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(54) Machine for the finishing of metal pieces.

(57) A machine for the finishing of metal pieces which consists of a number of rectilinear cradle shaped vibrating units quipped with slides or casters or wheels to enable the units to move along two or more parallel metal guides or rails which constitute the work run of the machine; of two or more translating conveyor belts which move transversally to the movement of the vibrating units along the work run and which move the units from one guide to the other at the end of each work run; of a charging station for the pieces to be processed, placed at the start of the work run; of a discharge station for the contents of the units, placed at the end of the work run; of one or more work stations used for the processing of the pieces contained in the units and situated along the work run and of adjustable controls for the progress of the abovementioned units along the aforementioned guides.

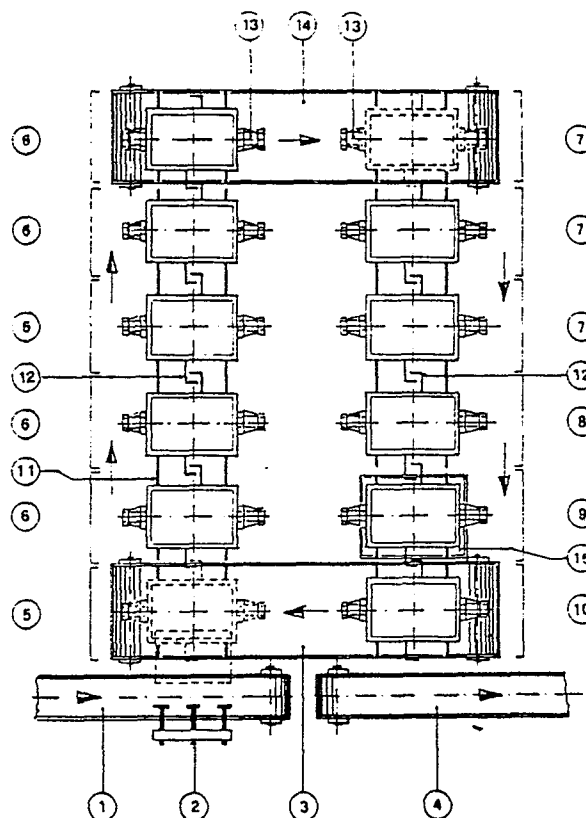


FIG 1

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"Machine for the finishing of metal pieces"

This invention relates to a machine for the finishing of metal pieces, particularly suitable for the performance of a series of processes such as: degreasing, pickling deburring, smoothing, washing, protection and polishing of said pieces. The machine for the finishing of metal pieces relating to this invention consists of a number of rectilinear cradle shaped vibrating units which are equipped with slides or casters or wheels to enable them to progress along two or more parallel metal guides which constitute the work run of the machine; of two or more translating conveyor belts which move transversally to the direction of progress of the units along the work run and which move the units from one guide to the other at the end of each guide; of a charging station, for the pieces to be processed in the units placed at the start of the work run; of a discharging station for the contents of the units placed at the end of the work run; of one or more work stations for the processing of the pieces contained in the units, these work stations being situated along the work run and of adjustable controls for the progress of the units along the work run.

In the case of mechanical processing of a piece, in particular in a plant for the production of pieces in series, the need arises for the execution of a number or series of finishing operations of the type listed above. Generally speaking, these finishing operations are carried out with single vibrating machines of the thoroidal or linear type, scroll or cradle shaped.

None of the above mentioned machines is capable of carrying out more than one type of process during each passage of the pieces within the machine, nor can the speed of progress of the pieces be changed within the machine beyond a reasonable limit in that an excessive slowing down of the pieces means their irregular progress and may cause them to knock against each other and bring about undesirable damage to the pieces themselves.

It has therefore been decided to solve this type of problem by combining a number of machines as, for example, in our previous application for Italian Patent no. 20143 A/84, in which, we describe a finishing machine which consists of a series of vibrating tank units mounted on a turntable or carousel structure. This type of machine, though it resolves in a satisfactory manner the problem of carrying out several different processes using a single machine, is rather large and cumbersome, it is difficult to soundproof, it presents certain problems at the piece discharge stage and so must resort to the use of a system of discharge outside

the machine itself. The time required for the discharge of each single unit becomes therefore determinant to the production speed of the entire machine and, consequently, limits its fullest exploitation as a completing function of the preceding processes.

The invention of this machine resolves all the abovementioned problems completely satisfactorily and it represents notable technical progress with respect to all the other machines in use up to the present day.

In particular, the machine related to the present invention allows: the maximum exploitation of each of the various stages of processing independently one of the other, to achieve a practically immediate discharge of the finished pieces at the end of the work cycle, to have a machine of reasonable overall dimensions with equal production capacity compared to the carousel type machine.

