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**Flowing cereals and milled cereal
products — Automatic sampling by
mechanical means**

*Céréales et produits de mouture des céréales en mouvement —
Échantillonnage automatique par des moyens mécaniques*



Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6644 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 4, *Cereals and pulses*.

This second edition cancels and replaces the first edition (ISO 6644:1981), which has been technically revised.

Annex A of this International Standard is for information only.

Introduction

Correct sampling is an operation that requires most careful attention. Therefore emphasis cannot be too strongly laid on the necessity of obtaining a properly representative sample of cereal grain or milled product. Careless or inaccurate sampling could lead to misunderstanding and to unwarranted financial adjustment.

The procedures given in this International Standard are recognized as good practice and it is strongly recommended that they be followed whenever practicable. It is difficult to lay down fixed rules to be followed in every case, and particular circumstances may render some modification of the method desirable. For example, determination of qualitative factors, such as moisture content, is best achieved by examination of the laboratory sample, whereas a quantitative factor, such as detection of insects, is best achieved by examination of individual increments.

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Flowing cereals and milled cereal products — Automatic sampling by mechanical means

1 Scope

This International Standard specifies requirements for the automatic sampling, by mechanical means, of cereals (as grain) or of milled cereal products moving in bulk, for assessment of their quality.

It is not applicable to commodities in sacks or in packages, to static bulks in wagons, ships, bulk tankers, silos or warehouses¹⁾. It does not apply to seed grain.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, this publication do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 13690, *Cereals, pulses and milled products — Sampling of static batches*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1

consignment

quantity of product dispatched or received at one time and covered by a particular contract or shipping document

NOTE It may be composed of one or more lots.

3.2

lot

stated portion of a consignment

NOTE Unless otherwise specified in the contract, consignments should be considered in lots of up to 500 tonnes.

3.3

increment

small quantity taken from the product stream during a stated short period of time

3.4

bulk sample

quantity of product obtained by combining and mixing thoroughly the increments taken from a specific lot, or obtained from a continuously taken sample allowed to accumulate

NOTE For recommendations on achieving a homogenous mix of large quantities of sampled product, see ISO 13690.

1) For sampling of cereals as grain, see ISO 13690.

3.5

laboratory sample

quantity of product divided according to instructions given in ISO 13690 and removed from the bulk sample, and intended for analysis or other examination

3.6

flowing product

product to be sampled moving through a conveying system, or in free-fall from a spout or chute

4 General requirements

4.1 Arrangements for fixed or temporary automatic sampling shall be made jointly by the interested parties.

4.2 The purpose of sampling is to obtain a sample corresponding in characteristics and composition with the lot from which it was taken. Therefore, the mechanical sampling device, having been installed, suitably adjusted and set in operation, shall automatically take an increment or a series of increments from a lot. Such increment or increments may be taken continuously, or intermittently and repeatedly, depending on the device used.

4.3 It is normal practice that a product which is sea-damaged or suspected of being contaminated, damaged or out of condition is kept separate from the sound product and is sampled separately. Samples of the unsound material shall not be mixed with samples of the sound material.

4.4 Special care is necessary to ensure that all parts of the sampler are clean, dry and free from foreign odours.

4.5 Sampling shall be carried out in such a manner as to protect the samples, the sampler, and the containers in which the samples are placed, from contamination such as rain or dust. In the case of products for human consumption, the installation shall comply with relevant food safety legislation.

5 Requirements for apparatus

5.1 General

Mechanical sampling equipment shall be capable of taking increments from the entire cross section, or as much of the cross section as possible, of the flowing bulk material. Annex A gives descriptions of the general types of automatic sampling devices and illustrations of examples of such types.

5.2 Adjustment

The equipment shall be capable of adjustment such that the size of increments and frequency at which they are taken can be varied over the desired wide ranges.

5.3 Access

Each sampler shall be provided with suitable access for convenient inspection, cleaning, maintenance and repair of all wearing surfaces, and for sampling verification. Access equipment should be constructed of materials that will not generate an electrostatic charge.

5.4 Safety

The installation shall comply with all applicable safety requirements, including adequate illumination for inspection, operation and maintenance. When used in a potentially dusty environment, the operator should wear a suitable respirator.

5.5 Location

5.5.1 In general it is advisable to take samples from a point as close as possible to the place where the commodity being sampled changes ownership (e.g. just before the loading of a wagon or vessel).

