Historie Babočkova posteru (CHISA 1987)

Všechno začalo tím, že Karel Aim našel ve vestibulu ústavu na podlaze částečně vyplněný formulář přihlášky na CHISU. Byla na něm jen adresa a podpis Jiřího Šmída (alias Babočky). Okamžitě ho napadlo tu přihlášku doplnit a dát mi ji jako další příspěvek (shromažďoval jsem totiž všechny přihlášky k elektronickému zpracování).

Vzhledem k tomu, že Babočka se zabýval sypkými hmotami, bylo nasnadě, že příspěvek se musí týkat "particulate solids". A proto vymyslel následující název:
"Experimental method for determining internal friction coefficients during granular flow under cyclic load and its application to the development of a new particulate solid for highly accurate sandglass"

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EXPERIMENTAL METHOD FOR DETERMINING INTERNAL FRICTION COEFFICIENTS DURING GRANULAR FLOW UNDER CYCLIC LOAD AND ITS APPLICATION TO THE DEVELOPMENT OF A NEW PARTICULATE SOLID FOR HIGHLY ACCURATE SANDGLASS

AUTHORS:
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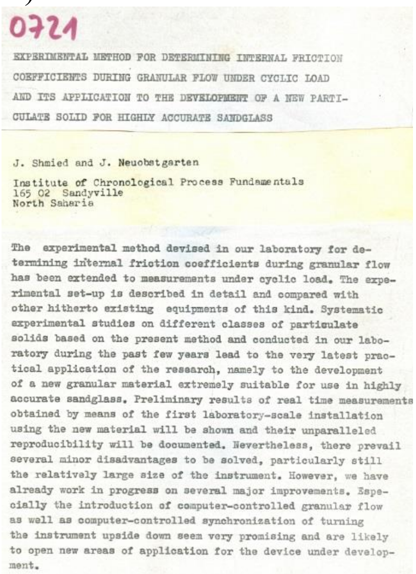
Pikantní je fakt, že málokdo ví, že sandglass znamená "přesýpací hodiny" (detailně v příloze).

K. Aim nadto vypracoval podrobný abstrakt, který byl povinnou přílohou přihlášky.
V původním souhrnu byl sice jako autor uveden J. Šmíd, později jsme to změnili na J. Shmied and J. Neuobstgarten (= J. Novosad, coby školitel); nakonec však zbyla jen přezdívka J. Babochka (detailně opět v příloze)



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J. Shmied and J. Neuobstgarten

Institute of Chronological Process Fundamentals
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North Saharia

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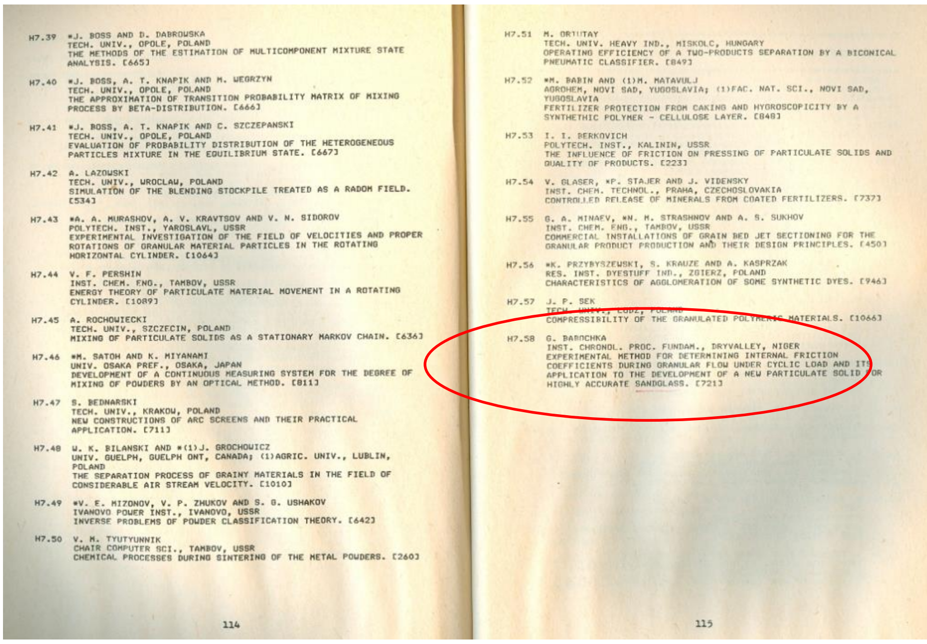
V té podobě (se souhlasem chairmana T. Míška) jsem příspěvek zařadil do 2nd Circular – Preliminary program a posléze i do Final Programu jako George Babochka z Inst. *Chronol*. Proc.

