BIVS TECHNICAL DESIGHN.

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The main demands to construction of BIVS are the following:

1. the effective transport light from scintillate tiles to the photomultiplier tubes;
2. the saving of the high vacuum;
3. the permanent control on each scintillate tile;
4. the easy assembly and access to all internal elements of the system.

Two projections of the BIVS construction are shown in Fig.1 and Fig.2. One of the variant of the assembly of the detector is on Fig.3. The scheme of LED control system is shown on Fig.4 and the variant of the scintillation tile is on Fig.5.

The main part of the detector is the section 1, consisting of 16 trapezoidal tiles. Each tile is dense connected 1mm lead with 5mm scintillation plates. These tiles have two holes (diameter 16 mm) for fixing them on the place. The scintillation plates have grooves (12-16 on one plate) with depth 1.7 mm and width 1.15 mm. The shifter fibers with diameter 1.1 mm are embedded in these grooves. Outside the tiles fibers 2 are assembled together and connected with photomultiplier 4, replacing outside of the vacuum volume.

For permanent control LED light signals are transported by quartz fibers (d = 1mm) throw holes 13 in cylinder 5 on each sections 1 (on each PM).

Eight sections 1 form ring and are tighten via holes with diameter 16 mm by two thick ring plates 6 and 24 bolts. The ring plates have diameter 1300 mm and thickness 10 mm. The thickness of the assembled ring is 120 mm.

For installation of the ring inside the barrel 5 the ring has two special shoes 9, which are clamped on two rails 10 by 4 bolts. For transportation of rings the top part of their plates 6 have holes 16 and special bolt 17 with distance sleeve 18.

Eight rings are placed inside the barrel, which has diameter 1640 mm and length 1000 mm.

Axels of symmetry of each ring turn consecutive on $22.5\,^{0}$ for covering every slots between sections.

The barrel has two welded flanges 14 on both sides. In the center inside of barrel the ring 12 is welded. Between flanges 14 and ring 12 the plates 7 and rails 10 are welded along of generatrix. On the top part flanges 14 the plates 19 are welded. They have the holes for transportation of the barrels. All of these provide to the barrel necessary rigidity.

Each barrel clamp on special base unit 11 and they together have possibility move along the beam direction.

At mounting and dismounting of the rings inside the barrel or from them the device 15 is used. It is fixed to the flange 14 and rails 10.

The BIVS consists of 4 barrels. Total number of the sections (and photomultipliers) – 256 pieces.

The special demanding to this detector is the providing the high vacuum.

The weight of one assembled ring is 240 kg.

The weight of one barrel is 700 kg.

The weight of one barrel with eight rings is 2620 kg.

"BARREL".

1. 1.6 tonns stainless steel on total barrel .
   Prize 1t. stainless steel - 50000 rub.
   Prize 6I. stainless steel - 300000 rub.

2. 1000 hours for performing 1 barrel.

   Prize 1 hour - 200 rub.

   Prize 1000 hours - 200000 rub.

3. Total:
   Prize of 1 barrel - 500000 rub
   Prize of 4 barrels - 2000000 rub. or - 70000$.

4. Performing drafts - 5000$

5. Transportation in USA by ship:
   Prize 1 kg -4$,

   Weight of 4 barrels = 3000 kg
   <u>Total prize - 12000$</u>

   TOTAL: 87000$

"PROTOTYPE".

1. Scintillators 16 plates: - 350$
   р) material;
   с) machining and polish of plates;
   т) machining grooves for shifters.

2. 16 lead plates: - 150$
   Material and machining.