5.5.2 Products moving in bulk may be sampled, for example, when moving on a conveyor belt, or in an inclined conduit, or when moving in air streams as in a pneumatic lift or conveyor, or when falling from a spout or the end of a conveyor belt.

5.5.3 When sampling grain from a spout, it is important that the velocity of the stream does not cause breakage of the grains. Therefore the apparatus shall be installed not more than 4 m from the weighing machine, bin, head of bucket elevator, or discharge point of a pneumatic elevator cyclone. The slope of the spout shall be not less than 35° from horizontal to avoid separation of smaller/lighter fractions from larger/heavier elements within the stream.

5.5.4 When sampling grain from a conveyor belt, the apparatus shall be installed at least 2 m from the nearest feeder, turn-head or place where the grain is fed onto the conveyor belt or band, to allow the grain stream elements to achieve near equilibrium a maximum distance of 15 m.

6 Requirements for taking increments

6.1 General

The increments shall be taken from as wide a cross section of the flowing product as possible, in such a way that almost every part of the lot has an equal opportunity of entering the inlet of the sampler. Some samplers allow full cross-sectional sampling; other designs cover 90 % to 95 % of the cross section of the product flow.

6.2 Continuous sampling

A small constant proportion of the lot shall be taken during the period that the lot is flowing past the sampling point.

6.3 Intermittent automatic sampling

A series of increments of fixed size shall be taken at predetermined intervals of time.

As the characteristics and composition of a lot can vary, the increment or series of increments shall be taken during the whole time that the lot is flowing past the sampling point.

7 Bulk samples

7.1 A continuously taken sample may be allowed to accumulate to form a bulk sample, during the entire time of sampling a particular lot. If desired, the sample may be divided, intermittently, into increments so that each increment represents a given proportion of the lot flowing past the sampling point during a known time interval. Any bulk sample should always be thoroughly mixed to ensure the composition is as homogeneous as possible.

7.2 A series of intermittently taken samples may be retained as separate increments so that the fluctuations in characteristics and composition of the lot can be assessed. Alternatively, they may be blended together and well mixed to provide a bulk sample. Separate-increment samples may also be retained as laboratory samples if the sample size coincides with requirements.

8 Laboratory samples

The bulk sample shall be divided into the required number of laboratory samples of the required size by using one or more of the techniques described in ISO 13690.

9 Size of samples

The automatic sampler should be adjusted so that the sizes of samples given in Table 1 are obtained. These sample sizes are for guidance only, and are not intended to over-ride national requirements or specifications.

Larger or smaller laboratory samples may be required in some cases, according to the tests to be carried out.

Table 1 — Approximate sizes of samples

Type of sampling	Lot size ^a tonnes	Maximum increment kg	Maximum bulk sample ^b kg	Laboratory sample	
				Grain kg	Milled products kg
Continuous	Up to 500	—	100	5	3
Intermittent	Up to 500	1	100	5	3

^a Unless otherwise specified in the contract.

^b A sample of a 100 kg is too large to put through a Boerner or riffle divider in one pass, but it may first be sub-divided (see ISO 13690 for methods).

10 Packaging and labelling of samples

10.1 Packaging of samples

10.1.1 The laboratory samples shall be packed in containers suitable for the purpose, bearing in mind the tests to be undertaken.

10.1.2 Samples for the determination of moisture, or for other tests in which it is important to avoid the loss of volatile matter (e.g. examination for evidence of chemical treatment), shall be packed in air-tight and vapour-tight containers with air-tight and vapour-tight closures (e.g. with chemically inert foil inserts) and stored under appropriate conditions. The containers shall be completely filled and the closures shall be sealed to prevent loosening or tampering.

10.1.3 The sample containers shall carry the seal of each sampler.

10.2 Labels for samples

If paper labels are used for the samples, they shall be of a suitably high quality for the purpose. The eyelet hole of the label shall be reinforced. The information on the labels shall be indelibly marked using a marker which will not transmit an odour to the sample.

The information on the label shall include such of the following items as are required by the terms of the contract:

- a) ship, wagon or freight container;
- b) point of departure;
- c) date of departure;
- d) destination;
- e) date of arrival;
- f) quantity;
- g) bulk;
- h) goods;
- i) identification mark or lot number;
- j) name of seller;

- k) name of purchaser;
- l) contract number and date;
- m) date of sampling;
- n) date of final discharge;
- o) place and point of sampling;
- p) name of sampler.

