PORTABLE DISK-DRIVE CRUSHER

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ABSTRACT

A portable disk-drive crusher is a mechanism made to destroy a storage device to a level where the data stored in the system is no longer accessible. This type of destruction or erasing of data is physical rather than being virtual guaranteeing that no retrieval methods can reconstruct the original data. However, any device destroyed by mistake also cannot be retrieved and hence prior precautions have to be taken before using this application. The device is designed to be portable and robust, also considering the fact that it will be used in a public environment, the mechanism does not involve emission of any kind of hazardous gases. The crushing device is a high-powered machine and therefore it is housed in a strong structure in order to avoid any accidents to the user around the system. We propose that the device be used in mass data destruction process and also in cases where highly classified information is to be destroyed.

5 Claims and 10 Drawings

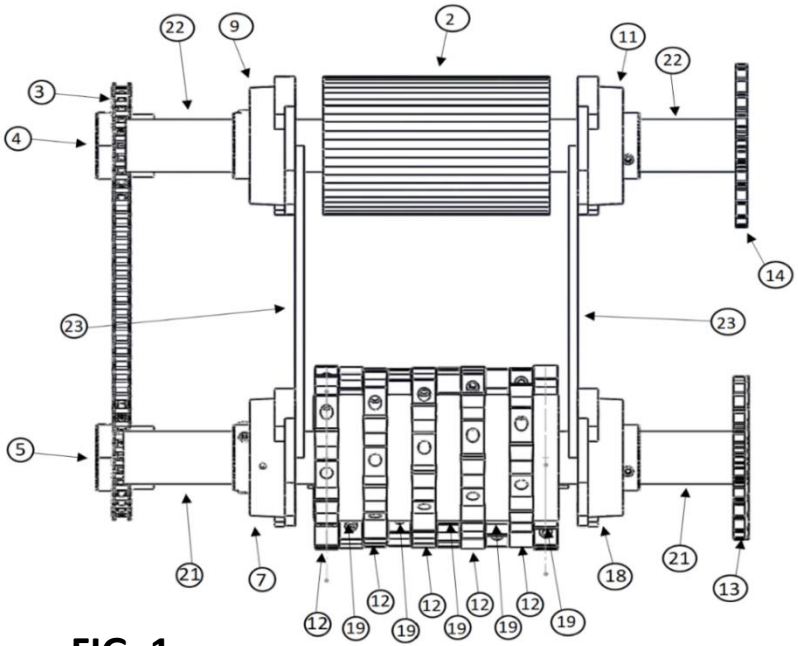

FIG. 1

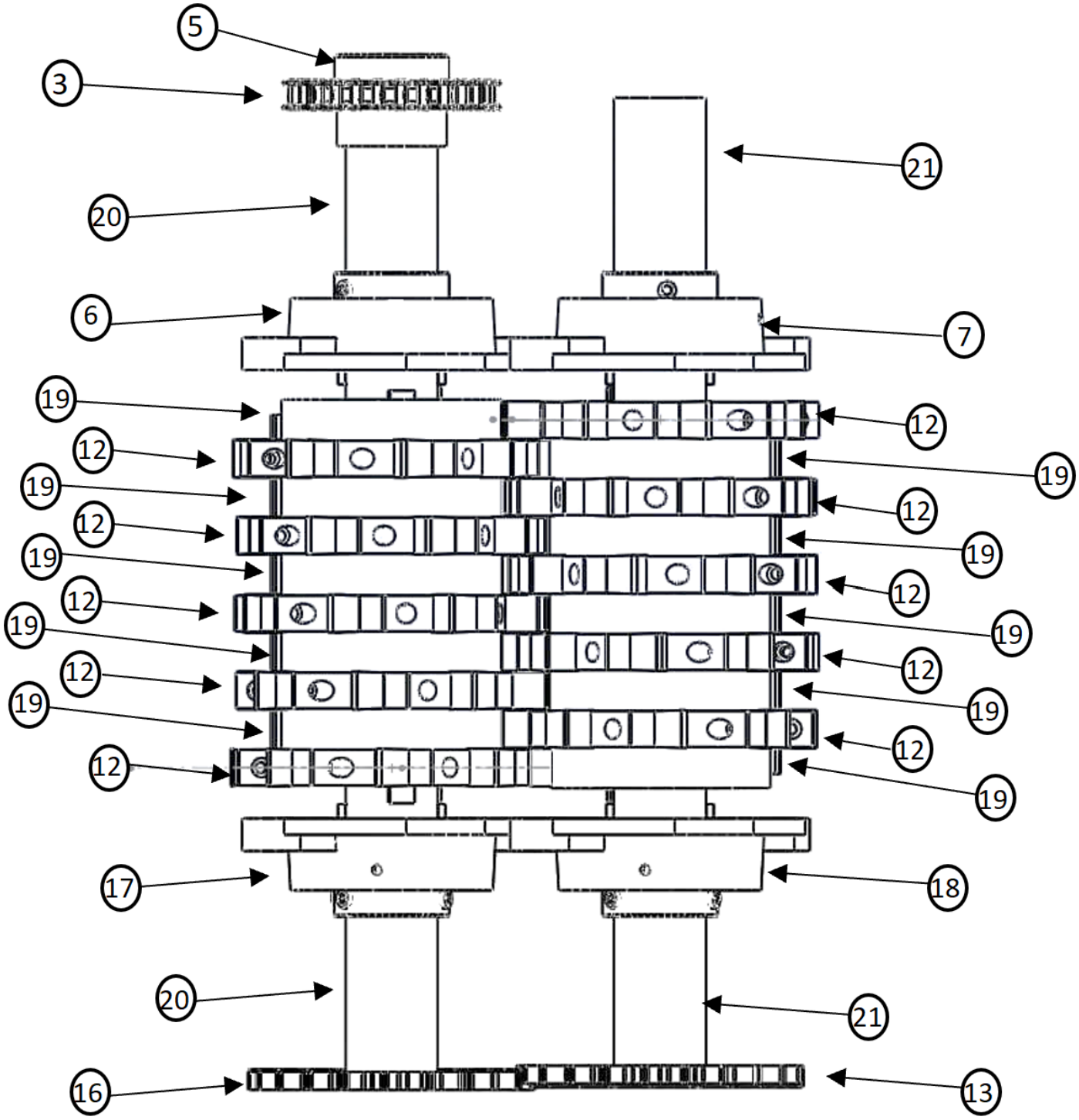
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FIG. 2