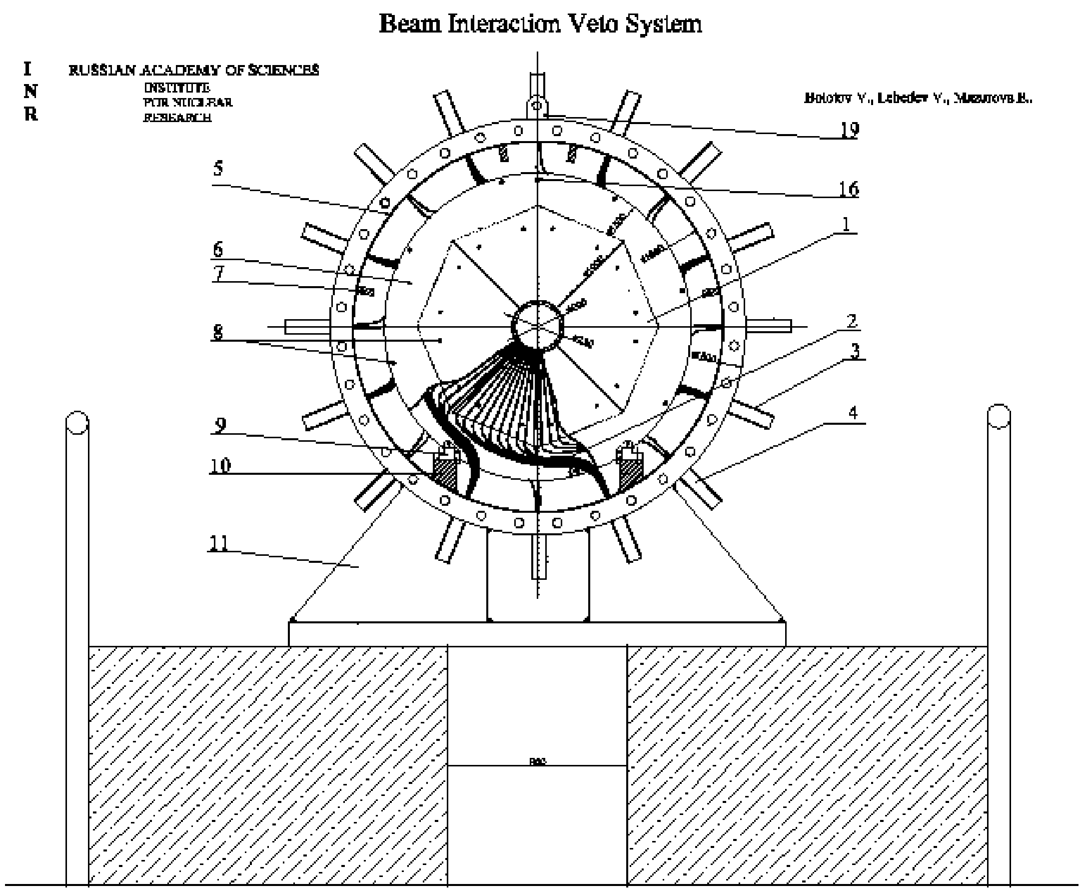
3. 32 tyvik plates - 50$

4. Shifting fibers L =230 ь - 200$

5. Machining and polish of fibers - 150$

6. Glue fibers in grooves, tight in plait and polish it - 200$
7. Performing of box for PMT - 100$
8. Performing of LED system - 150$
9. Performing walls of prototype box - 200$
10. <u>Overhead expenses - 450$</u>

TOTAL: 2000$



Beam Interaction Veto System
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19
16
1
2
3
4
5
6
7
8
9
10
11

Fig.1.