On agreement between the seller and purchaser, a duplicate label may be included inside the sample container, unless the sample is intended for moisture determination.

11 Dispatch of samples

Samples shall be dispatched as soon as possible. Only under exceptional circumstances shall this be more than 48 h after sampling has been completed, non-business days excluded. Whenever possible, samples should be kept below 15 °C, out of direct sunlight and in a non-humid location.

12 Sampling report

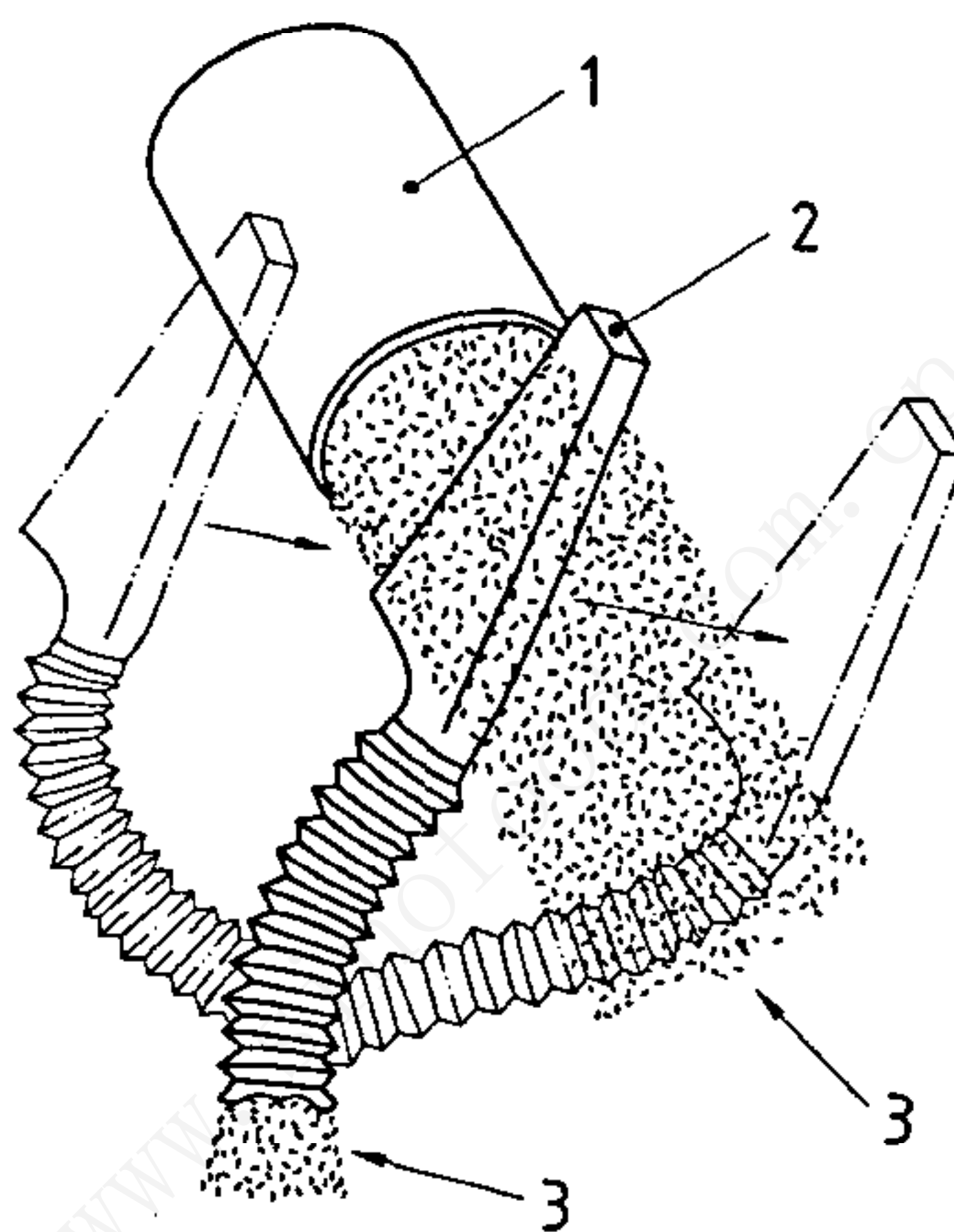
The sampling report, besides giving the usual information, shall refer to the sampling technique applied, and to any special circumstances that may have influenced sampling. The report may also make reference to the condition of the product sampled, including signs of insect, mite, rodent or other infestation visible in the warehouse, silo, mill or during working the vessel or other carrier. This infestation is not always readily apparent in the sample except on close inspection or sieving.