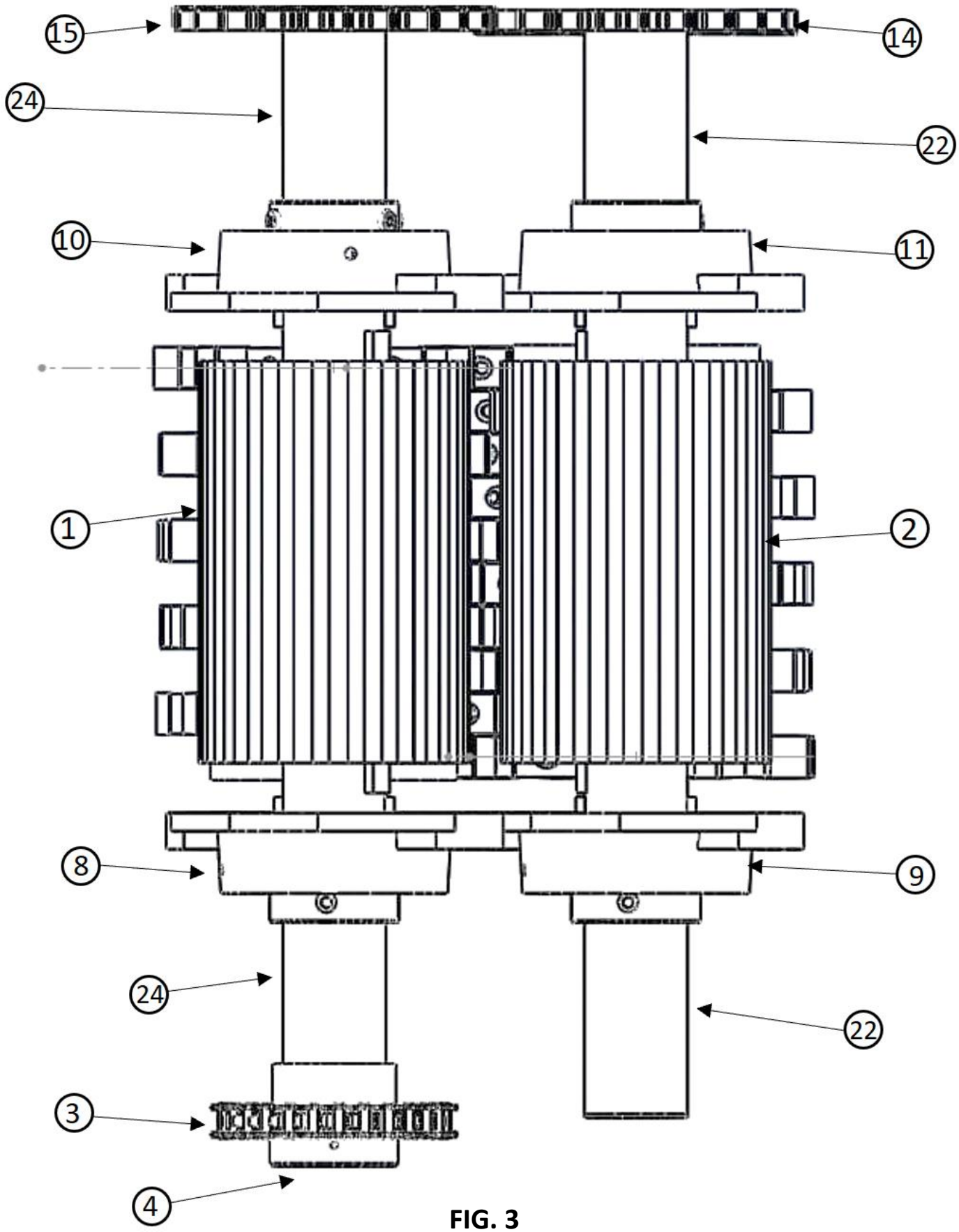

FIG. 3

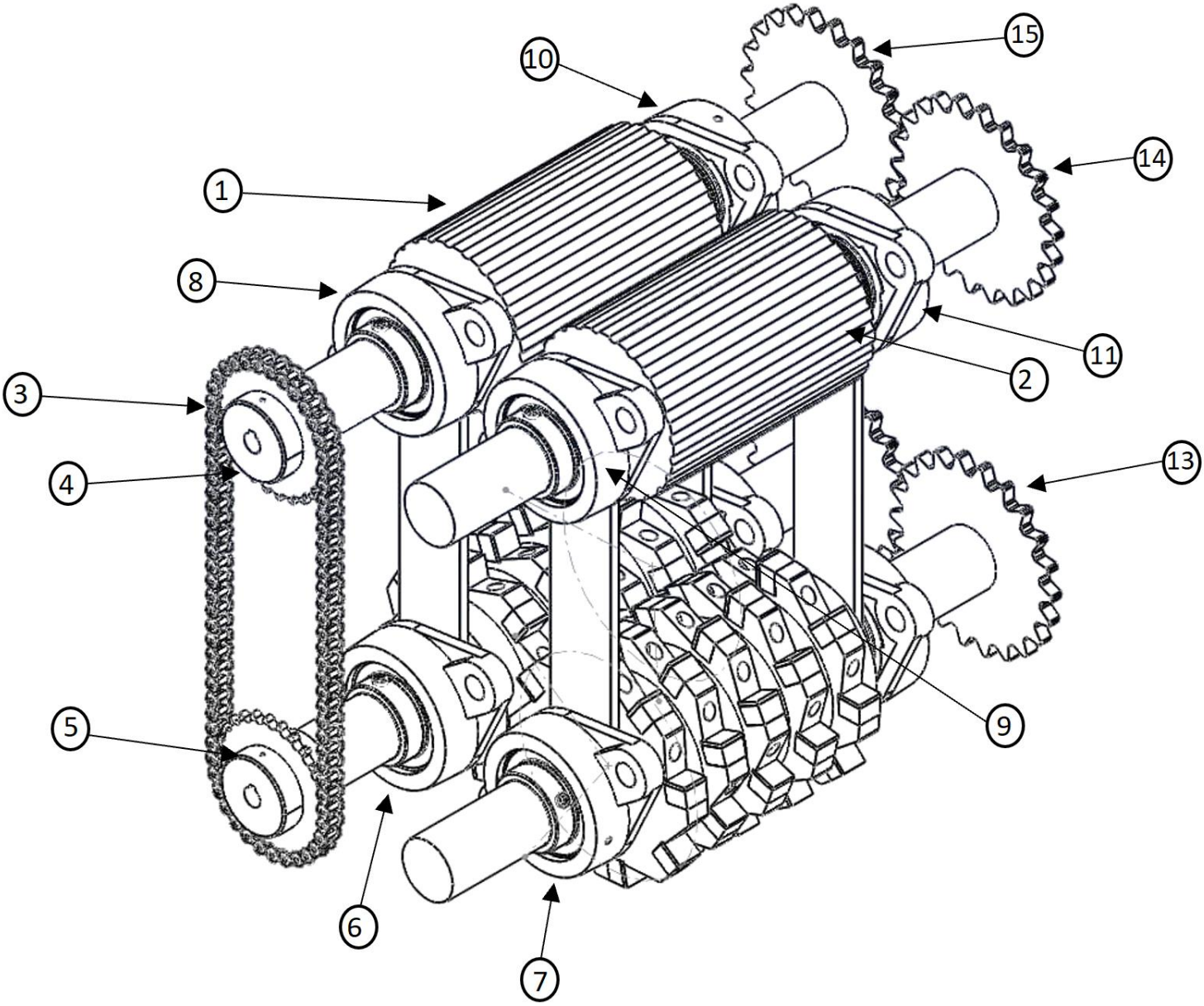

FIG. 4

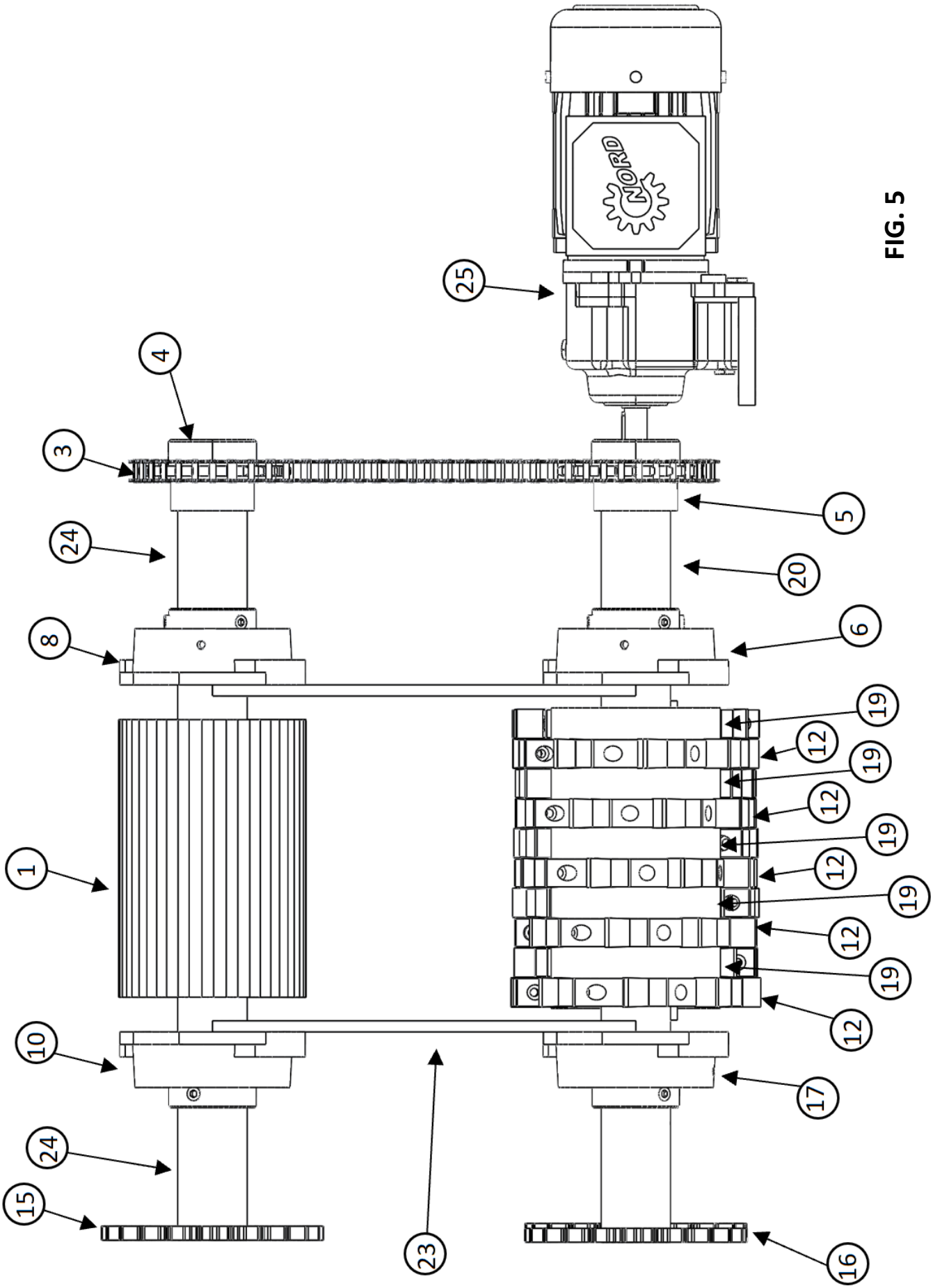

FIG. 5

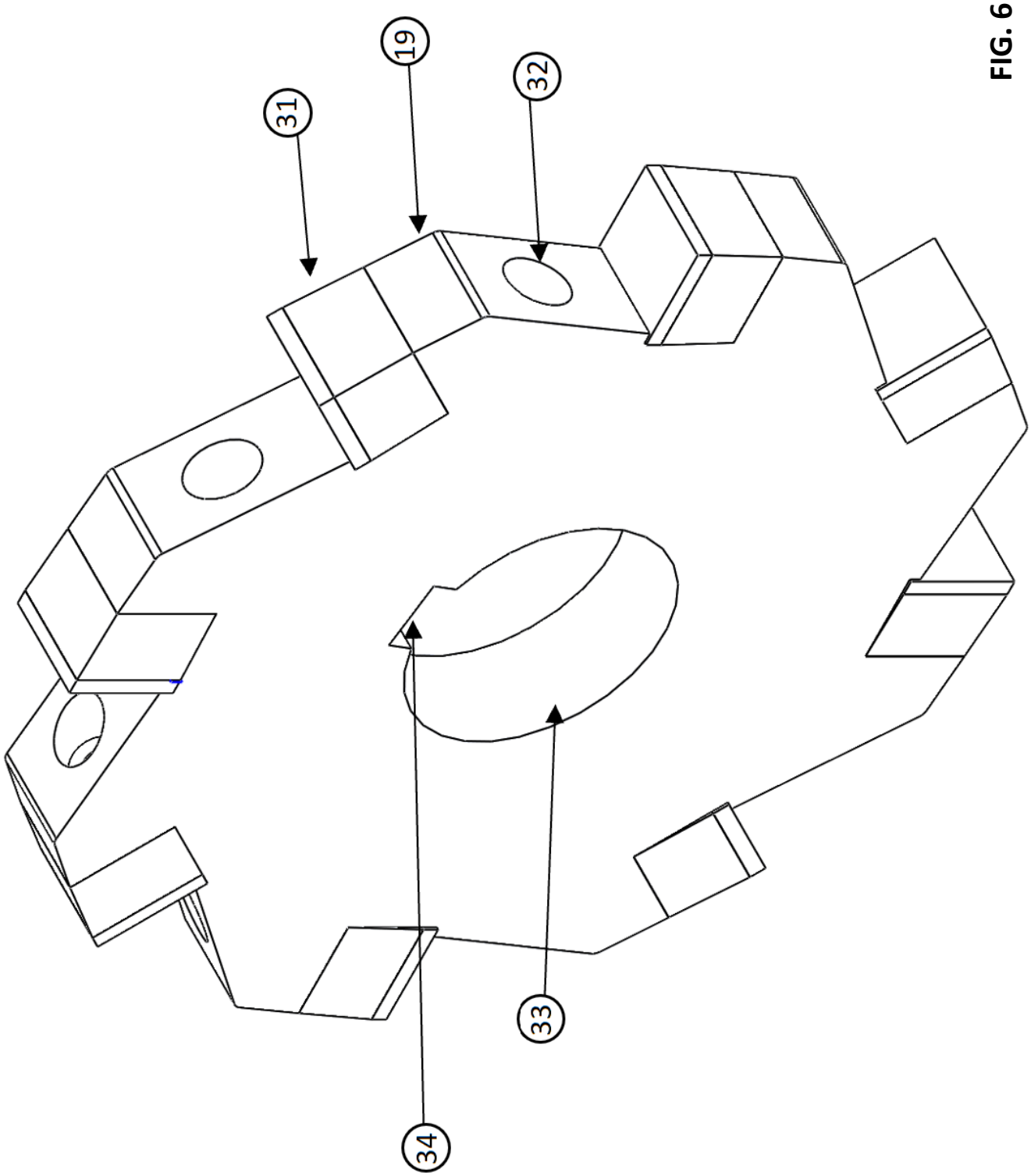

FIG. 6

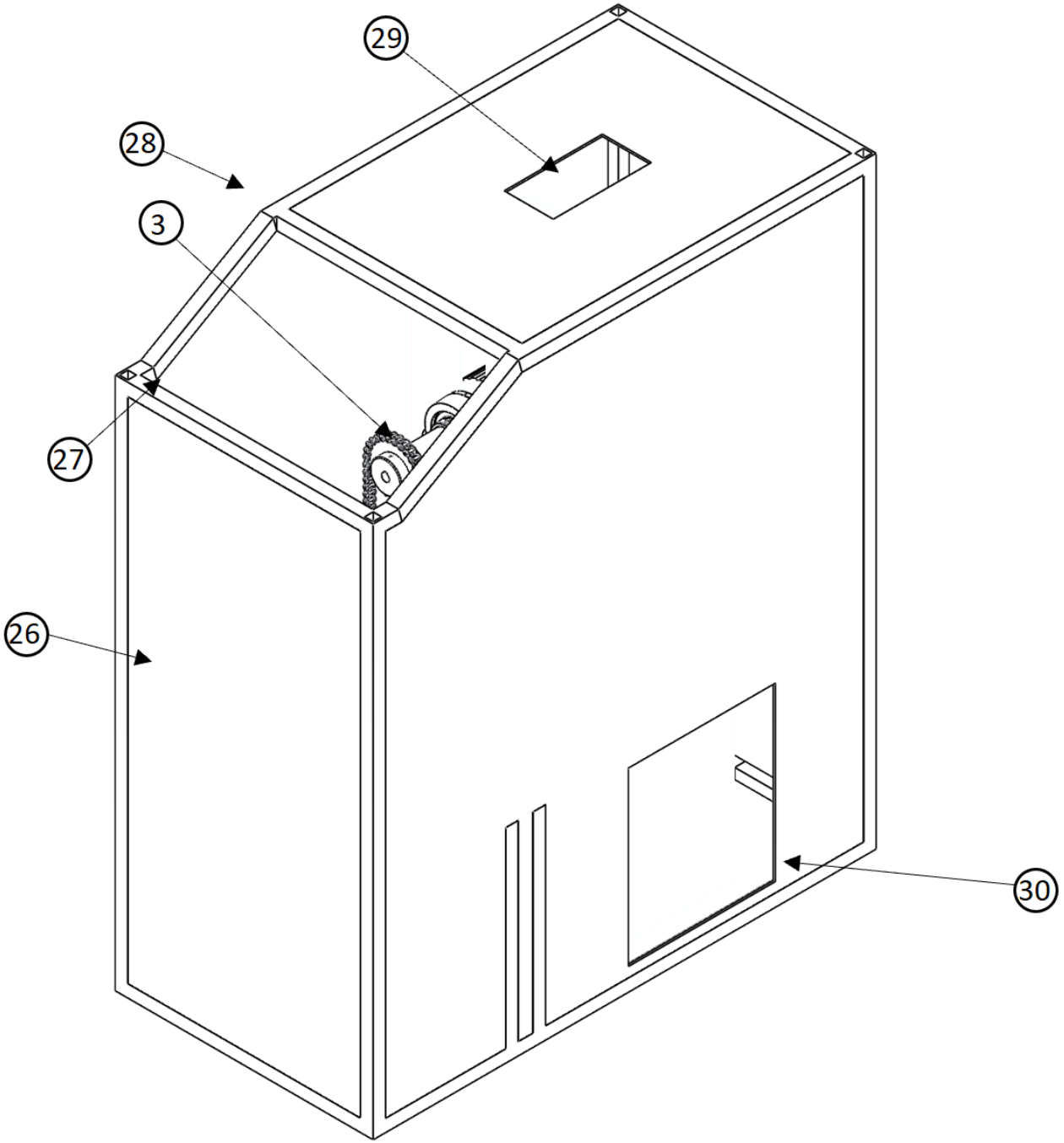

FIG. 7

ITEM NO.	PART NAME
1	Roller
2	Roller
3	Chain
4	Sprocket
5	Sprocket
6	UCFL Bearing
7	UCFL Bearing
8	UCFL Bearing
9	UCFL Bearing
10	UCFL Bearing
11	UCFL Bearing
12	Cutting blade plate
13	Gear
14	Gear
15	Gear
16	Gear
17	UCFL Bearing
18	UCFL Bearing
19	Spacer
20	Shaft
21	Shaft
22	Shaft
23	Mechanism Housing
24	Shaft
25	Motor
26	Machine body cover
27	Space for Machine Display
28	Machine body frame
29	Inlet for disk drive
30	Outlet for shredded material
31	Cutting Tip
32	Bore hole for fastening tip to cutting blade
33	Shaft hole
34	Key way for shaft

