(19) **UA** (11) **83 466** (13) **C2**

(51)ÌÏÊ

ÌÅÍÅÑÒÅÐÑÒÂÎ ÎÁÐÀÇÎÂÀÍÈß È ÍÀÓÊÈ ÓÊÐÀÈÍÛ

ÃÎÑÓÄÀÐÑÒÂÅÍÍÛÉ ÄÅÏÀÐÒÀÌÅÍÒ ÈÍÒÅËËÅÊÒÓÀËÜÍÎÉ ÑÎÁÑÒÂÅÍÍÎÑÒÈ

(12) ÏÈÑÀÍÅÅ ÈÇÎÁÐÅÒÅÍÈß Ê ÏÀÒÅÍÒÓ ÓÊÐÀÈÍÛ

(21), (22) Çà âêà: **a200500994, 03.02.2005**

(24) Äàòà íà÷àëà äåéñòâè ïàòåíòà: **25.07.2008**

(30) Ïðèîðèòåò: **05.02.2004 FR 04 01086**

(46) Äàòà ïóáëèêàöèè: **25.07.2008**

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20080101CFI20080101RHUA	F01D	9/02
20080101CLI20080506BHUA	F01D	7/00
20080101CLI20080506BHUA	F01D	5/00
20080101CLI20080506BHUA	F04D	29/38
20080101CLI20080506BHUA	F03B	3/18
20080101ALI20080506BHUA		

(72) Èçîáðåòàòåëü:
Ëåæàð Êëîä, FR,
Ïîíòóàçî Áðþ, FR,
Ñòàññåí Ðèøàð, FR,
Òðèêîíîå Íèêîë , FR

(73) Ïàòåíòîâëàäåëåö:
ÑÍÅÊÌÀ ÌÎÒÎÐ, FR

(54) ÐÓ×ÍÀ ÓÏÐÀÂËÅÍÈß ÓÃËÎÌ ÓÑÒÀÍÎÂÊÈ ËÎÏÀÒÊÈ ÒÓÐÁÎÌÀØÈÍÛ

(57) Ðåôåðàò:

Ðû÷àã óïðàâëåíèå óãëîì óñòàíîâêè ëîïàòêè â òóðáîìàøèíå, ïåðâûé êîíåö êîòîðîãî ìîíòèðóåòñ íà ïîâîðîòíóþ îñü ëîïàòêè, ÷òîáû ïîâîðà÷èâàòü åå, à âòîðîé êîíåö èìåò öèëèíäðè÷åñêèé øòèôò, óñòàíîâëåííûé íà êîíöåâîì êîëüöî, ýòî øòèôò ôèêñèðóåòñ ïóòåì îáæàòèÿ èç åãî êîíöîâ â îòâåðñòèè âòîðîãî êîíöà ðû÷àãà è ñîåäèíèò îêðóãëûé ôëàíåö, ê êîòîðîìó ïðèêëàäûâàåòñ âòîðîé êîíåö ðû÷àãà, ïðè÷åì ñðåäñòâà ðàñïîëîæåíû íàãðóçêè ðàñïîëîæåíû ìåæäó âòîðûì êîíöîì ðû÷àãà è îáæàòûì êîíöîì øòèôòà.

Îôèöèàëüíûé áþëëåòåíü "Ïðîìèñëîâàÿ ñîáñòâåííîñòü". Êíèãà 1 "Èçîáðåòåíèÿ , ïîëåçíûå ìîäåëè, òîâàðíûå çíàêè ñåðâèñíûõ ìèêðîñõåì", 2008, N 14, 25.07.2008. Ãîñóäàðñòâåííûé äåïàðòàìåíò èíòåëëåêòóàëüíîé ñîáñòâåííîñòè Ìèíèñòåðſñòâà îáðàçîâàíèÿ è íàóêè Óêðàèíû.