Annex A
(informative)

Examples of automatic samplers

A.1 Transverse samplers

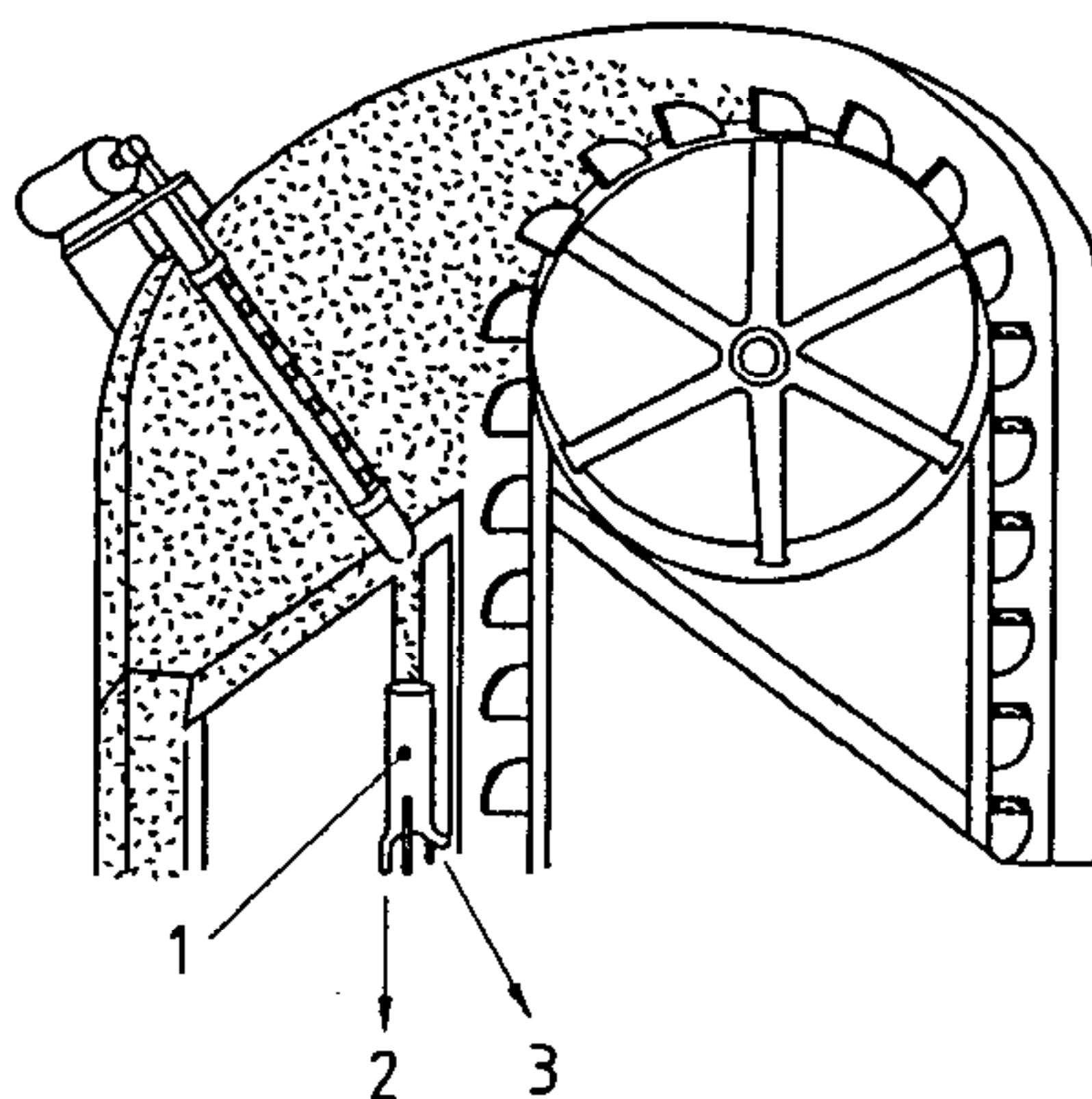
These are for taking a complete section from a falling grain stream. They may be open-spout samplers (see Figure A.1), tubular samplers with openable sampling holes (see Figure A.2), or screw-type tubular samplers (see Figure A.3).