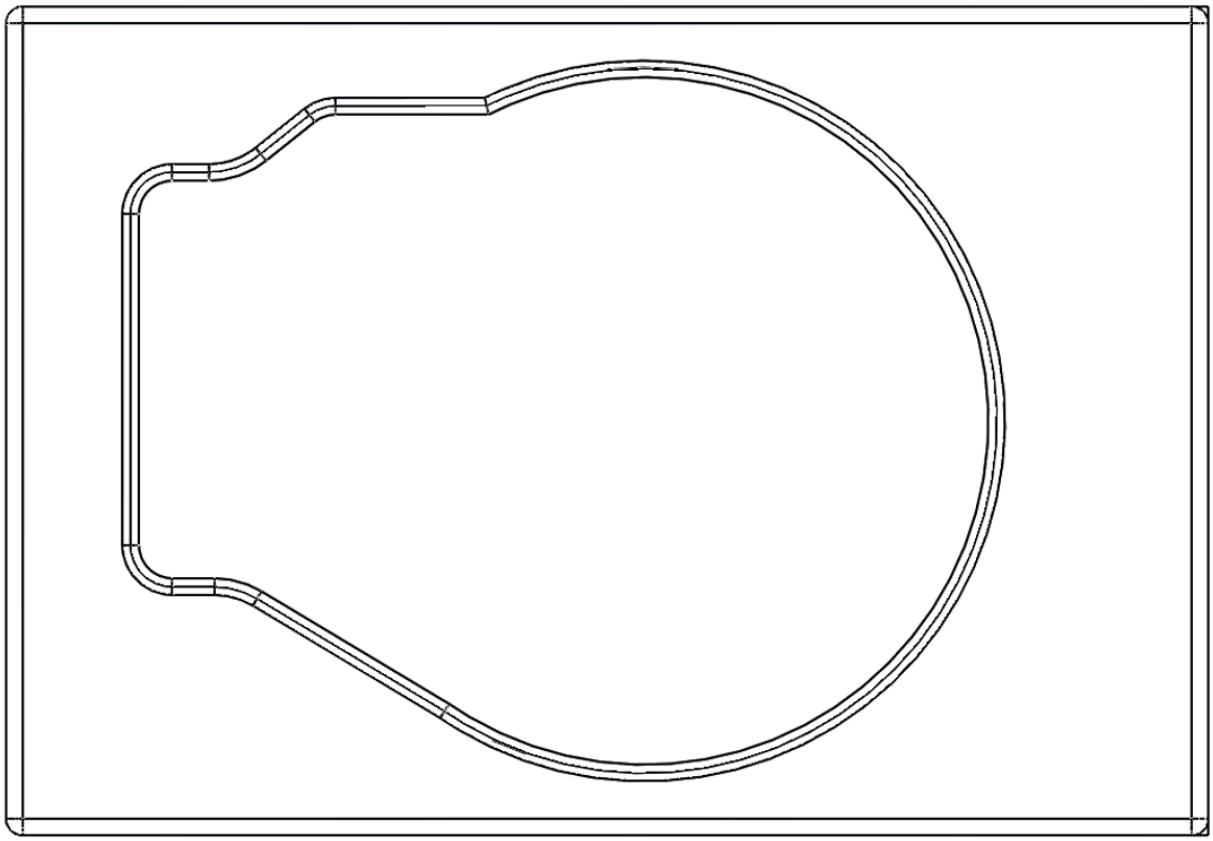

FIG. 8

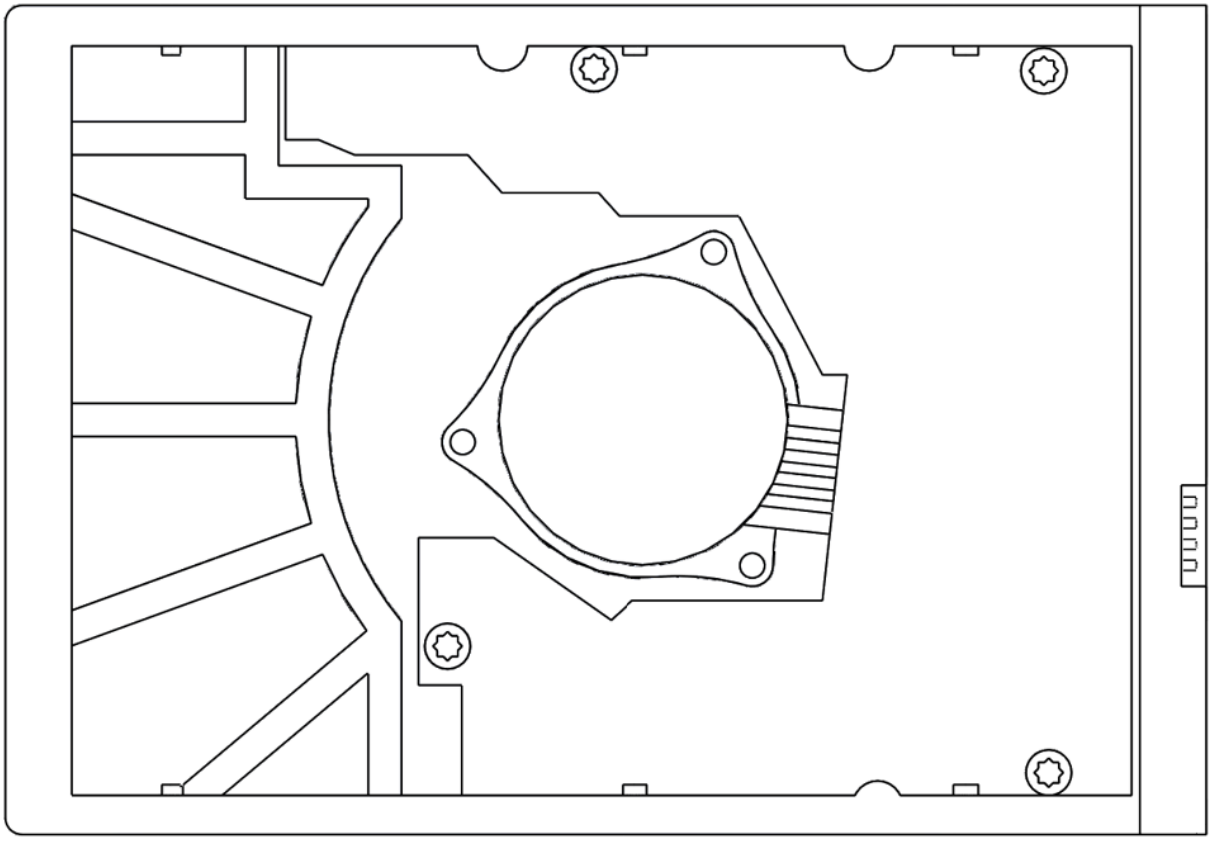

FIG. 9

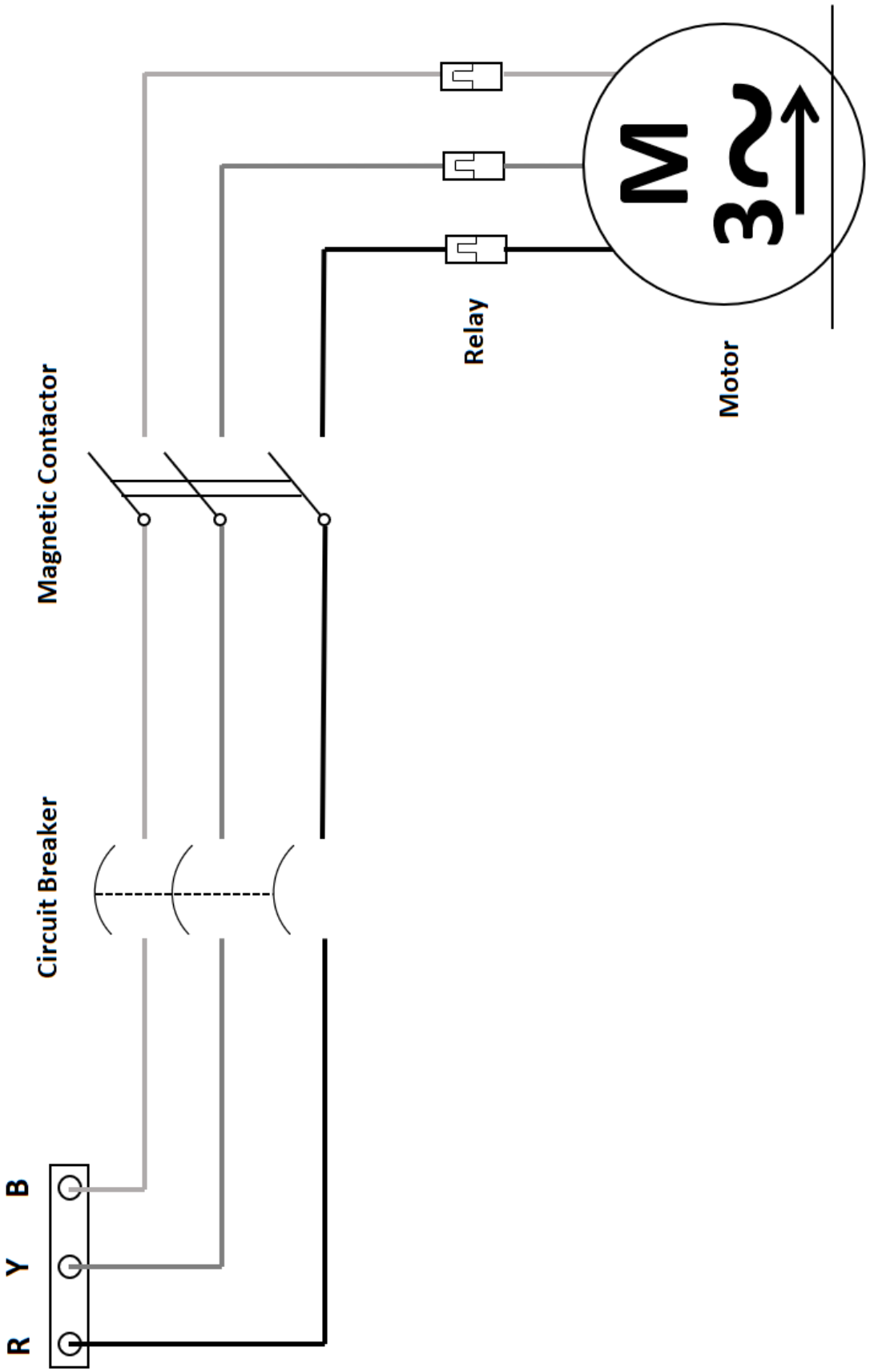

FIG. 10

PORTABLE DISK-DRIVE CRUSHER

TECHNICAL FIELD

This mechanism is made to improve the disposal of storage device like disk-drives easy and to make the machine portable and robust for a public environment. It also addresses the fact of theft of data and assuring maximum efficiency when it comes to erasing data during disposal.

BACKGROUND

In the modern era, digital storage is a popular way of storing data. It is considered to be the most efficient way of storing data because it uses less storage space and retrieval of data is very easy and quick. Data theft is also a major concern in this situation and protection of data is a growing market in the world of digitization. A physically destroyed data is impossible to recreate and is a more reliable way to erase data. Current methods of data erasing adopted by E-Waste Recycling Companies involves crusher but due to the huge size of the machine, it becomes difficult to transport it to the consumer's office for getting the job done and there is always a threat of disks being stolen when in transit from consumer's office to E-Waste Recycling Industries. Because of this fact, a design is made to make the machine compact, portable and capable enough to carry out its function properly.

