Shield Tunneling Machine for Tunnel Connectional Passage and Connectional Passage Tunneling Method Thereof

BACKGROUND OF THE PRESENT INVENTION

FIELD OF INVENTION

[0001] The present invention relates to the technical field of tunnel construction equipment, and particularly relates to a shield tunneling machine for a tunnel connectional passage and a connectional passage tunneling method of the shield tunneling machine.

DESCRIPTION OF RELATED ARTS

[0002] Under normal circumstances, a subway tunnel or a railway tunnel is a two-lane tunnel, and the distance between the two tunnels is relatively short. At a certain distance between the tunnels, a connectional passage needs to be designed to meet the needs of post-service and hedging and so on. The traditional construction for a connectional passage is carried out by means of ground reinforcement, water stop and manual excavation. There are many defects, such as complex settlement control, high safety risk, low construction efficiency and high cost. It is urgent to look for a safe, reliable and economical mechanized and intelligent equipment to achieve the construction of the connectional passage.

[0003] The shield tunneling machine is a highly mechanized and automated excavation lining complete equipment that integrates mechanical, electronic, hydraulic, laser and control technologies using a shield method. Shield technology does not require extensive demolition, no need to excavate the ground, no noise on the ground, no dust, no disturbance to the people, and it is used in all automatic control and has a fast project progress, therefore, it is a construction technology capable of reducing engineering pollution and saving a lot of money for engineering investment.

[0004] The shield tunneling machine itself is a complete set of complex equipment integrating machine, electric and liquid. When starting, it is necessary to design a suitable starting platform and a reaction frame, and needs to fix the end face and the reaction support thereof. A specific starting shaft is required and the space requirements are high. How to simplify the shield tunneling machine system, make a special starting platform and a special reaction frame, such that It can be assembled outside the tunnel and tunneling in the tunnel, which is still blank.

SUMMARY OF THE PRESENT INVENTION

[0005] The object of the present invention is to provide a shield tunneling machine for a tunnel connectional passage and a connectional passage tunneling method, wherein the shield tunneling machine has reasonable structural design, compact structure, stable construction, high efficiency, effective control of ground subsidence, and reduced construction risk.

[0006] The technical solution adopted to achieve the above objects is:

[0007] A shield tunneling machine for tunnel connectional passage, which comprises:

[0008] a start end supporting walking platform and a receive end supporting walking platform which are respectively arranged on material transportation rails in two main tunnels;

[0009] a shield tunneling machine main body;

[0010] a counterforce supporting frame and a main tunnel supporting assembly which are respectively arranged on the start end supporting walking platform and a corresponding main tunnel duct piece; and

[0011] a start end terminal sealing assembly and a receive end terminal sealing assembly which are respectively arranged at the start end and the receiving end of the

connectional passage, wherein a duct piece hanging assembly is provided at the start end supporting walking platform, and a jacking tunneling assembly is arranged between the counterforce supporting frame and the shield tunneling machine main body.

[0012] Each of the start end terminal sealing assembly and the receive end terminal sealing assembly includes a sealing sleeve fixed on the main tunnel duct piece at the end of the connectional passage, two annular sealing brush disposed on an inner wall of the sealing sleeve, and a grease injection hole formed on the wall of the sealing sleeve between the two sealing brushes, wherein the receive end sealing assembly further comprises a receiving end cover and a pressure maintaining system provided and communicated at the sealing sleeve and a sealing ring is provided between an inner end portion of the sealing sleeve and the main tunnel duct piece.

[0013] The shield tunneling machine main body comprises a shield body, a shield front partition, a main drive system and a drive motor disposed in the shield body, a cutter head provided at a front end of the shield body and connected with the main drive system, and a slag screw conveyor disposed in the shield body, wherein the slag screw conveyor is matched and communicated with the supporting duct piece of the connectional passage, and the jacking tunneling assembly achieves the excavation by pushing the supporting duct piece of the connectional passage communicated with the rear end of the shield body. The cutter head has a spoke-type structure, and a corresponding excavation cutter is arranged on the cutter beam at the front part of the cutter head.

[0014] The jacking tunneling assembly is a plurality of sets of jacking cylinders disposed on the counterforce supporting frame.

[0015] The main tunnel supporting assembly comprises a main tunnel duct piece, a force grid frame disposed parallel to the counterforce supporting frame, an annular reinforcing rib beam disposed between the force grid frame and the main tunnel duct piece, wherein the force grid frame is grid-like staggered arranged, wherein the counterforce supporting frame and the force grid frame are attached and supported with each other, and a force bearing panel is arranged on the force grid frame corresponding to

the counterforce supporting frame, wherein the annular reinforcing rib beam is matched with the main tunnel duct piece and cooperates with the force grid frame to provide the device with a counterforce supporting for pushing.