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MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

STATE DEPARTMENT OF INTELLECTUAL PROPERTY

(12) DESCRIPTION OF PATENT OF UKRAINE FOR INVENTION

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20080101CLI20080506BHUA	F01D	5/00
20080101CLI20080506BHUA	F04D	29/38
20080101CLI20080506BHUA	F03B	3/18
20080101ALI20080506BHUA		

(72) Inventor:
Lejars Claude, FR,
Pontoizeau Bruce, FR,
Staessen Richard, FR,
Triconnet Nicolas, FR

(73) Proprietor:
SNECMA MOTEURS, FR

(54) CONTROL LEVER FOR THE PITCH ANGLE OF A BLADE IN A TURBOMACHINE

(57) Abstract:

A control lever for the pitch angle of a blade in a turbomachine, said lever having a first end intended to be mounted on a blade pivot so as to rotate it and a second end comprising a cylindrical peg for mounting on a control annulus, this peg being fixed by crimping of one of its ends in an orifice of the second end of the lever and comprising an annular flange to which is applied the second end of the lever, wherein stress distribution means are interposed between the second end of the lever and the crimped end of the peg.

Official bulletin "Industrial property". Book 1 "Inventions, utility models, topographies of integrated circuits", 2008, N 14, 25.07.2008. State Department of Intellectual Property of the Ministry of Education and Science of Ukraine.

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(51)ÌÏÊ

Ì²Í²ÑÒÅÐÑÒÂÎ ÎÑÂ²ÒÈ ² ÍÀÓÊÈ ÓÊÐÀ¯ÍÈ

ÄÅÐÆÀÂÍÈÉ ÄÅÏÀÐÒÀÌÅÍÒ

²ÍÒÅËÅÊÒÓÀËÜÍÎ¯ ÂËÀÑÍÎÑÒ²

(12) ÎÏÈÑ ÂÈÍÀÕÎÄÓ ÄÎ ÏÀÒÅÍÒÓ ÓÊÐÀ¯ÍÈ

(21), (22) Äàí³ ñòîñîâíî çà âêè:
a200500994, 03.02.2005

(24) Äàòà íàáóòò ÷èííîñò³: **25.07.2008**

(30) Äàí³ ñòîñîâíî ïð³îðèòåòó â³äïîâ³äí äî Ïàðèçüêî¿ êîíâåíö³¿ : **05.02.2004 FR 04 01086**

(46) Ïóáë³êàö³ â³äîìîñòåé ïðî âèäà÷ó ïàòåíòó (äåêëàðàö³éíîãî ïàòåíòó): **25.07.2008**

F01D	17/00	
20080101CFI20080101RHUA	F01D	9/02
20080101CLI20080506BHUA	F01D	7/00
20080101CLI20080506BHUA	F01D	5/00
20080101CLI20080506BHUA	F04D	29/38
20080101CLI20080506BHUA	F03B	3/18
20080101ALI20080506BHUA		

(72) Âèíàõ³äíèê(è):
Ëåæàð Êëîä, FR,
Ïîíòóàçî Áðþñ, FR,
Ñòàññåí Ð³øàð, FR,
Òð³êîíîå Í³êîë , FR

(73) Âëàñíèê(è):
ÑÍÅÊÌÀ ÌÎÒÎÐ, FR

(54) ÂÀÆ²ËÜ ÊÅÐÓÂÀÍÍß ÊÓÒÎÌ ÓÑÒÀÍÎÂÊÈ ËÎÏÀÒÊÈ ÒÓÐÁ²ÍÀØÈÍÈ

(57) Ðåôåðàò:

Âàæ³ëü êåðóâàííÿ êóòîì óñòàíîâêè ëîïàòêè â òóðáîíàøèí³, ïåðøèé ê³íåöü êîãî ìîíóò¹òüñ íà ïîâîðîòíó â³ñü ëîïàòêè, ùîá îáåðòàòè ¿¿, à äðóãèé ê³íåöü ìà¹ öèë³íäðè÷íèé øòèô, âñòàíîâëåíèé íà êîíöåâîìó ê³ëüöå, öåé øòèô ô³êñó¹òüñ øë õîì îáòèñêàííÿ îãíîãî ç éîãî ê³ïö³â â îòâîð³ äðóãîãî ê³íö³ âàæåë ³ ì³ñòèòü îêðóãëåíèé ôëàíåöü, äî êîãî ïðèëÿãà¹òüñ äðóãèé ê³íåöü âàæåë , ïðè÷îìó çàñîáè ðîçùîä³ëó íàâàíòàæåíí ðîçòàøîâàí³ ì³æ äðóãèì ê³íöåì âàæåë ³ îáòèñêóòè ê³íöåì øòèôòà.

