systems and faktycheskye Benefits If you use a crusher for raw materials yzmelchenyya zhyvotnovodcheskyh on farms.

Crusher, Sieve, deck, yznos, yzmelchenyya, Durability, Tehnicheskoe decision.

As separation of crushed grain mass used different devices, the most common are sieves. Existing ways and methods to improve durability of separating work of crushers. Also take into account features of its structure as perforated systems and actual benefits when used the crushed grain on farm.

Crusher, Sieve, deck, wear, crushing, dureliability, technical solution.

UDC 631,312

SHOE DYNAMOMETRUVANNYA TILLAGE WORKING BODIES

VP Kurka, Ph.D.

The analysis methods and structures of existing devices for the study of power characteristics of agricultural implements in tillage and proposed a new method and device for determining the three components of the resultant force of resistance cultivating working body.

Power characteristics, traction resistance, tillage, cultivating your body that make the resistance.

Problem. Dynamometruvannya tillage tools allow for their characterization for energy and power rates, and get your calculations when designing new tillage job of developing them and processes. Conducting such research is aimed at improving the quality of the soil tillage, reduce energy and metal parts and wear by improving the design of tillage implements.

Analysis of recent research

The purpose research is to establish flaws in the methods and design data for existing devices dynamometruvannya agricultural tools to simplify the design of devices of this type, increasing the accuracy of measurements and calculations while minimizing.

Results. In developing construction installation, to improve measurement accuracy was analyzed devices dynamometruvannya tillage work of [1-5] and, the following requirements:

1. Holding dynamometruvannya cultivating working body, not the entire design together.
2. Parallel moving parts of the device relative to the direction of the force being measured.
3. To minimize the intermediate links and mechanisms between the working body and strain gauges in order to reduce the influence of friction between the moving parts of the device.
4. The minimum number of sensors to measure the necessary force or its components.
5. Installation of measuring devices in the field of direct action force being measured.

Plays an important role as universal device that enables the measurement of power characteristics of various types of tillage implements, and adjust the following settings:

- depth of soil;
- angles cultivating working body;
- change the width of capture;
- joining additional tillage tools;
- aggregation of different classes of vehicles.

The basis of the device [6] Task was to measure the three components of the resulting force resistance (longitudinal, transverse and vertical), acting on cultivating your body during cultivation (Fig. 1):

$$F_{верт} = F_{p1} - F_{x1}, F_{попер} = F_{p2} - F_{x2}, F_{позд} = F_{p3} - F_{x3}.$$

where F_{p1}, F_{p2}, F_{p3} - The resistance of vertical, transverse and longitudinal component at your pace.

F_{x1} - The force with which the vertical frame of the plow body acts on the sensor at idle (Fig. 2a).

F_{x2} - The power to move transverse frames (including vertical frame and plow) (Fig. 2b).

F_{x3} - The power to move the longitudinal frame (with vertical and transverse frames and hull plow) (Fig. 3, B).