Key

- 1 Spout
- 2 Sampler
- 3 Grain

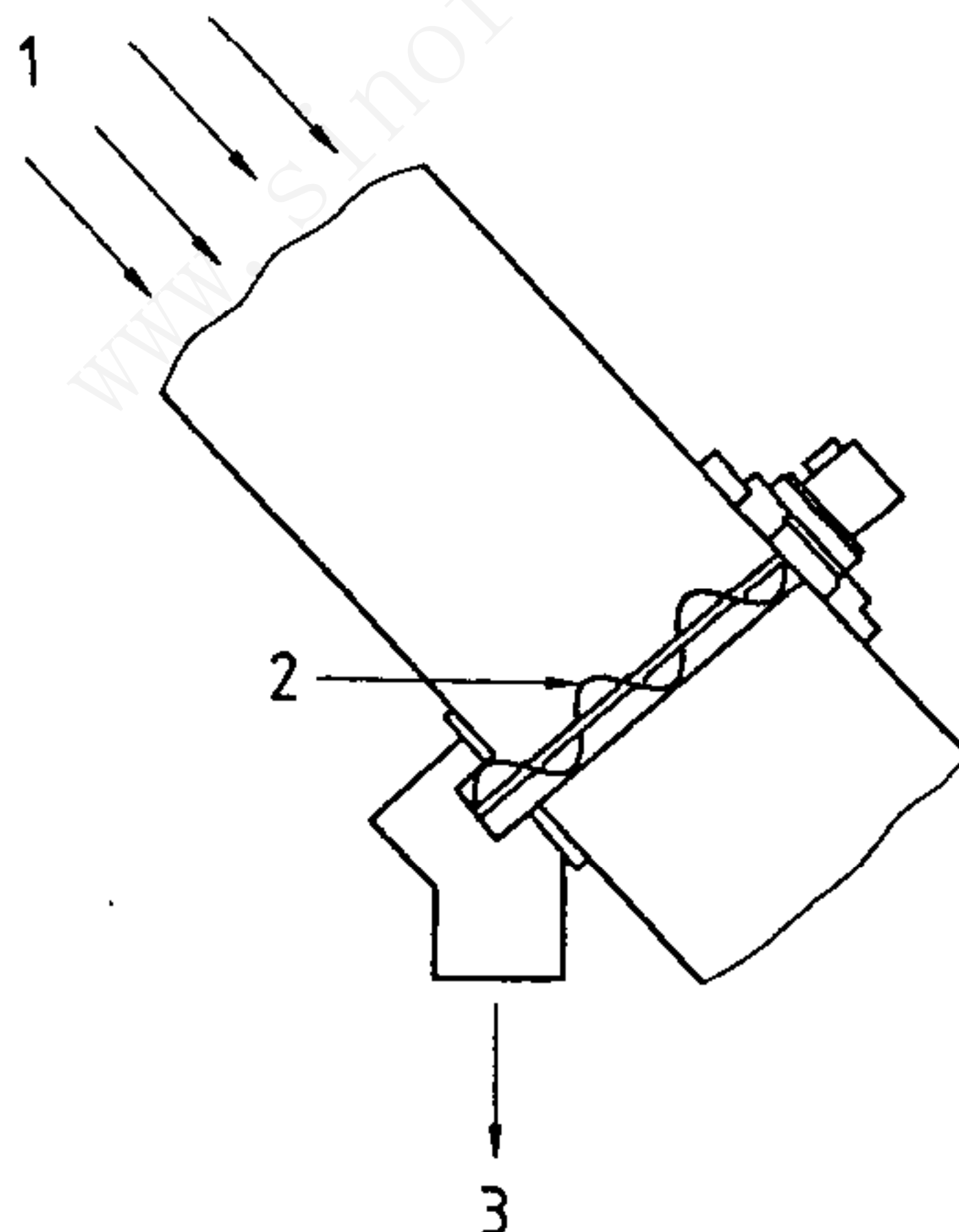
Figure A.1 — Transverse open-spout sampler, providing intermittent and repeated sampling