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Îïèñ âèíàõîäó

Öåé âèíàõ³ä ñòîñóºòüñ âàæåë êåðóâàííÿ êóòîì óñòàíîâêè ëîïàòêè â òóðáîíàæíèõ, ïðîáëåìè æ, êóòîì âèïð ìë ÷à íà ñòóïåí³ êîìïðåñîðà òóðáîíàæíèõ.

Ðåãóëþâàííÿ êóòà óñòàíîâêè äå êëî ëîïàòîê ñòàòîðà â òóðáîíàæíèõ ìàº íà ìåò³ ïîòè³çóâàòè ïîòóæí³ñòü ö³ð¿ òóðáîíàæíèõ ³ ñêîðîòèòè ñïîæèâàííÿ ïàëèâà â ð³çíèõ ïîëüîòíèõ êîíô³ãóðàö³ õ. Öå ðåãóëþâàííÿ çâè÷àéíî âèêîíóºòüñ íà îäíîì ÷è á³ëüøå ð ä³â êîìàòê çà äîïîìîãîþ êîíòðîëüíîãî ê³ëüö , êà îòî÷óº ñòàòîð òóðáîíàæíèõ ç éíãî çîâí³øíüîãî áîêó ³ îáåðòàºòüñ íàâêîëî ïîçäîâæíüî¿ îñ³ ñòàòîðíèõ ëîïàòîê ê³ëüö , êà ñèãíàë ïîñòóïàº íà îáìîòêó ê³ëüö ïðèâîäó ïîâîðîòó ëîïàòîê ñòàòîðíèõ ëîïàòîê çà äîïîìîãîþ òàêèõ ïðèâîä³â, ê ñèñòåì³ êîíòðîëþ ïîòóæíîñò³ òóðáîíè.

Øòèòî âñòàâëå ºòüñ â îòâ³ðñòÿ âàæåë ³ êð³ïèòüñ äî âàæåë øë õîì îáòèñíåíí , ö ïîâðàò³ ïîë ãàº â ñïëþùåíí³ ê³ëü øòèôòà íà ê³ëü³ âàæåë , êèé ïîêðàºòüñ íà îêðóãëèé ôëàíöü øòèôòà. Ö ïîâðàò³ âèêëèêàº çíà÷íà íàâàíòàæåíí íà ò³é ä³ë íü³ âàæåë , íà ê³é âèêîíóºòüñ îáòèñíåíí øòèôòà, ùî ðîâèòü ¿¿ á³ëüø êðèòè÷.

Ï³ä ÷àñ ðåãóëþâàííÿ êóòà óñòàíîâêè ëîïàòîê âàæ³ëü êâðóâàííÿ çàçíàº âïëèâó çãèíàëüíèõ ñèë íà òîìó ê³ëü³, äå âñòàíîâëåíî øòèôò, êèé ï³ääàºòüñ çóñèëë ì ñêðó÷óâàíí .

Ìåõàí³÷íà ì³öí³ñòü âàæåë çíèæóºòüñ ÷åðåç ïîâðàòí³ îáòèñíåíí øòèôòà, ³ ï³ñë ïâåíîãî ïåð³îäó ðîâíîò òóðáîíàøòè íà âàæåë³ ìîæóòü âèíèêíóòè ð³ùèíè ³ ù³ëèíè, ê³ ìîæóòü ñïðè÷èíèòè ïîëîì âàæåë êåðóâàííÿ , ùî â ñâîþ ÷åðãó ìîæå ñïðè÷èíèòè âèõ³ä çî ëàäó òóðáîíàøòè ³ ïîâíîãî ðîçãàäàòèñ ê äóæå ñåðéîçíà àâàð³éíà ñèòóàö³ .

Öåé âèíàõ³ä ìàº íà ìåò³ óñóíåíí âèçàíí¿ íááåçïåêè, ïîâ' çàíí¿ ç ïîëîìì âàæåë³â êâðóâàííÿ .