Fundam., *Dryvalley* (=Suchdol), Niger. (Ve full textu je ovšem jako autorova země uvedena North Saharia)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Tím měla celá akce skončit. Nicméně se k ní přidal Milan Rylek, který s pomocí Ondry Weina vypracoval první verzi "full textu" doprovázenou černobílými xeroxy přístroje, matematického aparátu, schematu a vzorků (viz pdf příloha). V současném dokumentu jsem vlastnoručně usklářené přesýpací hodiny (údajně zapůjčené Náprstkovým muzeem) vyfotil v barvě, jakož i ostatní ilustrace jsou barevné. Ty ilustrace pochází z posteru, který byl skutečně prezentovaný v posterové sekci.

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Nejlepší zážitek byl ovšem okamžik, kdy Babočka s nějakými Japonci došel ke "svému" posteru a aniž by pojal jakékoliv podezření, vysvětloval jim některé důležité aspekty příspěvku. My jsme byli schovaní za nějakými nejbližšími vývěskami a smíchem jsme se stěží udrželi na nohou. M. Rylek u posteru také mluvil s jedním Švédem, který se chechtal na celé kolo, a který jako jeden z mála pochopil, oč se jedná. Ten říkal, že mluví i za své kolegy, a že jen my jsme schopní takovou ptákovinu vymyslet.

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Ivan Wichterle (2018)

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1. Šmídovi se říkalo Babočka, protože stejně jako detektiv Babočka byl strašně zvědavý, takže jeho spolupracovníci před ním všechno uklízeli a schovávali.
2. O akci věděl i prof. E. Hála, protože jsem mu to s radostí vysvětlil jako svému šéfovi.
3. Babočka se přes Polytechnu v osmdesátých létech ucházel o místo v Nigerii. Ztroskotalo na tom, že nebyl ženatý, a tak ho tam nechtěli pustit.

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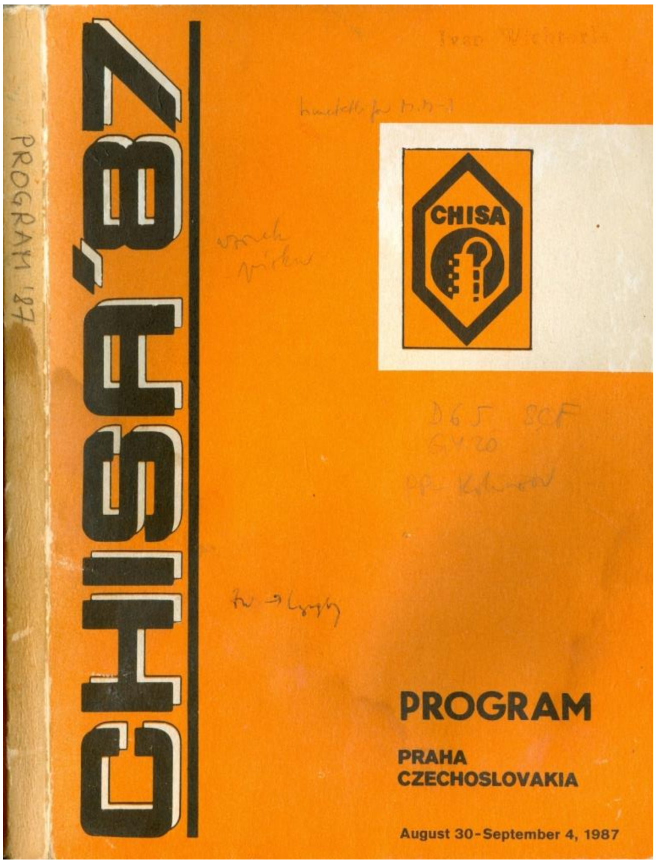