The compact mechanism designed involves two stages. In the first stage, the hard-drive is partially flattened by two rollers and guided to the second stage where strategically placed crusher blades destroy the hard-drive. The left-over pieces are stored in a tray at the bottom of the machine enclosure which can be removed later. The mechanism is built in such a way that it uses a single motor to drive the whole system.

As per the simulation conducted during this paper, we noticed that the mechanism was able to sufficiently damage the platters inside the hard-drive. The sample hard drive mechanical data were taken similar to that of hard-drives available in the market. Considering the fact that most market available hard-drives are generally very fragile, the above mention mechanism is efficient.

DISCLOSURE OF INVENTION

For the first stage, the pressing rollers as shown in Fig.1 are made of En-31 (Carbon alloy steel). And for the later stage, there is an assembly of crushing plates as shown in Fig.1 which are made with different materials. The tip which makes contact with the disk-drive and which bears maximum load is made up of OHNS and the cutting plate on which the tip is mounted is made up of Mild Steel as shown in Fig.1. Also, there are spacers at alternate sequence with the cutting blade which is made up of En-8. The whole system is housed in a compact body made by Mild Steel material. This mechanism with above-mentioned

materials exploits the fragility of a hard-drive.

The parts of the mechanism as shown in **FIG. 5** are shown in **FIGs 1, 2, 3** and **4**.