Key

- 1 Sample divider
- 2 Sample flow
- 3 Excess grain returned to system

Figure A.2 — Transverse tubular sampler with openable sampling holes



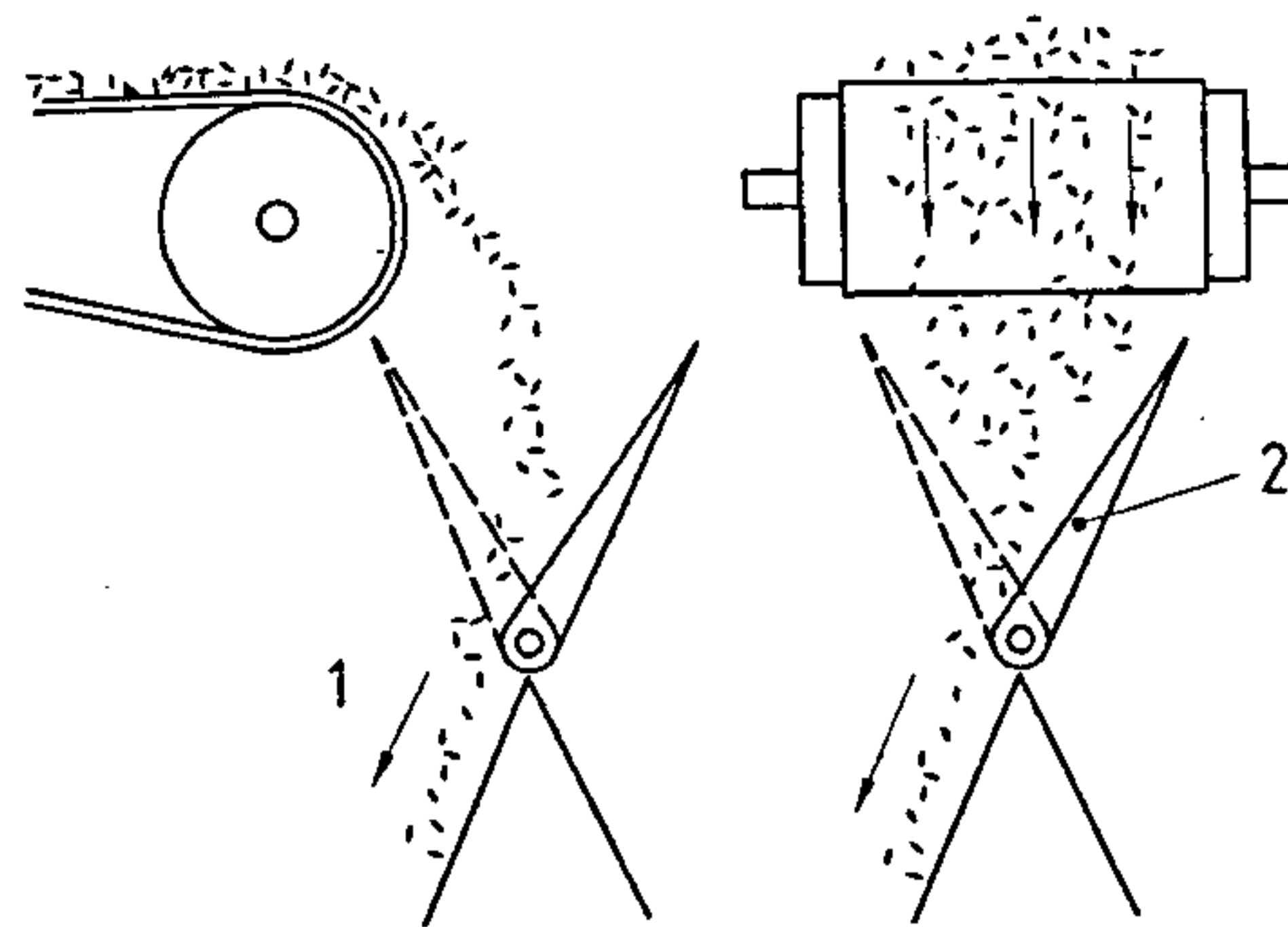
Key

- 1 Grain flow
- 2 Archimedes screw
- 3 Sample flow

Figure A.3 — Screw-type tubular sampler

A.2 Full-stream diverter samplers

In this type, a flap or paddle swings to divert intermittently the entire grain stream (see Figure A.4).