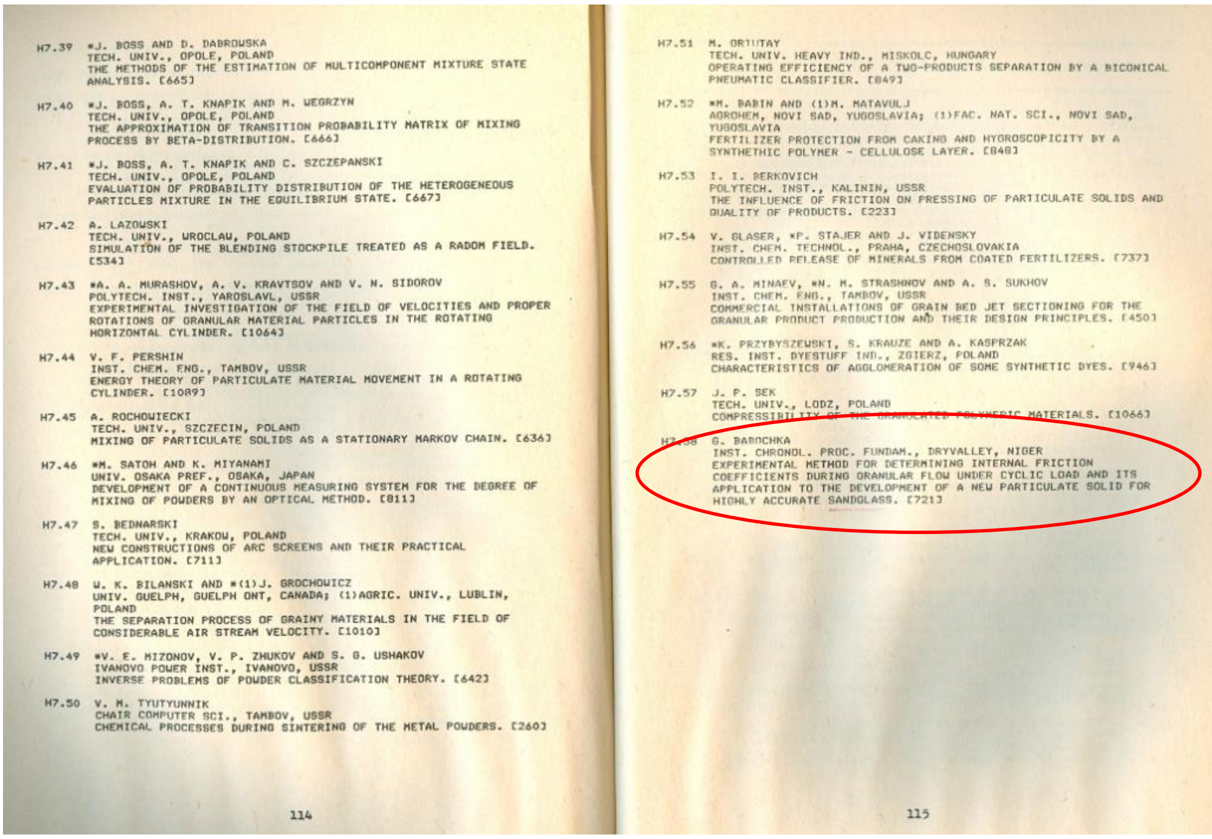

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G. BABOCHKA, Institute of Chronological Process Fundamentals,
Dryvalley, North Saharia

INTRODUCTION

Measurement of time based on flow of material has been used since antiquity (Fig. 1). Firstly, the water was used as a measuring media, however it caused large errors due to evaporation (in summer time) or due to solidification (in winter). Therefore, it was substituted by particulate material as a more suitable media for sandglass (die Sanduhr, le sablier, pesochnye chasy).

Early experiments were very simple and operated manually.
Advantages:

Relatively inexpensive raw material (desert or sea sand).
Disadvantages:

a) Discrete time measurement (as a sum of time elements between individual turnings of the equipment;
b) unpredictable control of flow;
c) human factor (delays, nonreliability of attendant);
d) requirement of three shift full time attendance.