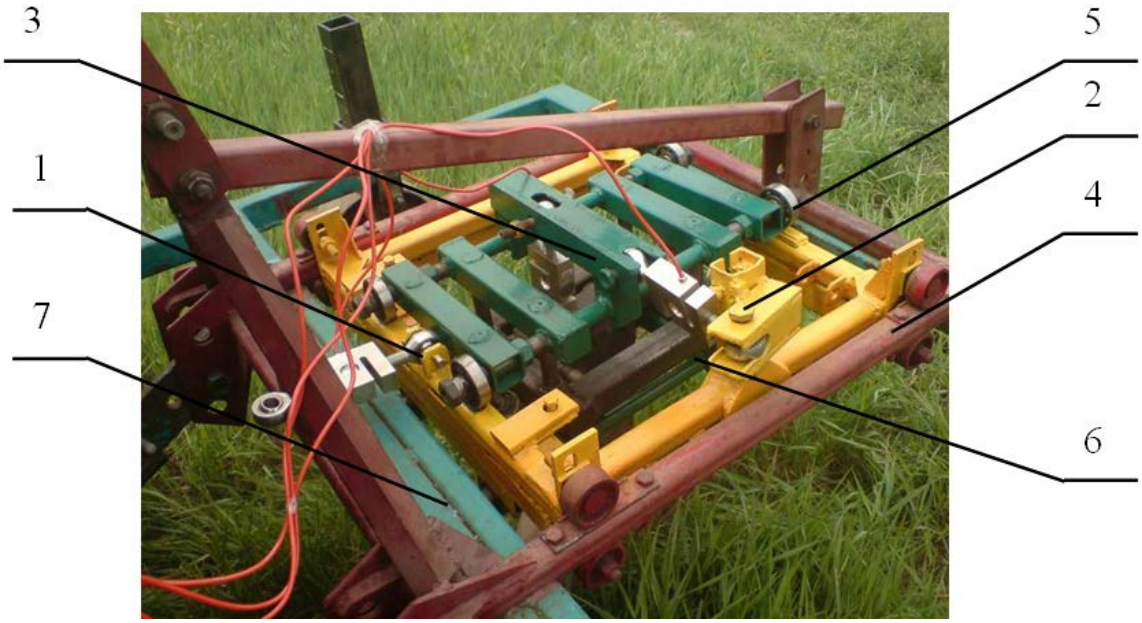
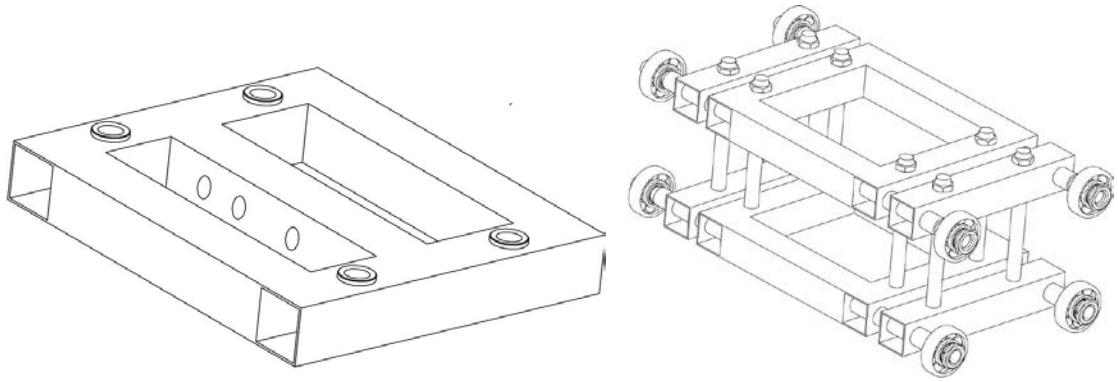


Fig. 1. Experimental setup: 1, 2, 3 - sensors for measuring respectively the longitudinal, lateral and vertical component of the resultant force of resistance; 4, 5, 6, 7 - frames, which see under longitudinal, lateral, vertical components of the resistance and the resulting frame for attachment of the assembly to the tractor [7].



a) b)

Fig. 2. Vertical frame (a) and lateral frame (b).

In determining the F_{x1}, F_{x2}, F_{x3} dynamometruvannya conducted by each of the frames load in place and mount the sensor on the body of the plow, to establish the accuracy of the data.

a) b)

Fig. 3. The sensor that measures the lateral component (a) and longitudinal component (b) resulting force resistance

Sensor №1 responsible for longitudinal (against the direction of movement of the tractor) component of the resultant force resistance (Fig. 3, B) sensor №2 - for vertical (up and down) (Fig. 4), the sensor №3 - the side (perpendicular direction movement) (Fig. 3, a).