Ó çâ' çêó ç öèì ïðîïîíóºòüñ âàæ³ëü êåðóâàííÿ êóòîì óñòàíîâêè ëîïàòêè â òóðáîíàøòè³, ó êîìó ïåðøèé ê³ñöü âàæåë ìàº áóòè çìîíòîâàíèì íà îñ³ ïîâîðîòó ëîïàòêè, ùîá îáåñïå÷èòè øòèôòà, ìîíòóºòüñ íà êîìòðîëüíîìó ê³ëüö³; öåé øòèôò ô³êñóºòüñ øë õîì îáòèñíåíí îäíîâî ç³ ñâî¿õ ê³ïö³â â îòâîð³ äðóãîâ ê³ïö³ âàæåë ³ ìàº ê³ëüöåïîäí³áíèé öèë³íäðè÷íèé ê³ïöåì âàæåë ³ íáèñíåíèì ê³ïöåì øòèôòà.

Îòæå, ï³ä ÷àñ îáòèñíåíí øòèôòà íà âàæåë³ ïîâåðõí âàæåë á³ëüøå íå ïðåâèùóº â ïð ìîìó êîíòàêò ç îáòèñíåíîþ ÷àñòèíîþ øòèôòà, à îáòèñíêàëüí³ íàâàíòàæåíí ðîçïîä³ë þüñ íà ïîâåðõ³ âàæåë , ùî äîñòàòíüî äë òîãî, ùîá íå çðîáèòè âàæ³ëü á³ëüø êðèòè÷.

Â³äïîâ³äí îñ öåðàêòåðèñòèêè âèíàõîäó, çàñîáè ðîçïîä³ëó íàâàíòàæåíí ìàþü øàéáó. Âîíà äîçâîë º ðîçïîä³ëèòè çóñèëë ç îáòèñíåíí íà äîñòàòí³é îáëàñò³ ïîâåðõ³ ³ ìà º ïðîñòîþ ³ äåøåâîþ.

Ó ïåøîì âàð³àíò³ âèíàõîäó øàéáà âèãîòîâë ºüñ ç á³ëüø ãíó÷êîãî ìàòåð³àëó, í³æ âàæ³ëü êåðóâàííÿ . Öå äîçâîë º øàéá³ ïîâëèíàòè íàâàíòàæåíí ç ìåõàí³÷íîãî îáòèñíåíí øë õîì ãíó÷êî¿ äåôîðìàö³¿ ³ âðâêòèâîì çàõèùàòè äðóãèé ê³íöü âàæåë â³ä áóäü- êèõ ìåõàí³÷íèõ ä³é ï³ä ÷àñ îáòèñíåíí .

Â ³øîìó âàð³àíò³ âèíàõîäó øàéáà âèãîòîâë ºüñ ç á³ëüø òåððîãî ìàòåð³àëó, í³æ âàæ³ëü êåðóâàííÿ . Ö øàéáà ìåíøà ï³ääàºòüñ äåôîðìàö³¿ â ïîð³âí³ ³ ìà º ïðîñòîþ ³ äåøåâîþ.

Ó ïåøîì âàð³àíò³ âèíàõîäó øàéáà âèãîòîâë ºüñ ç á³ëüø ãíó÷êîãî ³ ê³íåòè÷íèé ê³íöåâèé ìîìåíò ³íåðö³¿ ³ ìà º ïðîñòîþ äåôîðìàö³þ. Ö øàéáà ìåíøà ïîòóæí³ñòü ïðèâîäó, ùî âèêîðèñòîâóº âèíàõîäè, ùî ïîâ'ÿçàí³ ç ïåðåäà÷åþ ê³íåòè÷íîãî ìîìåíòó íà ïîâåðõ³ ³ íåâèñîêîþ ê³íåòè÷íîþ åíåðã³ºþ.

Ïðè ïîâíîìó çàíóðåííí âèíàõîäó ïîâíà ê³íåòè÷íà åíåðã³ÿ ïåðåòâîðþºòüñ íà ïîòåíö³éíó åíåðã³þ ïîëîæåííÿ ³ íà ê³íåòè÷íó åíåðã³þ ïîñòóïàëüíîãî ðóõó. Ïðè ïîâíîìó çàíóðåííí âèíàõîäó ïîâíà ê³íåòè÷íà åíåðã³ÿ ïåðåòâîðþºòüñ íà ïîòåíö³éíó åíåðã³þ ïîëîæåííÿ ³ íà ê³íåòè÷íó åíåðã³þ ïîñòóïàëüíîãî ðóõó.