AIMS

On the basis of an analysis of the studied problem, the following aims of the research program were identified:

1. Development of theoretical quantitative description of flow under cyclic load;
2. Optimum design of shape of the measuring device;
3. Reduction of the effect of friction factors of various sands on accuracy of the measuring device;
4. Automatic control with the aim to reduce the effect of unsteady state flow conditions at the beginning of the measurement.

Questions to be solved for optimum operation of precise sandglass:

a. Indication of the end of time interval;
b. Mechanical device for turning the equipment upside down within infinitesimal time;
c. Minimization of time interval for total throughflow;
d. Possibility of continuous flow control to eliminate the discrete measurement;
e. Elimination of stress singularity effects at the beginning of full load cycle;
f. Automation of the whole equipment.

RESULTS

The first part of theoretical flow control equation was developed; the remaining terms are under investigation (Fig. 2).

With regard to available modern techniques, the problem will be studied in the future by the method of computerized modelling of unsteady flow process.

With regard to the immense stock of raw material in our country, it was decided to compare the desert sand of various localities together with artificially prepared materials. The material used was pre-treated, so that a single size fraction was obtained (it was subjected to liquid fluidization with simultaneous removal of salts) and then dried. As a standard the quartz chronometer "SEIKO 2453" was used (Fig. 3). Simultaneously the image analysis of all materials used was made by the image analyzer Leitz Classimat. The dominant fraction consisted of ideally spherical particles.

All the performed experiments lead to the conclusion that the best material is the desert sand (black) from the region of north-west Sahara (Dryvalley). Advantageously, it enables very accurate readings (Fig. 4).

CONCLUSIONS

As indicated in the introduction, the optimum size and shape of particulate solid was found, which solves only a part of problems outlined.

Photosensitive diodes and elements, permittivity change indication and other sensors have been tried for the flow observation.

The microprocessor COMPUCHRONIC-1 of our design was built into a newly developed control unit enabling complete solution or at least radical improvement of the experimental equipment imperfections. However, the arrangement of computer controlled flow and the pneumatic turning of the central unit upside down has resulted in a large size of the equipment so preventing it from widespread applications.

On the other hand the accuracy of real time measurement seems to be superior and cannot be compared with commercially available devices.

LITERATURE

B. A. F. Murphy: J. Irreproducible Results *999*, 16-18 (1985).
J. Parkinson: J. Insignificant Research *27*, 1-38 (1986).

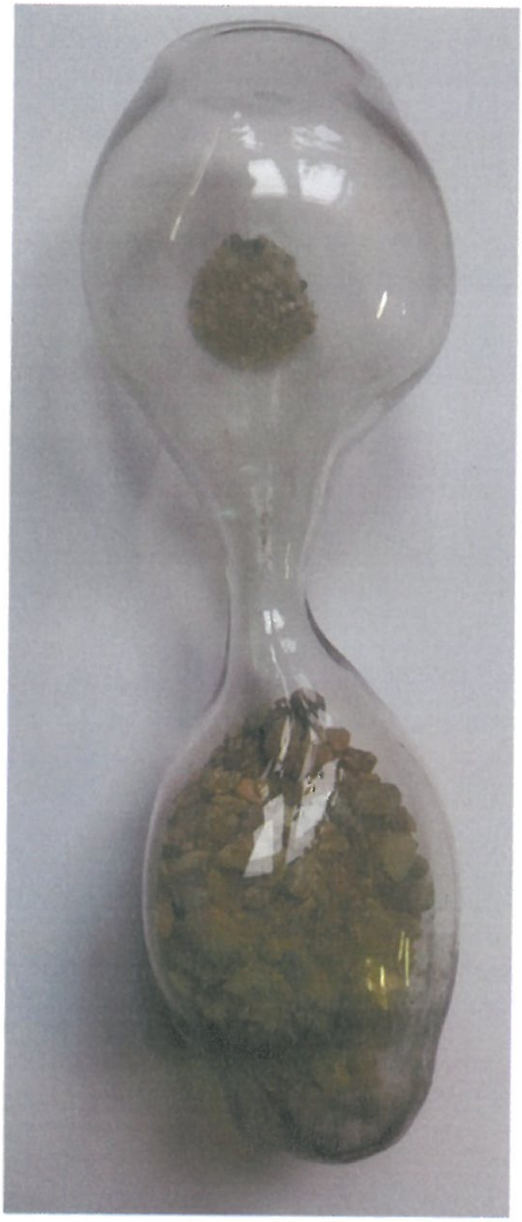

Fig.1

OLD ROMAN TYPE

(from excavation at Tassili)