One of the fundamental features of the machine relating to the present invention is that a discharge system is envisaged by which a complete tipping over of a each single cradle shaped tank occurs when it reaches the discharging station at the end of the work run.

All the contents of the vibrating unit i.e. pieces and working media are tipped onto a pieces/media separator (screen) which in turn conveys the pieces onto a conveyor belt which takes them to their storage or other destination and which allows the media to fall through into the empty tank unit (which is the one that has previously passed through the discharging station).

Another fundamental feature of the machine relating to this invention is that it is equipped with two transverse chain belts which carry a series of cut down rails with the same distance between them as the distance between the rails on the work run. The chains move in a transverse direction to the progress movement of the units along the work run so that the units can be easily transferred to the part of the machine which is parallel to the work run whenever a unit reaches the end of its work run.

Other features and advantages of a preferred embodiment of the machine relating to this invention will now be described by referring to the accompanying diagrammatic drawings, in which :
-fig.1 shows the schematic plan of the machine as seen from above; - fig.2 shows a schematic view of the discharge station of the machine with the units concerned shown in the discharge position.

The schematic machine in fig.1 consists of a number of rectilinear cradle shaped vibrating units 2, of two transverse belts for units 3 and 14, of two parallel guides 11, each consisting of a double rail (interrupted at position 9, the connection point of transverse belts 3 and 14 and at position 8) which constitutes the work run; of a number of work stations and of an elevator platform 15 for the discharge of the contents of the units; of two conveyor belts 1 and 4, the first for the charging of the pieces to be processed and the second for the transport of the finished pieces away from the machine and, finally, of a piece charging unit 2.

The pieces to be submitted to the finishing process required are conveyed to the machine relating to this invention by conveyor 1. The charging unit 2) charges the pieces brought by the conveyor 1 into the vibrating unit 5 which is at the start of the work run. The media is already in unit 5, having been discharged into it from unit 7 at the end of its work run, and having been separated from the finished pieces by hopper 18 and the separating grid 17 which were at position 10 of transverse belt 3.

Unit 5 is coupled to the other units, previously inserted onto the work run. The units which contain the pieces being processed and the media are entrained along the guides by means of a progress system consisting of a chain with an advancement device, driven by geared motors with adjustable controls.

At the end of the first part of the work run, the unit which reaches conveyor belt 14 is uncoupled from the units following it and is translated to the second part of the work run 11 where it is recoupled to the other units, previously inserted into the work run. Whenever a unit reaches the position above the discharging platform 15, it is uncoupled from the other units and blocked onto the platform 15. The discharge stage then starts. The motor 13 of the unit is never stopped, platform 15 is raised to position 20 and tipped over by more than 90 degrees in order to discharge the entire contents of the unit 21 onto hopper 18 which fits grid 17 for the separation of the media from the processed pieces.

In this way the pieces are discharged onto a conveyor belt 4 which takes them to storage, whereas the media is charged into unit 5 and this is moved by the transverse belt 3 to the start of the work run and the unit is charged with other pieces for processing and so starts a new cycle.

Along the work run, the units meet the work stations 6. These stations are equipped for the charge and discharge into the units of liquid additives (usually water) which contain in compounds (polishing, abrasive, degreasing, pickling or similar) which are used for the finishing processes on the pieces contained in the vibrating units. Each

station is completely independent of the others, so that it is possible to effect any type of process or series of processes in succession as required for the finishing of the particular pieces in the course of being processed. Furthermore, the time of each single work stage can be easily fixed in that one or more stations can be operated for each process and so make it possible to change the times of one stage with respect to the preceeding or to the following stage without changing the overall time of the stay of the unit along the work run.

As can be easily understood by the experts in the field, the machine relating to this invention can be expanded at will simply by extending the work run. Said work run can be extended either by lengthening the two guides or by increasing the number of said guides.

Another much favoured design of the machine relating to this invention is to construct the two or more parallel guides, which constitute the work run of the machine, in a superposed position. With this form of construction, when one of the units reaches the end of the run of one of the work guides it is shifted to the guides immediately above or immediately below by means of elevator equipment similar to that described above in connection with the discharge operations shown in fig.2. The belts which translate the units from one guide to the other of the work run then take on the form of raising and lowering equipment.

This particular type of construction of the machine is specially advantageous in cases where it is necessary to reduce the surface dimensions of the machine because of lack of floor space. The vertical development of this machine has the further advantage of permitting the use of one of the translation elevators serves also to effect the discharge operations of the vibrating unit at the end of the work run so saving on the general running costs.

Claims

1. Machine for the finishing of metal pieces consisting of a number of rectilinear cradle shaped vibrating units equipped with slides or casters or wheels to enable them to progress along two or more parallel metal guides which constitute the work run of the machine; of two or more translating conveyor belts which move transversally to the direction of progress of the units along the work run and which move the units from one guide to the other at the end of each guide; of a charging station for the pieces to be processed in the units placed at the start of the work run; of a discharging station for the contents of the units placed at the end of the work run; of one or more work stations

for the processing of the pieces contained in the units, these work stations being situated along the work run, and of adjustable controls for the progress of said units along the work run.