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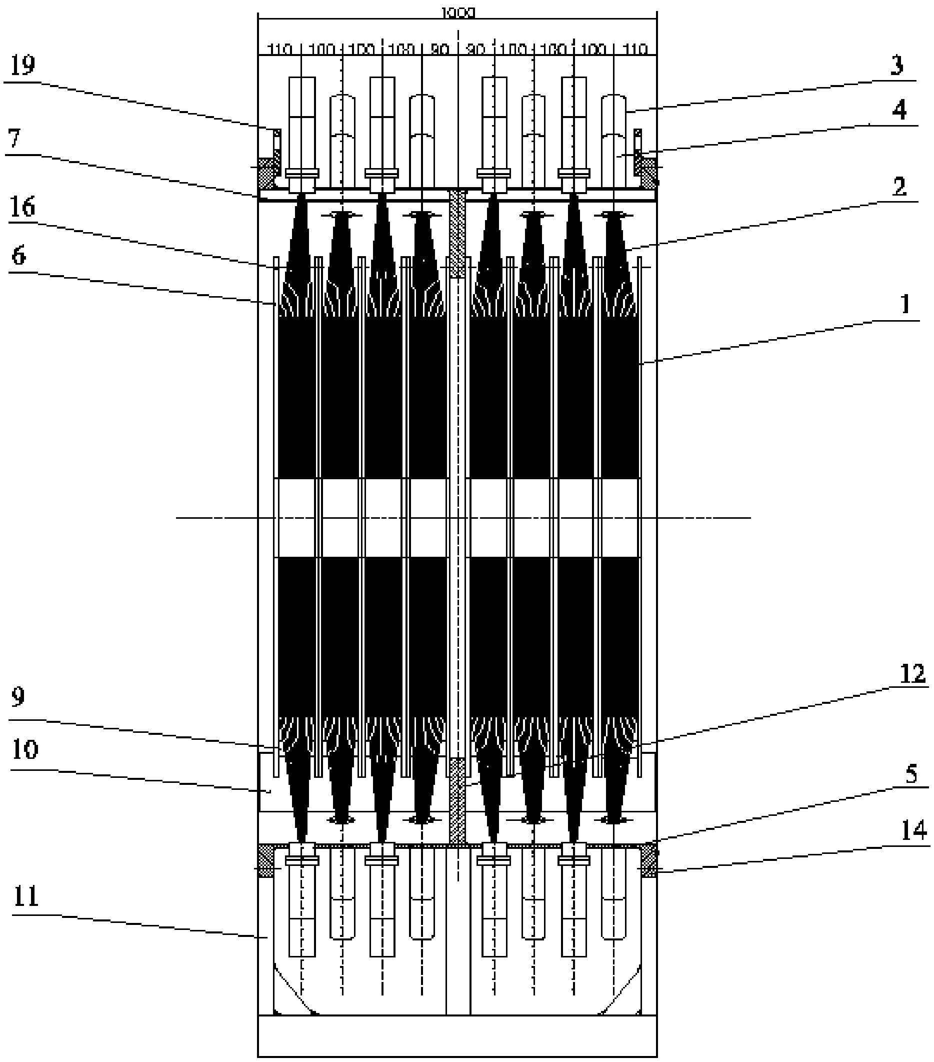

Fig.2.