[Courtesy of the Náprstkovo Museum]

Fig. 2

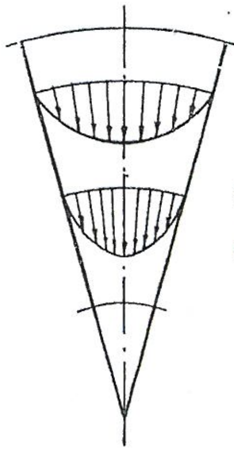

Рис. 20.

$$\frac{\partial \Phi_1}{\partial \lambda}=\frac{\tau_0}{h^3}\sum_{i=1}^{\infty}\sum_{k=1}^{\infty}\sum_{n=1}^{\infty}\left(\frac{C_n Z_{ik}'}{2ax^{m+i+k+n+2}}+\frac{U_{ik}'C_n}{2a^3x^{3m+i+k+n}}+\right.$$

$$\left.+\frac{V_{ik}'C_n}{2a^5x^{5m+i+k+n-2}}\right)-\left(\frac{\tau_0}{h}+\eta\right)\sum_{i=1}^{\infty}\frac{C_i'}{ax^{m+i}};$$

$$\frac{\partial^2\Phi_1}{\partial\lambda^2}=-\frac{\tau_0}{h^5}\sum_{i=1}^{\infty}\sum_{k=1}^{\infty}\sum_{n=1}^{\infty}\sum_{z=1}^{\infty}\sum_{\delta=1}^{\infty}\left[\frac{3Z_{ik}'Z_{z\delta}'C_n}{4ax^{m+i+k+n+z+\delta+4}}+\right.$$

$$+\frac{6U_{ik}'Z_{z\delta}'C_n}{4a^3x^{3m+i+k+n+z+\delta+2}}+\frac{3(2Z_{ik}'V_{z\delta}'+U_{ik}'U_{z\delta}')C_n}{4a^5x^{5m+i+k+n+z+\delta}}+$$

$$\left.+\frac{6U_{ik}'V_{z\delta}'C_n}{4a^7x^{7m+i+k+n+z+\delta-2}}+\frac{3V_{ik}'V_{z\delta}'C_n}{4a^9x^{9m+i+k+n+z+\delta-4}}\right]+$$

$$+\frac{\tau_0}{h^3}\sum_{i=1}^{\infty}\sum_{k=1}^{\infty}\sum_{n=1}^{\infty}\left(\frac{Z_{ik}''C_n+2Z_{ik}'C_n'}{2ax^{m+i+k+n+2}}+\frac{U_{ik}''C_n+2U_{ik}'C_n'}{2a^3x^{3m+i+k+n}}+\right.$$

$$\left.+\frac{V_{ik}''C_n+2V_{ik}'C_n'}{2a^5x^{5m+i+k+n-2}}\right)-\left(\frac{\tau_0}{h}+\eta\right)\sum_{i=1}^{\infty}\frac{C_i''}{ax^{m+i}};$$

$$\frac{\partial^2\Phi_1}{\partial\lambda\partial x}=\frac{\tau_0}{h^5}\sum_{i=1}^{\infty}\sum_{k=1}^{\infty}\sum_{n=1}^{\infty}\sum_{z=1}^{\infty}\sum_{\delta=1}^{\infty}\left\{\frac{3(i+k+2)Z_{ik}Z_{z\delta}'C_n}{4ax^{m+i+k+n+z+\delta+5}}+\right.$$

$$+\frac{3C_n[(2m+i+k)U_{ik}Z_{z\delta}'+(i+k+2)Z_{ik}U_{z\delta}']}{4a^3x^{3m+i+k+n+z+\delta+3}}+$$