2. Machine according to claim 1 characterized by the fact that the pieces to be processed are moved from a conveyor belt to the unit which starts its work run and which contains the work media of another unit which had previously reached the end of its work run.

3. Machine according to claim 1, characterized by the fact that the discharge station consists of a pneumatically raisable platform to which the unit at the discharge stage is fixed.

4. Machine according to claim 1, characterized by the fact that the unit which has terminated its work run, after having been discharged of its contents, is moved to the start of the work run by means of a translator belt which moves transversally to the progress movement of the units along the work run.

5. Machine according to claim 1, characterized by the fact that the unit in operation is moved from one side of the work run to the parallel side, in order to progress along it in the opposite direction, by means of a translator belt which moves transversally to the direction of progress of the units along the work run.

6. Machine according to claim 1, characterized by the fact that, along the work run, there are one or more work stations which allow the feed or the discharge of liquids containing the compounds to be used in the unit which is in connection with this particular station.

7. Machine according to claim 1, characterized by the fact that the translator belts consist of two chains upon which pieces of cut off rails are mounted, said rails having a distance between them which is the same as that of the rails (guides) of the work run.

8. Machine according to claim 1, characterized by the fact that the unit which has finished its work run is discharged and moved to the start of the work run by means of only one single raising platform which has also the function of translator belt of the unit from one guide to the other of said work run.

9. Machine according to claim 1, characterized by the fact that the unit in operation is moved from one part of the work run to the parallel part in order to progress in the opposite direction by a raising and lowering device which takes on the function of translator belt.

10. Machine according to claim 1, characterized by the fact that the units which hold the pieces being finished and the work media are en-

trained along the guides by a progress system consisting of a chain with an advancement device, driven by geared motors with adjustable controls.

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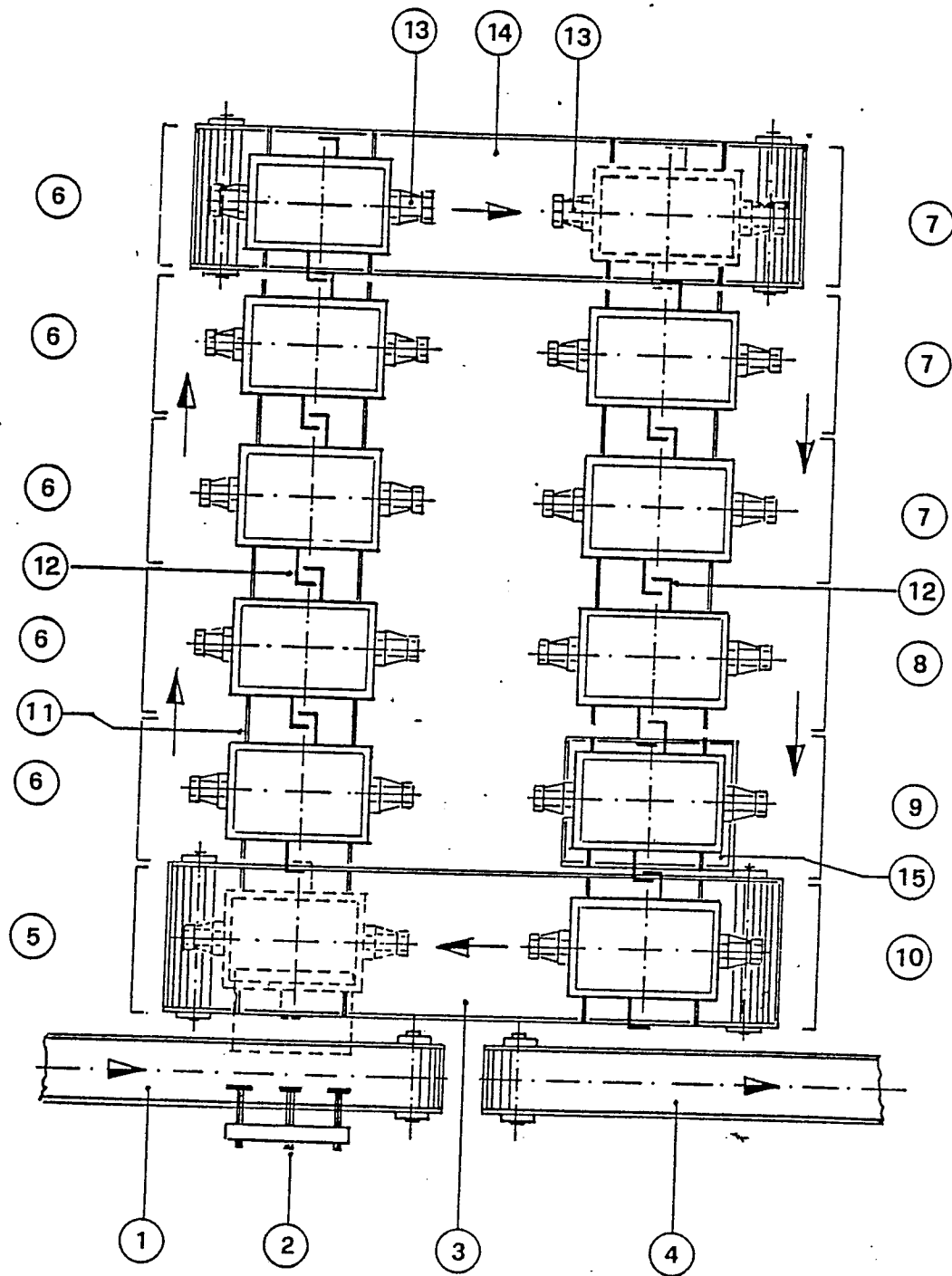