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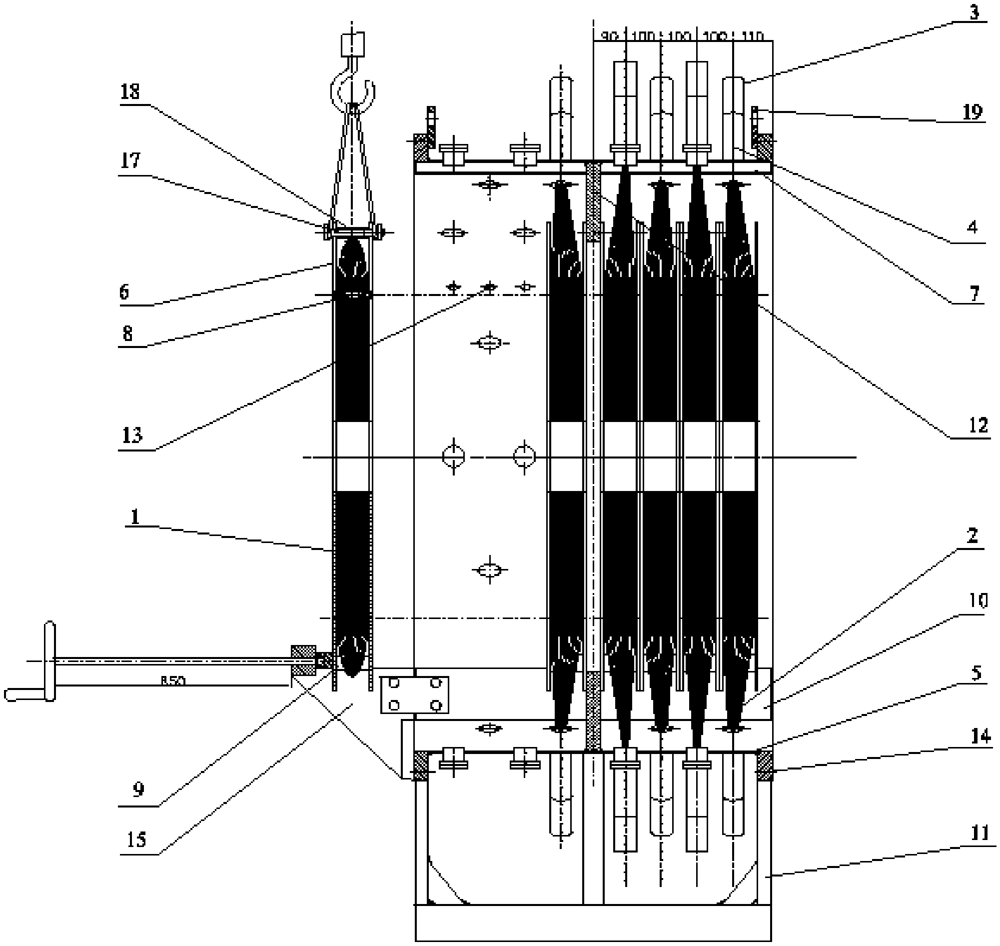