âåðõí³é ê³íåöü 14 øòèôòà. Íà öüîìó ê³íö³ øòèôòà 11 çâåðõó ôëàíö 13 º öëë³íäðè÷íèé îñüîâèé ðîçòî÷åíèé îòâ³ð, ïðèçíà÷åíèé äë îáòèñêàíí øòèôòà íà ê³íö³ 10 âàæåë . Îáòèñêàíí âèîíóºòüñ øë õîì ïðåñîâî¿ ïîñàäêè â³äïîâ³äíîãî ³íñòðóìåíòà â îòâ³ð ó òàêèé ñïîñ³á, ùîá çàãíóòè âíèç ³ ðîçïëþùèè âåðõí³é ê³íöü 14 øòèôòà íà ê³íö³ 10 âàæåë , ê ïîêàçàíî íà ô³ã.3.

Ó õîä³ îáòèñêàíí ê³íöü âàæåë 10, êèé ïðèêëàäàºòüñ äî ôëàíö 13 âåðõíüîãî ê³íö 14 øòèôòà, áåçïîñåðåäíüî çàçíàº îáòèñêàëüíîãî íàâàíòàæåíí , ùî ìîæå çðíáèòè éîãî á³ëüø êðèõêèì. Ó ïðîöåñ³ ðîáîòè ï³ä ÷àñ ðåãóëþâàíí êóòà íàõèëó ëîïàòîê ö³ ê³íö³ âàæåë³â ïðàöþòü ó ðåæèì³ íàïðóæåíí ïðè çãèí³, â òîé ÷àñ ê øòèôòè ïðàöþòü ó ðåæèì³ êðóò³íí ³ çàçíàþòü â³ðâàö¿ òóðáîìàøèíè, ùî ðîáèòü âàæåë³ ùå á³ëüø êðèõêèì. Çãîäíî öå îñòå ñïðè÷èíèòè ðóéíóâàííº ê³íö 10 âàæåë .

Äàíèé âèíàõ³ä ðîáèòü ìîæëèâèì óñóíóòè öüîãî ðèçèêó çà äîïîìîãîþ ðîçïîä³ëó çàñîá³â íàâàíòàæåíí ì³æ îáòèñíáíèì ê³íöåì øòèôòà ³ ê³íöåì 10 âàæåë 4 êåðóâàííº .

Ô³ã.4, 5 ïîêàçóþòü äâà âàð³àíòè çä³éñíåíí öèõ çàñîá³â ðîçïîä³ëó íàâàíòàæåíí , óòâîðåíèõ ïëîñêèì øàéáàì 16, 17 ç ê³ëüöåâîþ çîâí³øíüîþ ôîðìîþ, êà ïîêàçó º îñüîâèé ê³ëüöåïîä³áíèé îòâ³ð 15, ä³àìåòð êîãî òðîõè á³ëüøèé çà ä³àìåòð øòèôòà 11. Òîâùèíà øàéáè ìàº áóòè áëèçüêî îäíîãî ì³ë³ìåòðà, ³ ¿¿ çíâí³øí³é ä³àìåòð íå ïîâèíåí ïåðåâèùóâàòè ä³àìåòð ôëàíö 13 øòèôòà 11.

Ï³ä ÷àñ ðåàë³çàö³¿ âèíàõîäó çà ô³ã.4 øàéáà 16 ñêëäàºòüñ ç äâîõ ³äíòè÷íèõ ïàðàëåëüíèõ ïëîñêèõ ïîâåðõîíü ³ âèãîòîâëåíà ç á³ëüø ãíó÷êîãî ìàòåð³àëó, í³æ âàæ³ëü 4, òîáî ç ìàòåð³àëó, ìîäóëü Þíãà êîãî ìåíøå, í³æ ó ìàòåð³àë³ âàæåë 4, êèé âèãîòîâëåíèé ºòüñ , ê ïðàâèëî, ç òèòàíó. Øàéáà 16, âèãîòîâëåíà, íàïðèêëàä, ³ç ïîë³ìåðó, ìîæå ïëàñòè÷íî äåôîðìóâàòèñ â ïðîöåñ³ íàòèñêíí , íà çàâäàþ÷è øêîäè âàæåþ 4 êåðóâàíí òà â ïðîöåñ³ ðîçïîä³ëó íàâàíòàæåíü íà ê³íö³ 10 âàæåë 4.