[0016] Each of the start end supporting walking platform and the receive end supporting walking platform has a docking support frame for positioning and supporting the shield tunneling machine main body, wherein the duct piece hanging assembly comprises a hanging frame, a duct piece transporting track arranged at the start end supporting walking platform, a duct piece transporting device arranged on the duct piece transporting track and a duct piece hanging device disposed on the top of the counterforce supporting frame, wherein the duct piece transporting track provided on the start end supporting walking platform has a track switch that docks with the ground.

[0017] Both of the start end supporting walking platform and the receive end supporting walking platform are defined by connecting a plurality of platform units end to end, and each of platform units has a running mechanism provided at a bottom thereof to enable the device in the tunnel to move rapidly, so as to meet the needs of the construction of connectional passages in different locations. Stable supporting boots are respectively provided at two sides of each of the start end supporting walking platform and the receive end supporting walking platform, and the start end supporting walking platform further comprises a hydraulic system, an electric system, a control system, a slag improving system and a slag discharging system arranged thereat.

[0018] A connectional passage tunneling method using the above shield tunneling machine, for excavating a connectional passage between two adjacent main tunnels, comprising the following steps:

[0019] (A) stabilizing the start end and the receiving end: stabilizing the start end and the receiving end of the connectional passage, and the main tunnel wall and the duct piece surrounding the start end and the receiving end to meet the requirement of the tunneling of the shield tunneling machine, wherein a main tunnel supporting assembly is provided on a rear side wall of the main tunnel corresponding to the start end of the

connectional passage, to meet the equipment of pushing during the tunneling process of the shield tunneling machine;

[0020] (B) fixing and supporting the whole device: installing the shield tunneling machine and its accessory equipment on the start end supporting walking platform, and pulling the start end supporting walking platform through a tractor to an excavation position of the connectional passage, supporting and fixing the whole equipment completely, and when the equipment is about to pass through, pulling the receive end supporting walking platform by a tractor to a receiving position corresponding to the connectional passage, to complete fixation;

[0021] (C) installing the start end terminal sealing assembly and excavating: firstly installing the start end terminal sealing assembly, achieving the docking through the end connecting plate and the sealing ring at the connectional passage, and make the shield body of the shield tunneling machine and the sealing sleeve of the start end terminal sealing assembly be docked, and injecting the sealing grease between the shield body and the sealing sleeve through the grease injection hole to achieve the sealing and pressure maintaining of the start end, and when the shield tunneling machine and its accessory equipment are supplied with the power source, and the joint debugging is performed, wherein the jacking tunneling assembly provided on the counterforce supporting frame controls the excavation process and the excavation posture of the shield tunneling machine; after completing an excavation of one stroke, assembling the supporting duct piece for the connectional passage at the rear of the shield body of the shield tunneling machine by a duct piece hanging assembly, and continuing to tunnel by jacking the supporting duct piece for the connectional passage through the jacking tunneling assembly, repeating the above stroke boring until the receiving end of the connectional passage is to be reached;

[0022] (D) sealing the receiving end: installing the receive end terminal sealing assembly at the main tunnel duct piece of the receiving end of the connectional passage, and filling the slag into the sealing sleeve of the receive end terminal sealing assembly by the pressure maintaining system to maintain the stability of the stratum and the duct piece

after the cutter head of the shield tunneling machine passes through the receiving end of the connectional passage, and when the sealing and forcing of the receiving end is finished, the shield tunneling machine and its accessory equipment continue to tunnel until the tunneling is through the connectional passage and the receiving end are supported and finished;

[0023] (E) removing the receive end terminal sealing assembly: loading the shield body of the shield tunneling machine on the receive end supporting walking platform and pulling it by a tractor out of the tunnel, and detaching the start end supporting walking platform, the auxiliary equipment and the tunnel supporting assembly and pulling it by a tractor out of the tunnel to complete the tunneling of a connectional passage.

[0024] With the above technical solution employed, the beneficial effects obtained are:

[0025] The structure of the invention is compact and reasonable, and a stable push-pushing force support for the tunneling of the shield tunneling machine is provided by the structural design of the counterforce supporting frame and the main tunnel supporting assembly, and during the tunneling process of the shield tunneling machine, the force exerted on the counterforce supporting frame can be distributed to the entire main tunnel duct piece, thereby ensuring that the shield body of the shield tunneling machine can provide sufficient reaction support when excavating.