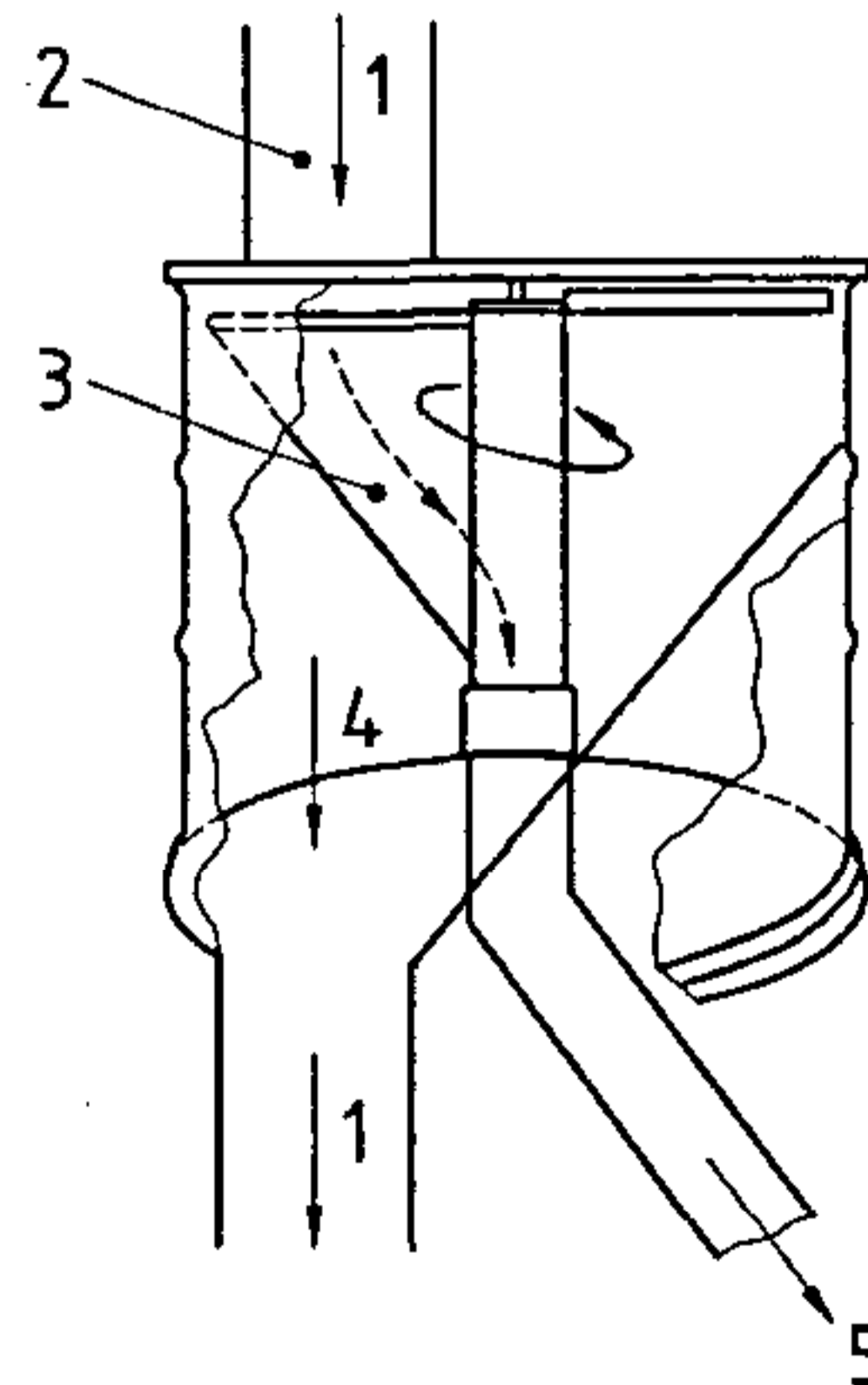
Key

- 1 Sample flow
- 2 Flap or paddle

Figure A.4 — Full-stream diverter sampler

A.3 Rotating cup samplers

With this type the falling grain stream is intermittently sampled by a cup with an outlet spout rotating on a central vertical shaft (see Figure A.5).