Ó äðóãîìó âàð³àíò ç³ãíóòîãî, ïîäàíîìó íà ô³ã.5, ðîçòàøîâàíó ì³æ îáòèñíáíèì ê³íöåì øòèôòà ³ âàæåëåì 4 øàéáó 17 çðîáëåíî ç ìàòåð³àëó, ìîäóëü Þíãà êîãî âèùé, í³æ ó ìàòåð³àë³ âàæåë 4 êåðóâàíí . Öèì ìàòåð³àëîì ìîæå áóòè, íàïðèêëàä, ïîë³ìåð àáî ìàòåë. Ó öüîìó âèïàäêó, ê ïîêàçàíî â á³ëüøîìó ìàñøòàá³ íà ô³ã.6-7, ïîâåðõí 18 øàéáè 17 ïåðâáóâàº â êîíòàêò ç ê³íöåì 10 âàæåë 4 ³ ñôîðìîâàíà ïîóêëèì îêðóãëåíèì êðàºì 19 íà âñ³é çîâí³øí³é ïåðèôåð³¿ (ô³ã.6) àáî ñêîøåíèì çîâí³øí³ì êðàºì 20 (ô³ã.7).

Òàêà êîíô³ãóðàö³ø øàéáè 17 äîçâîë º íå ñòâîðþâàòè í³ êèõ ìàêñèìàëüíèõ íàâàíòàæåíü ó âàæåë³ 4 íà çîâí³øí³é ïåðèôåð³¿ øàéáè ï³ä ÷àñ îáòèñíáíí , ïîóêëà îêðóãë³ñòü 19 àáî ñê³ñ 20 äîçâîë þòü ïîñòóïîâî çìåíøóâàòè íàâàíòàæåíí íà ìàòåð³àë âàæåë 4.

Ôîðìóëà âèíàõîäó

1. Âàæ³ëü êåðóâàííí êóòîì óñòàíîâêè ëîïàòêè â òóðáîìàøèí³, ïåðøèé ê³íöü êîãî çìîíòîâàíèé íà ïîâîðîò³é îñ³ ëîïàòêè òàê, ùîá îáåðòàòè ¿¿, à äðóãèé ê³íöü ìàº öèë³íäðè÷íèé øòèôò, êèé âñòàíîâëåíèé íà êîíðöåíòðè÷íî ê³ëüö³, öåé øòèôò ô³êñóºòüñ øë õîì îáòèñíåíí îãíîãî ç éîãî ê³íö³â â îòâîð³ äðóãîãî ê³íö äâæåë ³ ì³ñòèòü ê³ëüöåïîä³áíèé ôèàíöü, äî êîãî ïðèêëàäàºòüñ äðóãèé ê³íöü âàæåë , ïðè÷îì çàñîáè ðîçïîä³ëó íàâàíòàæåíí ðîçòàøîâàí³ ì³æ äðóãèì ê³íöåì âàæåë ³ îáòèñíóòèì ê³íöåì øòèôòà.

2. Âàæ³ëü êåðóâàíí çà ï. 1, ó êîì çàñîáè ðîçïîä³ëó íàâàíòàæåíí ìàþòü øàéáó.

3. Âàæ³ëü êåðóâàíí çà ï. 2, ó êîì øàéáà âèãîòîâëåíà ç á³ëüø ãíó÷êîãî ìàòåð³àëó, í³æ âàæ³ëü êåðóâàíí .

4. Âàæ³ëü êåðóâàíí çà ï. 3, ó êîì øàéáà âèãîòîâëåíà ç ïîë³ìåðíèõ ìàòåð³àë³â.

5. Âàæ³ëü êåðóâàíí çà ï. 2, ó êîì øàéáà âèãîòîâëåíà ç á³ëüø òåðäîãî ìàòåð³àëó, í³æ âàæ³ëü êåðóâàíí .