$$+\frac{3C_n[(4m+i+k-2)V_{ik}Z_{z\delta}'+(2m+i+k)U_{ik}U_{z\delta}'+(i+k+2)Z_{ik}V_{z\delta}']}{4a^5x^{5m+i+k+n+z+\delta+1}}+$$

$$+\frac{3C_n[(4m+i+k-2)V_{ik}U_{z\delta}'+(2m+i+k)U_{ik}V_{z\delta}']}{4a^7x^{7m+i+k+n+z+\delta-1}}+$$

$$\left.+\frac{3C_n(4m+i+k-2)V_{ik}V_{z\delta}}{4a^9x^{9m+i+k+n+z+\delta-3}}\right\}-$$

$$-\frac{\tau_0}{h^3}\sum_{i=1}^{\infty}\sum_{k=1}^{\infty}\sum_{n=1}^{\infty}\left[\frac{(m+i+k+n+2)Z_{ik}'C_n+(i+k+2)Z_{ik}C_n'}{2ax^{m+i+k+n+3}}+\right.$$

$$+\frac{(3m+i+k+n)U_{ik}'C_n+(2m+i+k)U_{ik}C_n'}{2a^3x^{3m+i+k+n+1}}+$$

$$\left.+\frac{(5m+i+k+n-2)V_{ik}'C_n+(4m+i+k+n-2)V_{ik}C_n'}{2a^5x^{5m+i+k+n-1}}\right]+$$

$$+\left(\frac{\tau_0}{h}+\eta\right)\sum_{i=1}^{\infty}\frac{(m+i)C_i'}{ax^{m+i+1}}+$$

$$+\frac{\partial\Phi_2}{\partial\lambda}+-\frac{\tau_0}{h^3}\sum_{i=1}^{\infty}\sum_{k=1}^{\infty}\sum_{n=1}^{\infty}\left(\frac{Z_{ik}'D_n}{2x^{i+k+n+3}}+\frac{Z_{ik}'\omega_n''+U_{ik}'D_n}{2a^2x^{2m+i+k+n+1}}+\right.$$

$$\left.+\frac{U_{ik}'\omega_n''+V_{ik}'D_n}{2a^4x^{4m+i+k+n-1}}+\frac{V_{ik}'\omega_n''}{2a^6x^{6m+i+k+n-3}}\right)+$$

$$+\left(\frac{\tau_0}{h}+\eta\right)\sum_{i=1}^{\infty}\left(\frac{D_i'}{x^{i+1}}+\frac{\omega_i'''}{a^2x^{2m+i-1}}\right)+$$

$$+\frac{\partial^2\Phi_2}{\partial\lambda^2}+\frac{\tau_0}{h^5}\sum_{i=1}^{\infty}\sum_{k=1}^{\infty}\sum_{n=1}^{\infty}\sum_{z=1}^{\infty}\sum_{\delta=1}^{\infty}\left\{\frac{3Z_{ik}'Z_{z\delta}'D_n}{4x^{i+k+n+z+\delta+5}}+\right.$$

$$+\frac{3(2U_{ik}'Z_{z\delta}'D_n+Z_{ik}'Z_{z\delta}'\omega_n'')}{4a^2x^{2m+i+k+n+z+\delta+3}}+$$

$$+\frac{6Z_{z\delta}'(V_{ik}'D_n+U_{ik}'\omega_n'')+3U_{z\delta}'U_{ik}'D_n}{4a^4x^{4m+i+k+n+z+\delta+1}}+$$

$$+\frac{3[2V_{ik}'(Z_{z\delta}'\omega_n''+U_{z\delta}'D_n)+U_{ik}'U_{z\delta}'\omega_n'']}{4a^6x^{6m+i+k+n+z+\delta-1}}+$$

$$\left.+\frac{3(2U_{ik}'V_{z\delta}'\omega_n''+V_{ik}'V_{z\delta}'D_n)}{4a^8x^{8m+i+k+n+z+\delta-3}}+\frac{3V_{ik}'V_{z\delta}'\omega_n''}{4a^{10}x^{10m+i+k+n+z+\delta-5}}\right\}-$$