Fig.3

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LED

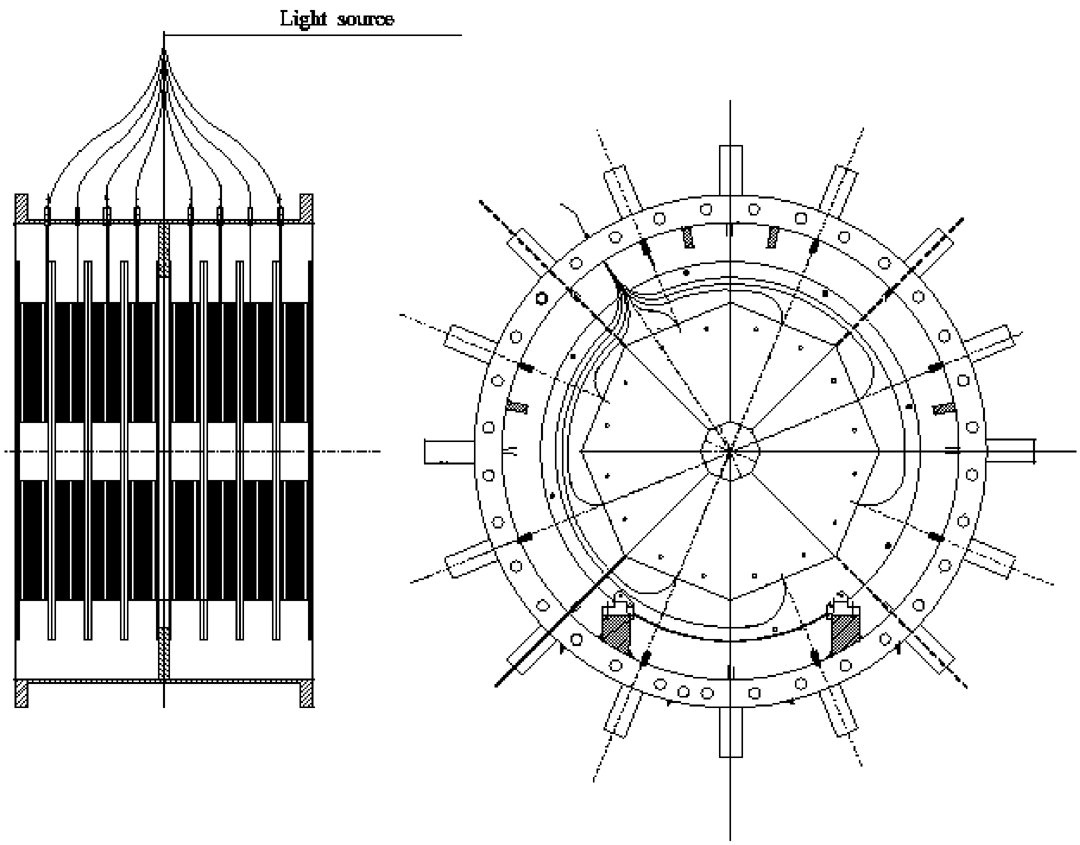

Fig 4.

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Scintillation tile

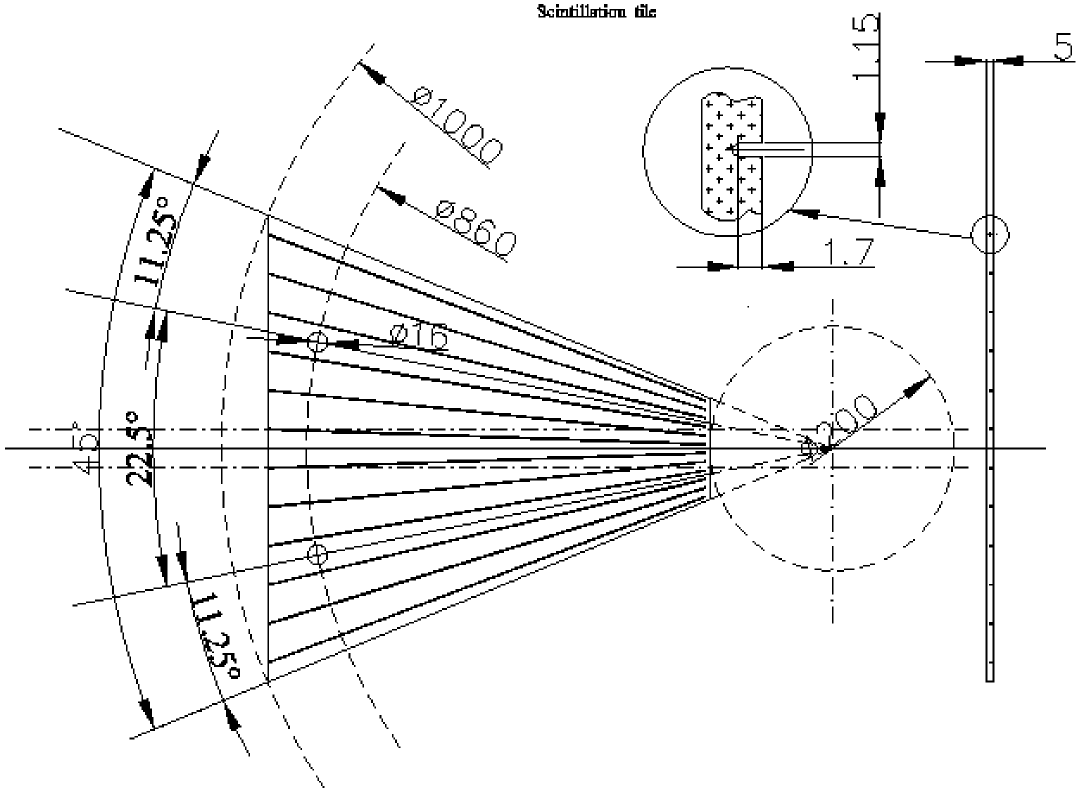

Fig.5

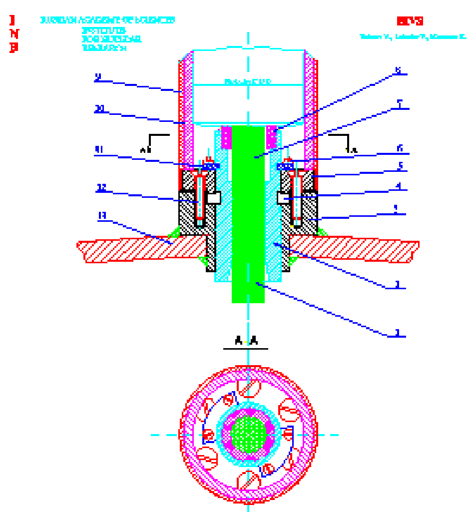

Fig 6.

