barriers or challenges which still need to be overcome?)		It needs to be optimized in order to use it for plant biomass such as straw, virginia fantepals, sorgo
TECHNOLOGY/EQUIPMENT AVAILABILITY		technology license sellers Technology supplier has a prototype functioning in semi - technical scale. It is possible to test the technology for potential customers. The technology supplier is not a producing company.
PATENT RIGHTS		YES /NO
METHOD OF MAKING THE TECHNOLOGY AVAILABLE	<i>Licence selling</i>	YES/ NO
	<i>Licence granting</i>	YES/ NO
POSSIBLE END USERS OF TECHNOLOGY	<i>Please name end users/ contacts that should be invited to project workshops</i>	Biogas plant operators

Description of the technology/equipment:

Device for mechanical crushing substrate plant with a rotating perforated drum-shaped roller covered by a thermal layer, integrated with the plant substrate feeder and geared motor causes rotation of cylindrical drum. There are weights, spheres or cylindrical of different diameters inside the cylindrical drum. The permanent magnets are placed on the inner walls side of the perforated drum. There is a device for producing infrared radiation placed in the upper edge of the rotating perforated drum. Plant after the destruction reaches the appropriate size corresponding to the sizes of perforated holes of the roll surface. This technological solution reduced 10-30% energy consumption for the process of destruction of organic material in comparison to conventional ball mill.

The magnetic radiation caused by the radiator increase about 10% destruction of the substrate and improve the process efficiency.



The magnetic field and infrared radiation increase the efficiency of destruction and change the structure of the substrate.

The device has a rotating drum-shaped roller 1 with the diameter hole 5 mm 2. There are weights 3 spheres or cylindrical of different diameters inside the cylindrical drum 1

The permanent magnets 4 are placed on the inner walls side 1 of the perforated drum with the attract 1t per 1 m² of the side wall 1. The drum 1 is covered by thermal layer 5. Under the drum there is a receptacle 6 for substrate after the destruction and pump 7 used for substrate recyrculation .

The drum 1 is integrated with geared motor 10 and the screw feeder 8 used for continiously giving batch plant 9 which is destructed

Above drum perforated surface there is device 11 producing infrared radiation 0,6 kW per 1 m² with the possibility to keep the temperature of plant substrate to 80⁰C.

This solution is patented, Patent Nr P-391338 decision from 25.06.2013r.