SCHEMATIC DIAGRAM of APPARATUS

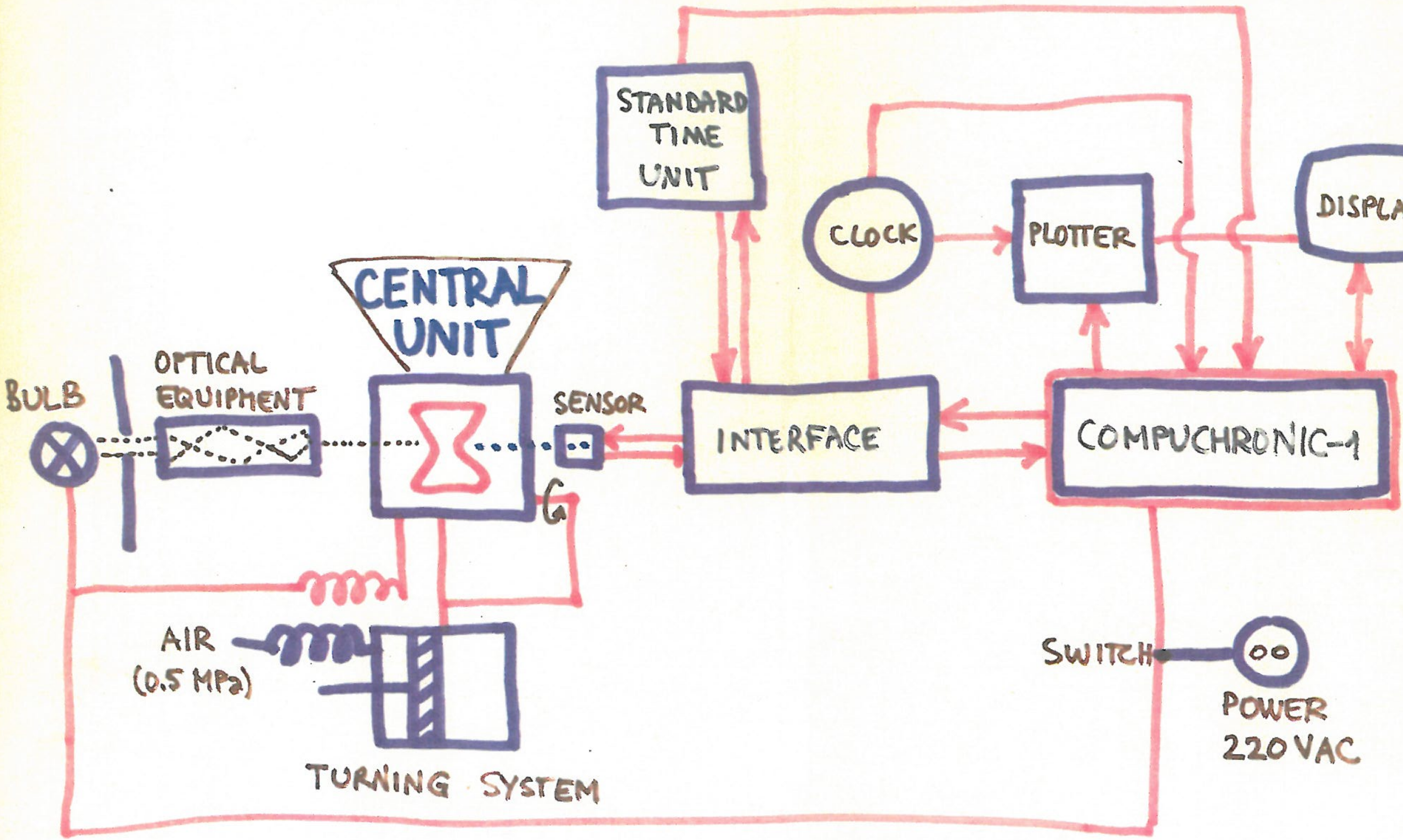

FIG. 3

SCALE 1:100


Fig. 4
SAMPLE of a NEW MATERIAL
25x enlarged

H7.58

(now Permanent Poster)