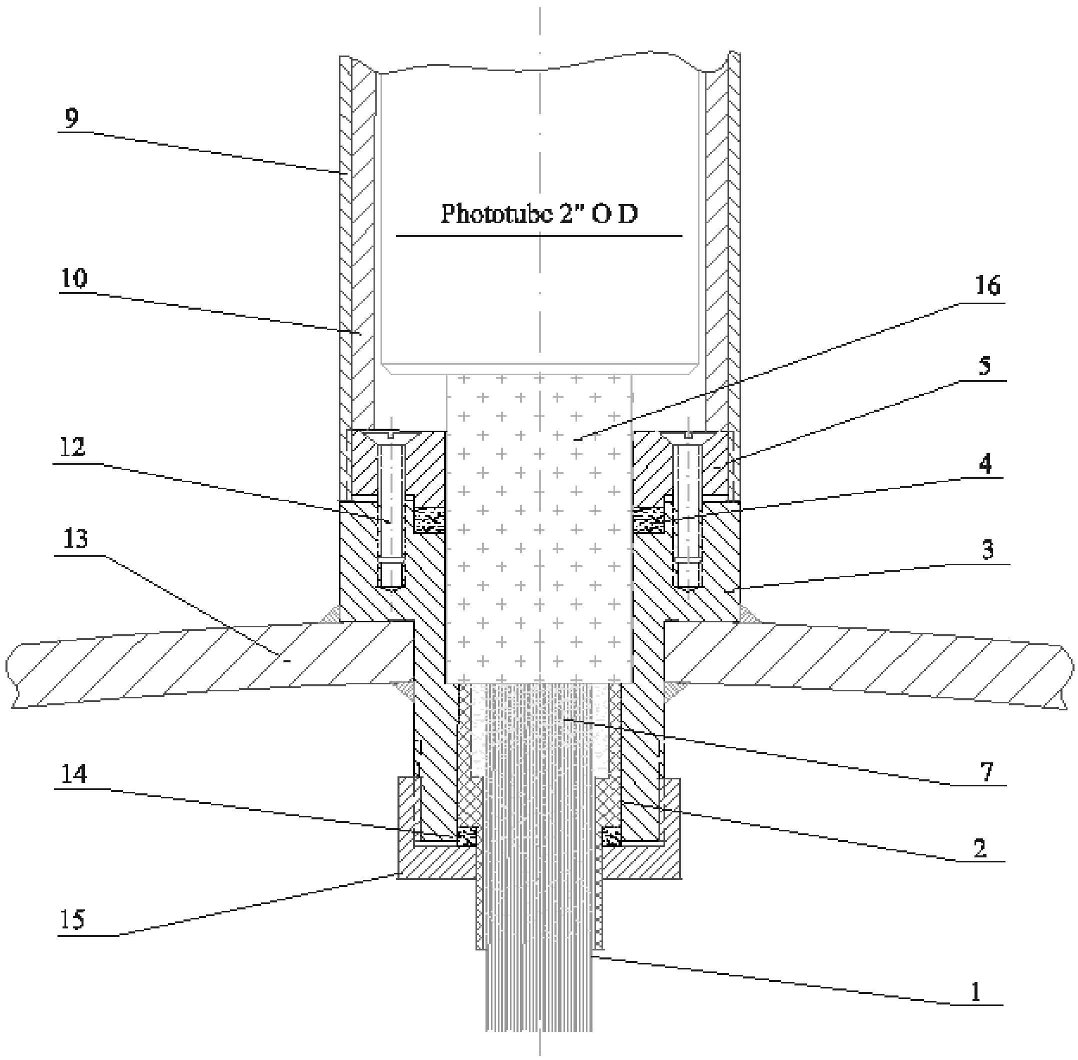

Fig.7