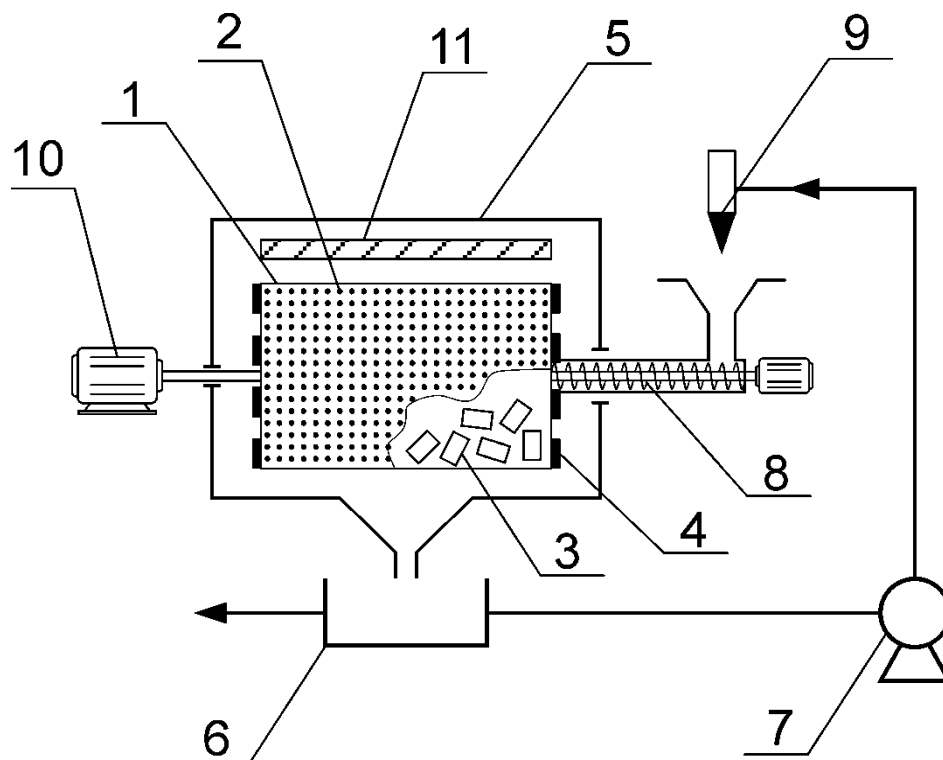


Fig. 1 Device for mechanical grinding of plants substrates – idea of working

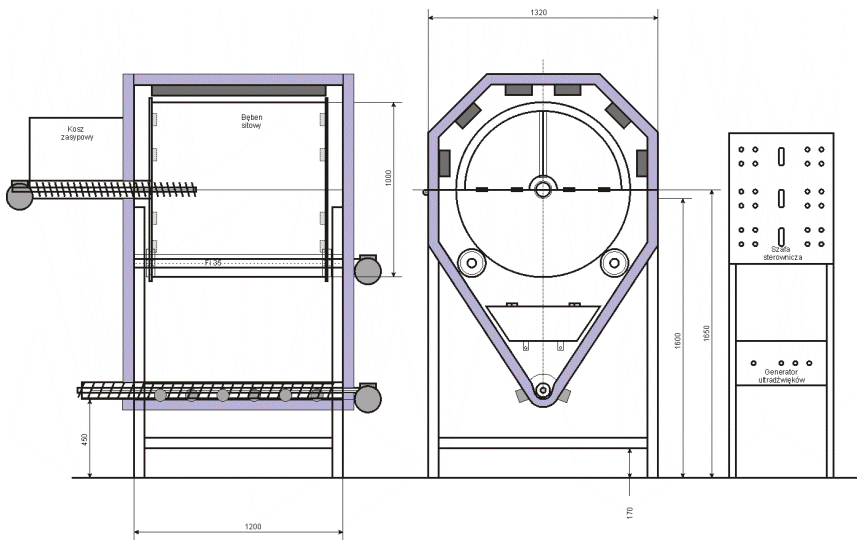


Fig. 2 Scheme of the device for plant disintegration, 1 – perforated drum, 2 – thermally secured box, 3 - hopper feeder introducing, 4 – feeder drain, 5 – ultrasound generators

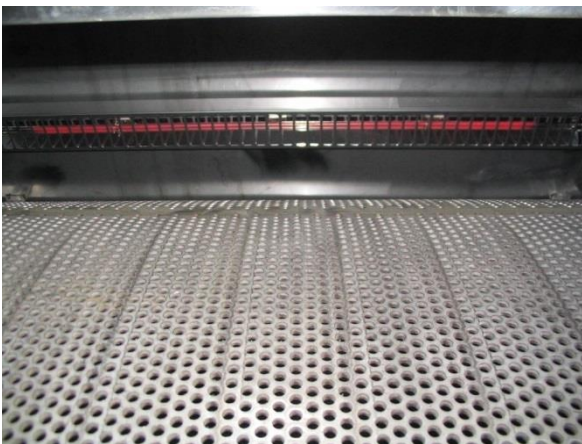


Fig. 3 The perforated cylinder



Fig. 4 Device for mechanical grinding of plants substrates - photo

Technical Data

<i>Parameter</i>		Value (please fill or tick) If value not available, please give estimate (and indicate with *).	Comments (e.g. which condition does the entered value correspond to?)
<i>Current technology</i>	Flow rate of technology at current TRL-level (Mg/h)	0,2 Mg/h	
<i>Data basis for following data list</i>	<p>1.: market ready stage of technology (based on test runs of current techn.)</p> <p>Please only use 2. or 3. if <u>1. not at all possible.</u></p> <p>2.: market ready stage of technology (based on estimate)</p> <p>3.: current level (TRL) of technology</p>	<p>1 <input type="checkbox"/> (preferably)</p> <p>2 <input type="checkbox"/></p> <p>3 <input checked="" type="checkbox"/></p>	
<i>Technical efficiency</i>	Increase in biogas production through pre-treatment technology (%)	18 %	Measurement for production based on maize
<i>Capacity</i>	Flow rate (range) (Mg/h)	0,2 Mg/h	The process is carried out for the solid substrates (silage), depending on the needs of the recirculation should be used



	Possible range for upscaling	up to 1,0 Mg/h	
<i>Data for assessment of economical added value, possible contribution to GHG-reduction and flexibility</i>	Electricity demand (kWhel/Mg Substrate)	7 kWhel/Mg Substrate	
	Heat demand (kWhth/Mg Substrate)	-	
	Chemical/additives demand (kg/h)	-	
	Demand of other substances (kg/h)	-	
	Full load hours (h/a)	8700	24h/7d
	Dry matter content (range) (%)	max. to 90 % dm	Device for crushing and pounding the plants substrates
	Space requirement (m ²)	8,0 m ²	
	Staff requirement (excluding maintenance) (h/a)	750	The device does not need additional staff. The staff member of biogas plant simultaneously controls the disintegrator
	Specific capital costs (excluding project development, planning, permission and additional building costs) (€/Mg nominal capacity/h)	Please give exact specific cost if possible, if not please specify range. <input type="checkbox"/> < 5.000 €/Mg/h <input type="checkbox"/> 5.000 - 10.000 €/Mg/h <input type="checkbox"/> 10.000 k€ - 15.000 €/Mg/h <input type="checkbox"/> > 15.000 €/Mg/h 25 000	
	Maintenance costs (including spare parts, staff) (€/a or €/operating hour)	700 €/a	
Production costs (€/Mg)	1		
Expected lifetime of unit (years)	6		
<i>Flexibility</i>	Types of substrate (solid and liquid)	Device is predicted for conditioning	



		across pounding and crushing plants substrate such as silages	
	Start-stop-flexibility	Not required	The device is ready for use immediately after installation
	Part-load possibility	<input checked="" type="checkbox"/> Yes, 10% of full capacity <input type="checkbox"/> No	With the part-load device is lower efficiency
	Is self-maintenance of technology possible?	<input checked="" type="checkbox"/> Yes, 100% of total maintenance hours per year that can be done by operator himself <input type="checkbox"/> No	
	Necessity for adaptations of other parts of the plant	no	
	Advantages/disadvantages of technology	<u>Advantages:</u> The simplicity of use, no need to add chemicals, a large increase in the amount of biogas. <u>Disadvantages:</u> The high energy inputs	
	Special application area of technology	Biogas plants using a substrate of poor quality	