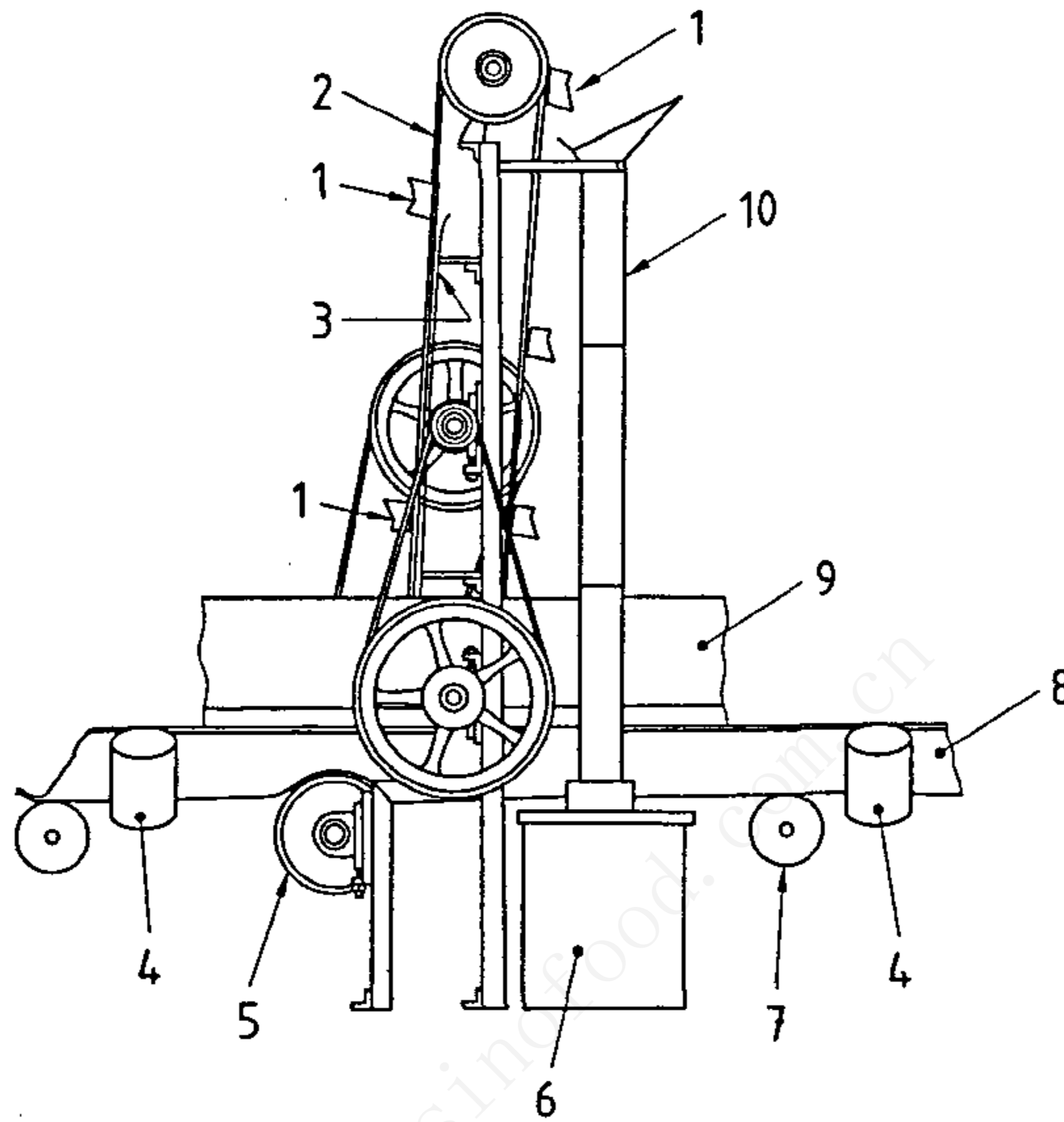
Key

- 1 Grain flow
- 2 Vertical spout
- 3 Rotating cup
- 4 Flow
- 5 Sample flow

Figure A.5 — Rotating cup sampler

A.4 Bucket elevator samplers

These take samples of grain moving on a belt or conveyor. Buckets, on a continuous loop, remove samples from the full width of the grain stream because of the configuration of the side rollers concentrating the grain on the belt. The samples are released into the receiving hopper as the buckets move over the upper roller pivot (see Figure A.6).



Key

- | | |
|----|-----------------------|
| 1 | Sampling buckets |
| 2 | Sampling bucket chain |
| 3 | Chain guide |
| 4 | Concentrator |
| 5 | Special roller |
| 6 | Sample container |
| 7 | Carrier roll |
| 8 | Conveyor belt |
| 9 | Splash boards |
| 10 | Hopper |

NOTE On their upward path, the buckets sample grain moving on a belt or conveyor and deposit the samples in the upper hopper once they pass over the top roller pivot.

Figure A.6 — Bucket elevator sampler

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