FIG. 1 shows the right side view of the internal mechanism inside the housing displaying the pressing rollers, cutting blades and the brackets holding them.

FIG. 2 shows the bottom view of the internal mechanism of the displaying the cutting blades and the spacers between the cutting blades.

FIG. 3 shows the top view of the internal mechanism of the pressing rollers.

FIG. 4 shows the assembled mechanism without the housing which comprises of the pressing rollers, chain, sprocket, shafts, UCFL bearings, cutting blades and gears.

FIG. 5 shows the left side view of the mechanism along with the motor coupled to the shaft.

FIG. 6 shows a single cutting blade which comprises of cutting tip and cutting plate.

FIG. 7 shows the fully assembled machine which comprises the frame and the housing along with the fully assembled mechanism.

FIG. 8 shows the bottom view of a generic disk-drive.

FIG. 9 shows the top view of a generic disk-drive.

FIG. 10 shows the circuit diagram to power the motor

DETAILED DESCRIPTION OF THE INVENTION

With reference to **FIG. 4** as displayed, shows the rollers **1** and **2**. It also displays the chain **3** which is linked with two sprockets **4** and **5**. **6, 7, 8, 9, 10, 11** in **FIG. 4** along with **17,18** in **FIG. 2** are the UCFL bearings. **20, 21** and **22, 24** are shafts shown in **FIG. 2** and **FIG. 3** respectively. Spur gears **13, 14, 15** in **FIG. 4** and **16** in **FIG. 2** are responsible for transferring the power to their adjacent shafts. The supply circuit is given in **FIG. 10**.