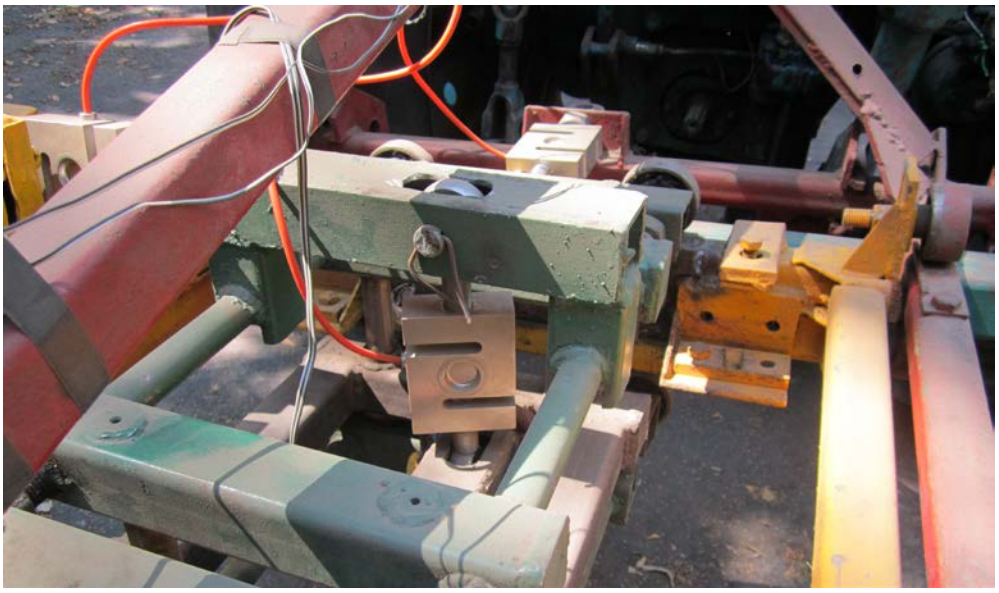
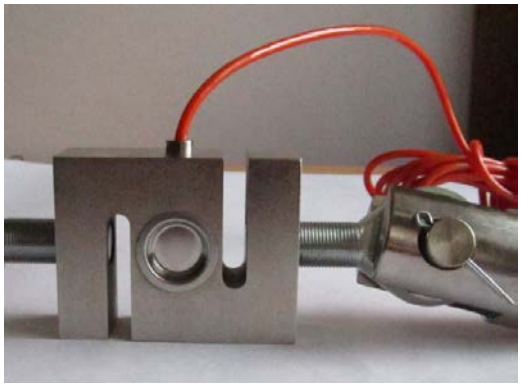
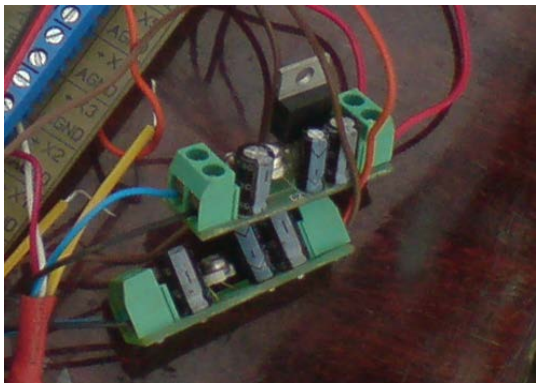


Fig. 4. The sensor that measures the vertical component of the resultant force resistance.

For data measure used to measure the force sensor type DEF - A2t (Fig. 5 a). To improve the accuracy of the data used in research rechargeable battery, making it possible to reduce noise in ADC. To ensure a constant voltage that was applied to the sensors, voltage regulators used (Fig. 5 b).





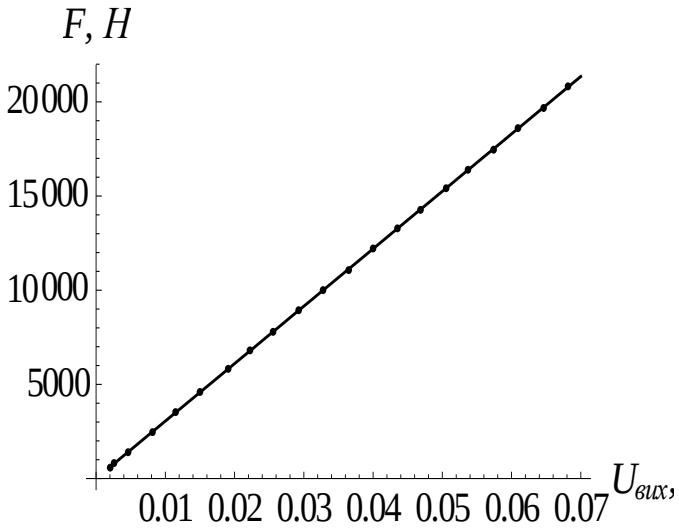
a) b)

Fig. 5. The strain gauge sensor DEF - A2t (a) and voltage regulator (B).

