

# RESEARCH ON THE WORLD STATE OF TECHNIQUE THROUGH PATENTS WHICH REFERS TO MOULDBOARD THAT EQUIP THE PLOUGHS WITH CORPS AND MY CONTRIBUTION TO THE MODERNIZATION OF THE MOULDBOARDS

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## Abstract

*From assemblies of parts that form the plow with moldboard, the part of the plow which consumes most of the energy is the mouldboard (50-60% of the plowing work).*

*From research through patent in the field of mouldboard for plows, which I have conducted revealed that in the world today there are 11 inventions most representative. These inventions generally contain known elements and technical elements of the original to their authors and inventors that they get the record (and they claim them in the Chapter "Claims") which must necessarily be part of any deposit submitted to obtain a patent.*

*From the analysis of the technical attributes presented in the table shows that the global study of the mouldboard has not enjoyed particular attention. From the library of patents of OSIM Romania if in the motor field are some hundreds of inventions in the field of mouldboards are only 11.*

*Remember as a new thing, worthy of recognition, the German patent DE3318159A1, author Hans Wacker in which the moldboard is made of strips (bands) with the advantage that it reduces the moldboard area by 50% and a disadvantage that the bands (strips) are unstable during work.*

*Based on these findings I tried to achieve an improvement of the mouldboards with significant economic and practical effects.*

**Key words:** mouldboard, invention, claim, strips (bands), the economy.

In conditions when Romania is already part of a united Europe and when the economic crisis is increasing its presence, getting the quality of plowing with a high granulation share such a way as to achieve energy savings in the work of plowing and the subsequent agricultural work, now represents a goal more than ever.

From assemblies of parts that form the plow with moldboard, the part of the plow which consumes most of the energy is the mouldboard (50-60% of the plowing work).

From research through patent in the field of mouldboard for plows, which I have conducted revealed that in the world today there are 11 inventions most representative, inventions which are listed below:

1. Plough's mouldboard  
Invention 69871, file 87924, recorded at OSIM on 6.10.1976, published on 30.03.1982,

Inventors: Eng. Petru Stoica and Dr. Doc. Ladislav Ondrej, Prague-Czechoslovakia.

2. Mouldboard with variable geometry  
Date of deposit 15.04.1994, patent no. 117992 B1,

Inventor: Crăciun Vasile, proffesor at Polytechnic Institute Iași, Romania.

3. Plough's corps  
Patent no. Ro 96266, recorded on 6.10.1986, published on 17.05.1989,

Inventor: Pentek Ludovic, Salonta village, Bihor county, proffesor at Enterprise for Mechanical Parts Exchange -Oradea.

4. Pflug, bestehend aus streich-brett und Schar  
Recorded 11.03.1983  
Published 13.09.1984

Inventor: Lohff Bernhard  
Patent no. 3309278  
Bunde5REPUBLIC DEUTSCHLAND,  
DEUTSCHES PATENTAMT

5. Streifen pflugkoper

- Recorded 01.07.1983  
 Publicated 03.01.1985  
 Inventor Gassner Benno  
 Patent no. 3323791/3.01.1985
6. Plow Bottom  
 Patent UNITED STATES PATENT  
 OFFICE  
 Patent no. 1642301/13.09.1927  
 Inventor Glen Forgy  
 Filed Jan. 29.1926
7. Breast of Plough  
 Recorded 19.08.1952  
 Application made in Japan on sept. 6.  
 1951  
 Complete Specification Published  
 19.01.1955  
 THE PATENT OFFICE OF LONDON  
 Inventor: TAKAKITA SHINJIRO S.A.  
 JAPONIA
8. Plough's corps  
 Recorded 21.10.1996  
 Publicated 30.07.1998  
 Patent no. RO 11 34 15 B1  
 Inventor Bocancea Ioan
9. Plow mold board  
 Patent no. 3.850.252/26.11.1974  
 Recorded 20.08.1973  
 Inventor: James A. Ingalls
- UNITED STATES PATENT  
 10. Plugkorper mit streifenstreichbleck  
 Patent DE3318159A<sub>1</sub>  
 Recorded 18.05.1983  
 Publicated 22.11.1984  
 Inventor: Wacker Hans  
 Bundesrepublik Deutschland  
 DEUTSHES Patentamt
11. Streichblech eines Pfluges  
 Recorded 01.04.1961  
 Publicated 10.01.1963  
 Patent no. 1.142.248  
 Deutsches Patentamt  
 Vertreter Dipl. Ing. A. Boshart und Dipl.  
 Ig. W. Jackisch
- These inventions generally contain known elements and technical elements of the original to their authors and inventors that they get the record (and they claim them in the Chapter "Claims") which must necessarily be part of any deposit submitted to obtain a patent.
- Next we present in table form the state of the art world resulting from patent research, of the authors that claim these patents which we call the technical attributes that they claim:

TABLE:

No.	Technical novelty	Attributes K
1.	Reducing the angle $\gamma$ from 40° to 27° (angle $\gamma$ is the angle formed by the mouldboard with the share's wall of 40° which is reduced to 27°) -Romania Patent 69.871	K <sub>1</sub>
2.	Adding a sharp rod at the mouldboard's tail Patent Germany DE 3309278 A <sub>1</sub>	K <sub>2</sub>
3.	Adding a hooked rod at the mouldboard's tail Patent Germany DE 3309278 A <sub>1</sub>	K <sub>3</sub>
4.	Modify the plowshare by adding an active edges under a circle arc form (pressure behavior as a foot bridge reducing resistance submission) Patent Romania RO 113415 B <sub>1</sub>	K <sub>4</sub>
5.	Unification of plowshare și mouldboard in one piece. Patent USA 1642301	K <sub>5</sub>
6.	Splitting the mouldboard in three equal bands with shard tip at the lower part. Patent USA 1642301	K <sub>6</sub>
7.	The three bands with shard tip at the top part of the mouldboard too. Patent USA 1642301	K <sub>7</sub>
8.	Împărțirea cormanei în benzi echidistante de la pieptul cormanei spre coada cormanei. Splitting the mouldboard in equidistance bands from the mouldboard's chest to its tail. Patent Germany 3323791	K <sub>8</sub>
9.	Modification of the mouldboard's chest by adding a reverse curve. Patent Germany 3323791	K <sub>9</sub>

10.	Replacement of the moldboard's wing extension with three knives arranged radially. Proposed by Proff. Dr. Eng.Vâlcu Victor and Drd. Eng. Aruștei Constantin	K <sub>10</sub>
11.	Replacement of the moldboard's wing extension with three knives arranged parallel. Proposed by Proff. Dr. Eng.Vâlcu Victor and Drd. Eng. Aruștei Constantin	K <sub>11</sub>
12.	Replacement of the plowshare's edge by a selfsharpening edge. Proposed by Proff. Drd. Eng. Aruștei Constantin	K <sub>12</sub>
13.	Replacement of the plowshare with a continuously edge with one with saw teeth. Proposed by Proff. Drd. Eng. Aruștei Constantin	K <sub>13</sub>
14.	Replacement of the additional mouldboard with knives for better grind of the soil. Proposed by Proff. Drd. Eng. Aruștei Constantin	K <sub>14</sub>
15.	Jointed mouldboard made of two plates. Patent Romania RO 117992B <sub>1</sub>	K <sub>15</sub>
16.	The joint between the plates is achieved through a cylindrical joint. Patent Romania RO 117992B <sub>1</sub>	K <sub>16</sub>
17.	Two devices for adjustment made by cylindrical joints. Patent Romania RO 117992B <sub>1</sub>	K <sub>17</sub>
18.	Plough's frame two sectional plates. Patent Romania RO 117992B <sub>1</sub>	K <sub>18</sub>
19.	Reinforcement rods are replaced with the adjustment device. Patent Romania RO 117992B <sub>1</sub>	K <sub>19</sub>
20.	The mouldboards is made of rods. Patent Germany 1142248	K <sub>20</sub>
21.	Heads of the rod that forms the mouldboard's chest enter a shoe attached by screws. Patent Germany 1142248	K <sub>21</sub>
22.	The ends of the upper part of the rods are finished with rings placed on a pivot bar intercalated with the lower heads rings moldboard's tail. Patent Germany 1142248	K <sub>22</sub>
23.	The bar that connects the rods of the two sides of the moldboard has a setting to the top of the moldboard. Patent Germany 1142248	K <sub>23</sub>
24.	Vârfurile vergelelor cozii cormanei sunt ascuțite. The rod's tips of the mouldboard's tail tip are sharp. Patent Germany 1142248	K <sub>24</sub>
25.	Mouldboard of bands (strips) with little space between them on the back of the mouldboard reinforced with a welded bar. Patent Germany 1142248	K <sub>25</sub>
26.	Mouldboard made of inarticulately rods the outside being made from one rod with both ends attached to the share and being concentric. Patent Romania RO 96266	K <sub>26</sub>
27.	The upper part of the mouldboard has some knives. Patent Romania RO 96266	K <sub>27</sub>
28.	The plough's corps is provided with a wheel to turn the sliding friction into rolling friction. Patent Romania RO 96266	K <sub>28</sub>
29.	The mouldboard made of bands is reinforced with a bar. Patent Germany 3318159A <sub>1</sub>	K <sub>29</sub>
30.	The mouldboard of bands made from two pieces (chest and tail). Patent Germany 3318159A <sub>1</sub>	K <sub>30</sub>
31.	The chest and tail of the mouldboard is articulated by an adjustment screw caught between two brackets. Patent Germany 3318159A <sub>1</sub>	K <sub>31</sub>
32.	The bands of the half-mouldboards each have reinforcements on the posterior side with superimposed bands. Patent Germany 3318159A <sub>1</sub>	K <sub>32</sub>
33.	Some demicircular tips arranged parallel to the moldboard bottom to the top of the moldboard to grind the soil. Patent USA 3850252	K <sub>33</sub>