6. Âàæ³ëü êåðóâàíí çà ï. 5, ó êîì øàéáà âèãîòîâëåíà ç ïîë³ìåðó àáî ìàòåëó.

7. Âàæ³ëü êåðóâàíí çà ï. 5, ó êîì øàéáà ìàº ïëîñêó êðóãëó ïîâåðõíþ, ùî ïðèêëàäàºòüñ äî äðóãîãî ê³íö äâæåë , ³ ìàº ïîóêëèé àáî ñêîøåíèé ê³ëüöåïîä³áíèé êðàé íâî¿é çîâí³øí³é ïåðèôåð³¿.

8. Âàæ³ëü êåðóâàíí çà ï. 2, ó êîì øàéáà ìàº òîâùèíó áëèçüêî ïâîãî ì³ë³ìåòðà.

9. Âàæ³ëü êåðóâàíí çà ï. 2, ó êîì øàéáà ìàº çîâí³øí³é ä³àìåòð, êèé äîð³âíþº ä³àìåòðó ôëàíö øòèôòà àáî òðîõè ìåíøèé çà íüîãî.

10. Âàæ³ëü êåðóâàíí çà ï. 1, ó êîì âàæ³ëü âèãîòîâëåíèé ç òèòàíó, à øòèôò - ç³ ñòàë³.

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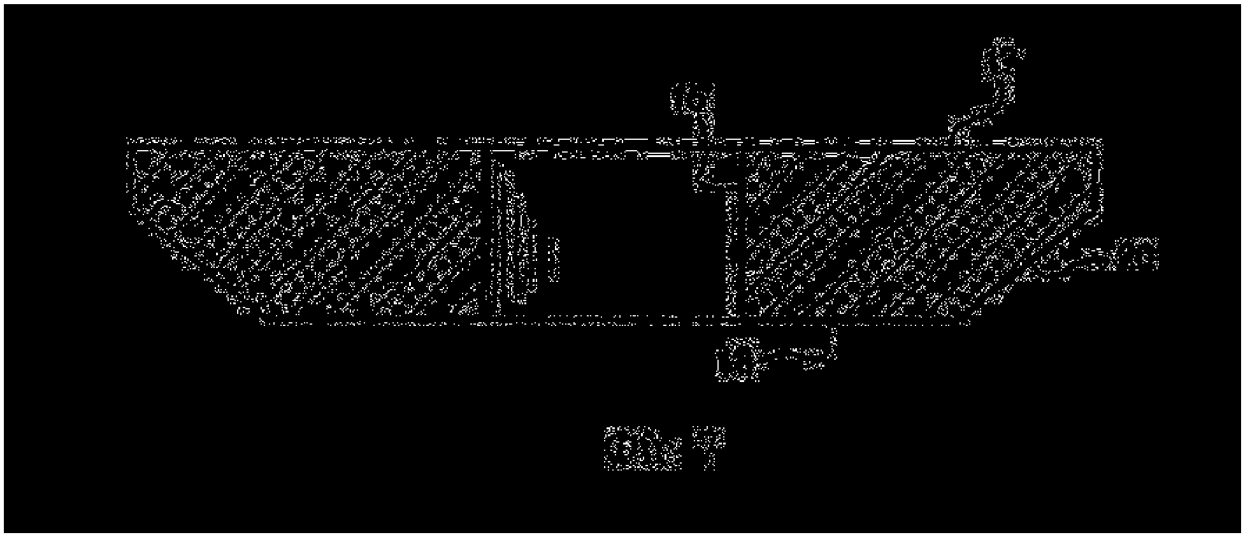
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Îô³ö³éíèé áþëåòåíü "Ïðîìèñëîâà âëàñí³ñòü". Êíèãà 1 "Âèíàõîäè, êîðèñí³ ìîäåë³, òîïîãðàô³¿ ³íòåãðàëüíèõ ì³êðîñõåì", 2008, N 14, 25.07.2008. Äåðæàâíèé äåïàðòàìåíò ³íòåëåêòóàëüíî¿ âëàñíîñò³ Ì³í³ñòåðñòâà îñâ³òè ³ íàóêè Óêðà¿íè.

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