FIG 1

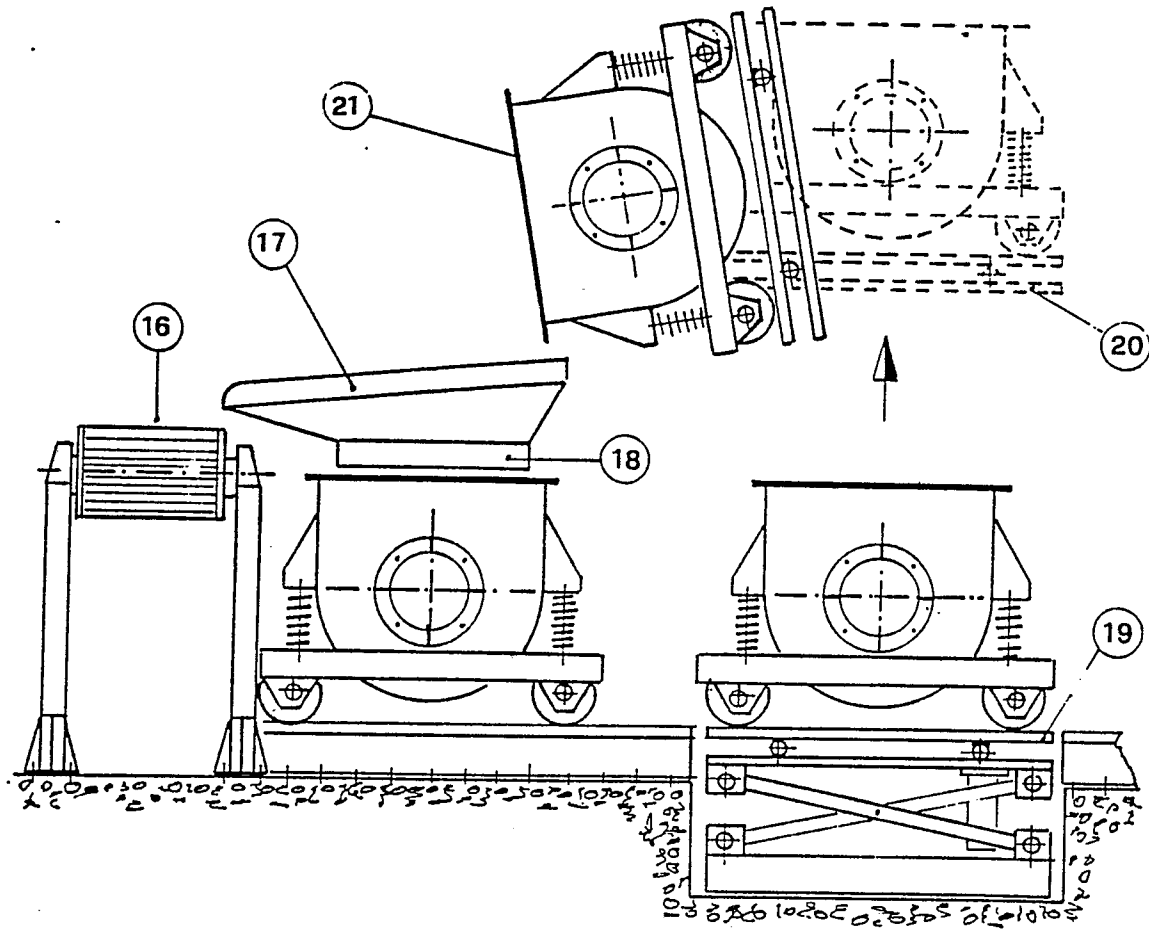


FIG 2