34.	Knives with triangular section mounted on the moldboard from the bottom to the top part in order to grind soil. Drd. Eng. Aruștei Constantin Drd. Eng. Chirilă Constantin Patent record OSIM A/00008/2007	K <sub>34</sub>
35.	Selfsharpening knives placed on mouldboard from the bottom to the top part (modify the prior deposit). Drd. Eng. Aruștei Constantin Drd. Eng. Chirilă Constantin Patent record OSIM A/00008/2007	K <sub>35</sub>
36.	Processing of the surfaces that come into contact with the ground. Proff. Dr. Eng. Crăciun Vasile	K <sub>36</sub>
37.	Covering the mouldboard's working areas with different materials to reduce the coefficient of friction. Proff. Dr. Eng. Crăciun Vasile	K <sub>37</sub>
38.	Using a jet of water that contributes to soil dislocation. Proff. Dr. Eng. Crăciun Vasile	K <sub>38</sub>
39.	Application the electro-osmosis phenomenon.	K <sub>39</sub>
40.	Decrease soil adhesion at the working parts by heating them.	K <sub>40</sub>
41.	Moldboard's geometry optimization in order to decrease resistance to advancement.	K <sub>41</sub>
42.	Decreasing the plough's weight.	K <sub>42</sub>
43.	Construction of the working parts rotating passive combined.	K <sub>43</sub>
44.	Moldboard with variable geometry with spring.	K <sub>44</sub>
45.	Moldboard with variable geometry with pneumatic cylinders.	K <sub>45</sub>
46.	Moldboard with variable geometry with hydraulic cylinders and servomotor.	K <sub>46</sub>
47.	Mouldboard cut in strips or bands, with selfadjustable bands (Japanese experts).	K <sub>47</sub>
48.	Moldboard with variable geometry automated hydraulic.	K <sub>48</sub>
49.	Moldboard with variable geometry linked to a computer with a program for selfadjusting.	K <sub>49</sub>
50.	Replacing the plough's pre-corps with long knives. Proposed by Proff. Dr. Eng. Vălcu Victor	K <sub>50</sub>

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Remember as a new thing, worthy of recognition, the German patent DE3318159A1, author Hans Wacker in which the moldboard is made of strips (bands) with the advantage that it reduces the moldboard area by 50% and a disadvantage that the bands (strips) are unstable during work.

**My contribution to improving of  
mouldboard  
Mouldboard of bands (strips), with  
selfsharpening knives  
(extrapolation analogy)**

The paper refers to a plough's corps destined for normal plowing, superficial or deep.

To achieve a share is known a corps for plough that has the moldboard made of bands (strips), (German patent DE 3318159A1) which aims to decrease resistance to the submission of the corps(bars, moldboard, share) reducing the active area of the mouldboard and achieving a high degree of grind soil at the work of plowing.

This mouldboard presents the disadvantage that the advancement of the degree of the grind soil to work is not enough and that the bands (strips) which consists of moldboard are unstable during work.

Problems which are resolved by this paper are those to increase the degree of grind soil to show, increased the stability of the bands (strips) during work, the saving of fuel at the agricultural work and the subsequent work.

The plough's corps consists of a mouldboard mounted on frame. On the frame is still mounted the additional mouldboard to enhance the capsizing of the share in the direction of ploughing the soil, the mouldboard is provided at the lower part with a plowshare, at the bottom of the mouldboard is mounted the plaz and plowshare which is provided with self-sharpening blade, and on the mouldboard

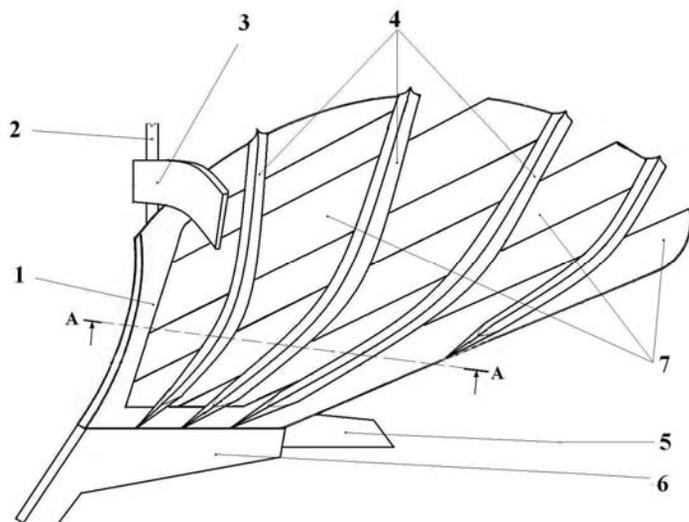
tail's bands are mounted knives of special shape by welding or with screws from the bottom and continuing up to the top.