For numerical values of the components (longitudinal, lateral and vertical) resulting in the resistance of soil tillage performed calibration sensor for determining the change in voltage from the power applied to the sensor, which, according to the data, presented in Fig. 6, characterized by the following relationship:

$$F = 0,041011 + 304999U,$$

where U - voltage, V; F - force N.

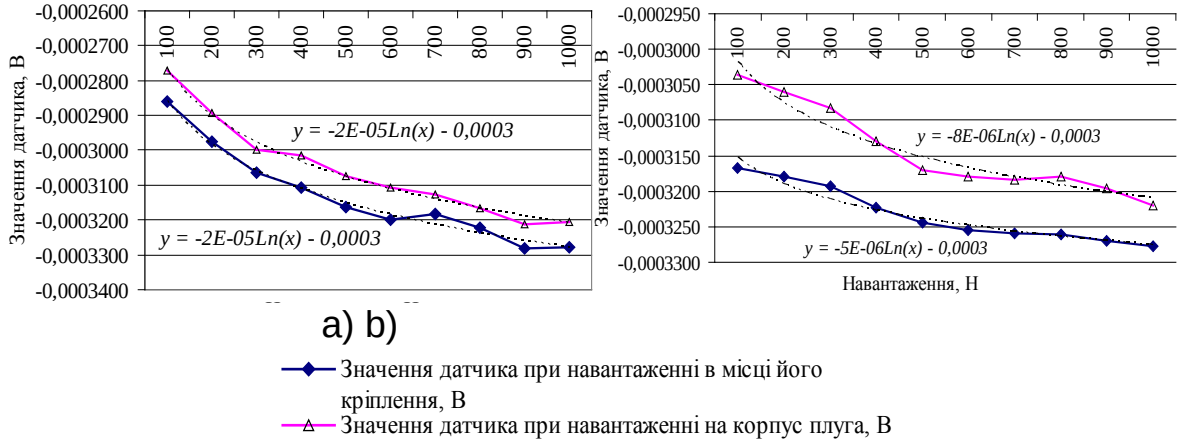


a) b)

Fig. 6. The loading unit (a) and sensor calibration graph (b).

To improve the accuracy of measurements and obtaining reliable data, the study of power characteristics of the experimental shelf plowing component, conducted a comparative assessment shows the sensor when exposed to plow and mount the sensor in place at idle frames. The load frames and plowing component was carried out at intervals of 1000 Nm at three times the sequence, and the data recorded using the ADC. Analysis of the data obtained in the calibration side (Fig. 7, B) and the

longitudinal frame (Fig. 7, a), which measure the appropriate parts of the resistance of the resulting displacement hull plow during plowing showed that the difference in displays data received from sensors with a load case plow idling less than values obtained from the application of force in the fixing of sensors, sensor №1 (longitudinal frame) - 2.4%; sensor №3 (lateral frame) - 2.7%. Have been conducting research power characteristics polytsevyh working bodies (Fig. 8, b) and disk working bodies (Fig. 8 a).



a) b)

Fig. 7. Schedule calibration longitudinal (a) and side frame (b).

a) b)

Fig. 8. An apparatus for spatial dynamometruvannya disc working body (a) and the plowing component (b).

Conclusion. A method and apparatus for spatial design dynamometruvannya tillage working bodies, enabling the measurement of spatial power characteristics tillage implements various types. Said device allows dynamometruvannya providing the following parameters and operating modes: depth of soil to 30 cm; change the width to capture35 cm; speed of 15 km / h; joining additional tillage working bodies; aggregation of different tractors traction classes.

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Conducted analysis methods and structures for devices suschestvuyuschyh characteristics of the study of power in the direction selskohozyaystvennыh Monitor soil and suggestions new method and devices for definitions Trejo sostavlyayuschyh rezultyruyuschey sylы Resistance pochvoobrabatыvayuscheho Rabocheye body.

Silovye characteristics Resistance traction, handling soil, soil-cultivating laboring body sostavlyayuschye sylы resistance.

The analysis methods and structures of existing devices for study of power characteristics of agricultural implements in cultivation and proposed new method and device for determining the three components of resultant force of resistance cultivating working body.

Power characteristics, traction resistance, soil tillage, cultivating working body, components of resistance.