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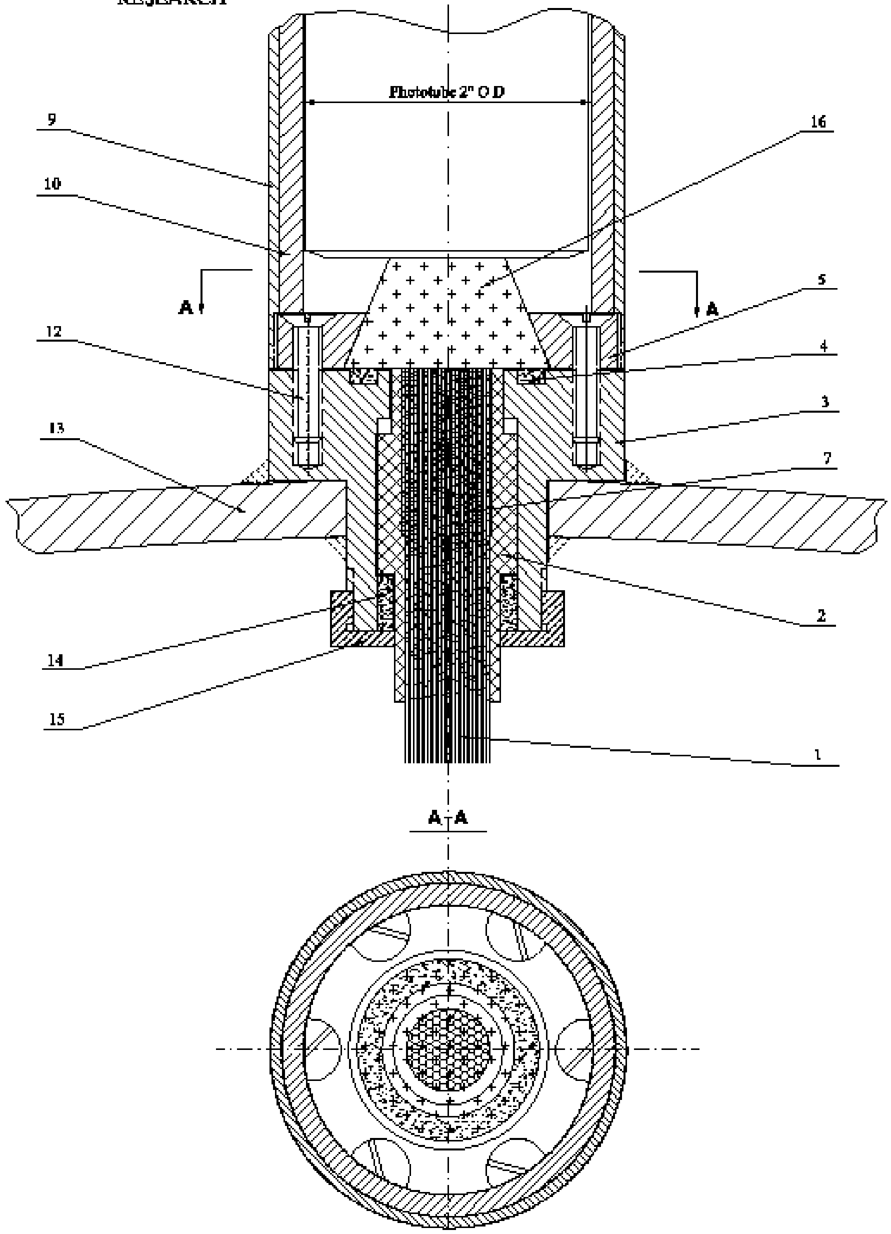

Fig.8