By applying this paper degree of grind soil increases, the stability of the bands (strips) during work increases and the saving of fuel at the agricultural work and the subsequent work.

Next we give an example of achieving a technical solution proposed in connection with Figure 1 which represents an overview of the plough's corps with the section A-A representing a cross section through the mouldboard made of bands(strips) and through the knives and in connection with Figure 2, view from B and the cross sections C-C and E-E, the views D and F, which represents a special form of selfsharpening knife, more keenly to the bottom and wide at the top so that the knife edge due and owing to the effect of turnover the soil share, the share is shredded and loose.

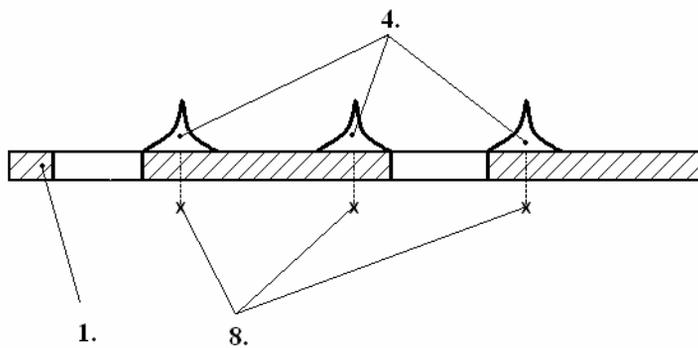
The plough consists of a moldboard of special construction 1 supported by frame 2, which on is further mounted the additional mouldboard 3, on the moldboard are mounted the special form knives 4, at the posterior of the mouldboard is mounted the mouldboard's wing extension 5 and at the bottom of this is mounted the plaz 6 and the plowshare 7 on frame 2 whole forming the plough's corps-plough assembly.

On the cylinder surface, screw or other form of mouldboard are mounted the knives 4 by welding or with screws 8 which are designed to cut and grind the share shattered almost immediately by the cylinder, screw or other form of the mouldboard.

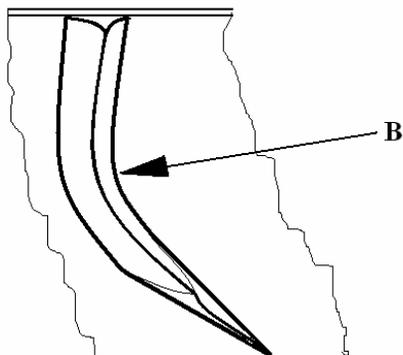


**Secțiunea A-A**

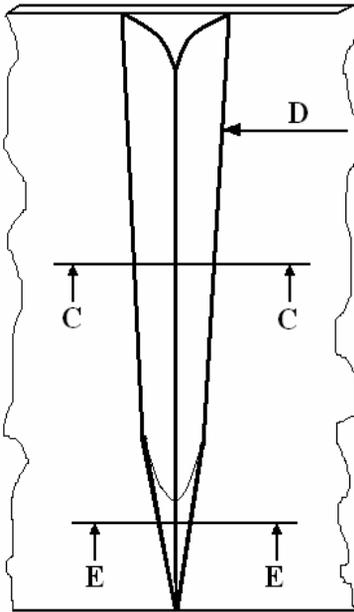
**Secțiune prin cormană și cuțite**



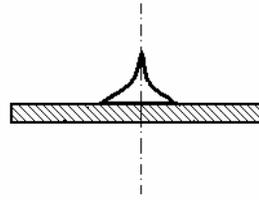
**Figura Nr. 2**



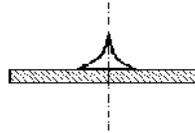
**Vedere din B**



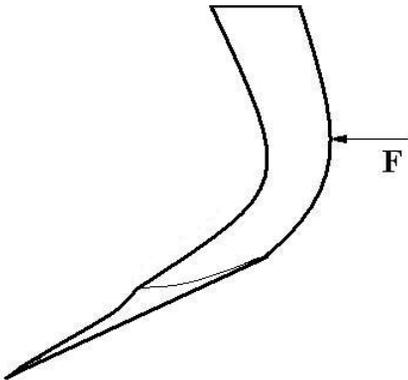
**Secțiune C-C**



**Secțiune E-E**



**Vedere din D**



**Vedere din F**