The rollers **1** and **2** are made of Carbon alloy steel (En-31) as well as the shafts **20, 21, 22** and **24**. The sprockets **4** and **5**, cutting blades **12**, gears **13, 14, 15**, **16** and the machine frame **28** are made of mild steel (MS). The cutting tip **31** in **FIG. 6** of the cutting blades are made of OHNS material. The spacers **19** in **FIG. 2** are made En-8 (Carbon steel).

The mechanism is assembled by fixing the rollers **1** and **2** on shafts **22** and **24** as shown in **FIG. 3** and arranging the cutting blades **12** and spacers **19** on shafts **20** and **21** as shown in **FIG. 2**. The mechanism housing **23** is made as per design in **FIG. 11**. The mechanism housing consist of a slot having the radius as per the radius of the shafts **20** and **21.** The shafts **20** and **21** are slide into the slots of housing **23**. Later the cut slot material of the mechanism housing is again cut reduced to a particular height and again welded back into the slot above shafts **20** and **21**. Then the shafts **22** and **24** are slide into slots of

housing **23** which result with distance between the shafts **22** and **21**, also shafts **20** and **24** as shown in **FIG. 1, FIG. 4** and **FIG. 11.** The UCFL bearings **6, 7, 8, 9, 10, 11, 17** and **18** are inserted around the shafts **20, 21, 22, 24** and mounted using bolts to the housing **23**. The gears **13, 14, 15** and **16** are coupled to one side of the mechanism housing **23** to shafts **21**, **22**, **24** and **20** respectively as shown in **FIG.2** and **FIG.3**. And on the other side of the mechanism housing **23** sprockets **4** and **5** are coupled to the shafts **24** and **20** respectively as shown in **FIG. 5**. Chain **3** is wound around the sprockets **4** and **5**. Motor **25** is coupled with the sprocket **5** as shown in **FIG.5** and the motor **25** is mounted securely on a platform made inside the frame **28**. The circuitry for the mechanism is installed and the panels of the mechanism body **26** are fastened.

The device is portable and can be kept in a corner of the room where the device is to be used. The device is to be switched on first. This will start the motor **25** as shown in **FIG. 5**. The shaft of the motor **25** being coupled to the sprocket **5** drives the chain **3**, thereby leading the sprocket **4** to be driven. The sprockets **4** and **5** being coupled to the shafts **24** and **25** begin to rotate in clock wise direction and also the rotation of the gears **15** and **16** meshed with gears **14** and **13** begin to rotate and hence the shafts **22** and **21** parallel to shafts **24** and **22** begin to rotate in anti-clock wise direction. The disk-drive as shown in **FIG. 8** and **FIG. 9** is to be inserted into the input slot **29** as shown in **FIG. 7**. Once the disk-drive is inserted, the pressing rollers **1** and **2** as shown in **FIG. 4** will partially press the disk-drive thereby reducing its strength and makes it easy for the cutting blades **12** as shown in **FIG. 2**. Further ahead, due to gravity the partially pressed disk-drive falls below to the shredding mechanism which is the stage two comprising of the cutting blades **12** as shown in **FIG. 2**. When the disk-drive falls over the cutting blades **12,** due to the rotation the disk-drive automatically comes by the valley formed in between the cutting blades mounted on the shafts **20** and **21**. The rotation of blades **12** pull the disk-drive and the sharp cutting tips **31** shreds it into small pieces. The cutting blades **12** shown in **FIG. 2** are spaced strategically using spacers **19** as shown in **FIG. 2** as well. These spacers provide excellent shearing due to the cutting tips **31** as shown in **FIG. 6**. Once stage two is completed, the shredded disk is accumulated in the temporary storage area under the mechanism as shown in **FIG. 7**. The residual waste can be removed from the housing **23** and outlet area **30** designed in the machine body as shown in **FIG.7** whenever the storage area in full.

While there has been shown and described the preferred embodiment of the instant invention it is to be appreciated that the invention may be embodied otherwise than is herein specifically shown and described and that, within said embodiment, certain changes may be made in the form and arrangement of the parts without departing

from the underlying ideas or principles of this invention, as claimed herein. We claim:

1. The structure of the machine body frame for compactness.
    a. The structure comprises of the mechanism housing having length four hundred sixteen millimetres.
    b. Breath of one thousand twenty-four millimetres.
    c. Height of one thousand two hundred millimetres.
2. A portable system for physically destroying the data storage disk-drives.
    a. Electrical motor is used for the mechanism.
    b. Chain drive mechanism used for power transmission.
    c. Gear drive mechanism used for power transmission.
    d. Rollers designed specifically for the pressing mechanism.
    e. Cutting blade mechanism designed specifically for the shredding purpose.
3. The rollers used for the pressing mechanism.
    a. The face to face distance between the two rollers is fifteen millimetres.
    b. The rollers have diameter of one hundred thirty-five millimetres.
4. The cutting blades used for the shredding mechanism.
    a. Cutting blades used are of thickness twenty millimetres and spacers are of thickness twenty-three millimetres.
    b. Cutting blades comprises of two parts, the cutting blade plate and the cutting tip mounted on the cutting plate.
    c. Cutting blade along with said cutting tip has the diameter of one hundred seventy-six millimetres.
    d. Next cutting blade plate in the sequence of mounting having the shaft key way with offset of nine degrees from the previous cutting blade plate.
    e. Design of nine degrees of offset in the shaft key way forming a diagonal entrance of the tip face while said rotatable cutting blade is engaging deforms the disk-drive.
5. The method of mounting of the shafts into the mechanism housing body.
    a. The shafts with the cutting blades go on the bottom.
    b. The shafts with the rollers go on top of the said shafts with cutting blades with an offset of three hundred and five millimetres.

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