[0026] The start end and the receiving end of the connectional passage of the present invention are provided with an end terminal sealing assembly, and the isolation between the main tunnel and the stratum is realized by the front partition of the shield body and the end terminal sealing assembly, thereby ensuring the safety of the jacking, and It can effectively resist the formation pressure, ensure the cutting position of the cutter head is consistent with the formation pressure, and prevent the excavation from collapsing or watering to the main tunnel.

[0027] The start end supporting walking platform and the receive end supporting walking platform of the invention can flexibly turn around in the main tunnel by traction,

thereby greatly improving the flexibility of the shield tunneling machine of the connectional passage, and being able to adapt to a limited working space, and achieving the excavation and the duct piece supporting in the limited working space, and during the excavation process, the single excavation stroke has a width of the duct piece, and after the completion of one stroke, the thrust cylinder is retracted, thereby leaving space for the assembling of the duct piece of the connectional passage, to enable the multi-step continuous tunneling to be realized, and the limited space can be effectively utilized in the excavation process at the start end and the receiving end, thereby realizing the stable and orderly excavation.

[0028] The invention can realize automatic mechanized excavation, greatly reduce labor intensity, reduce energy consumption, save cost, and at the same time, the equipment construction is stable, the efficiency is high, the ground settlement is effectively controlled, and the construction risk is reduced, wherein the walking support platform of the shield tunneling machine of the application is in the form of convenient movement, and the main tunnel duct piece support system of the auxiliary is convenient to disassemble and assemble, and can realize rapid and cyclic excavation of multiple connectional passages, so the overall structure design of the invention is reasonable, and the drawbacks of the tunneling of the connectional passage between the tunnels are well overcome by the shield tunneling machine, which has the characteristics of high efficiency, low risk, economic and environmental protection.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] FIG.1 is a structure diagram of the overall structure of the present invention.

[0030] FIG.2 is a structure diagram of a main tunnel of a start end of the connectional passage according to the present invention.

[0031] FIG.3 is another structure diagram of a main tunnel of the start end of the connectional passage according to the present invention.

[0032] FIG.4 is a structure diagram of a main body of the shield tunneling machine of the present invention.

[0033] FIG.5 is a left view of the main body of the shield tunneling machine shown in FIG. 4.

[0034] FIG. 6 is a structure diagram of the main tunnel supporting assembly of the shield tunneling machine of the present invention.

[0035] FIG.7 is a left view of the main tunnel supporting assembly shown in FIG. 6.

[0036] FIG. 8 is a structure diagram of a start end terminal sealing assembly and a receive end terminal sealing assembly according to the present invention.

[0037] FIG. 9 is a structure diagram of a counterforce supporting frame and a duct piece hanging assembly according to the present invention.

[0038] FIG.10 is a structure diagram of the AA direction of the counterforce supporting frame and the duct piece hanging assembly shown in FIG. 9.

[0039] FIG.11 is a structure diagram of the BB direction of the counterforce supporting frame and the duct piece hanging assembly shown in FIG. 9.

[0040] In the FIGs, the drawing number 1 represents the start end supporting walking platform, the drawing number 2 represents the receive end supporting walking platform, the drawing number 3 represents the main body of the shield tunneling machine, the drawing number 31 represents the shield body, the drawing number 32 represents the front partition of the shield body, the drawing number 33 represents the main drive system, the drawing number 34 represents the drive motor, the drawing number 35 represents the cutter head, the drawing number 36 represents the slag screw conveyor, the drawing number 37 represents the excavation cutter, the drawing number 4 represents the counterforce supporting frame, the drawing number 5 represents the main tunnel

supporting assembly, the drawing number 51 represents the main tunnel duct piece, the drawing number 52 represents the force grid frame, the drawing number 53 represents the reinforcing rib beam, the drawing number 54 represents the uniform force bearing panel, the drawing number 6 represents the start end terminal sealing assembly, the drawing number 7 represents the receive end terminal sealing assembly, the drawing number 8 represents the duct piece hanging assembly, the drawing number 81 represents the duct piece conveying track, the drawing number 82 represents the duct piece conveying equipment, the drawing number 83 represents the duct piece hanging equipment, the drawing number 84 represents the track turnout, the drawing number 85 represents the hanging frame, the drawing number 9 represents the jacking cylinder, the drawing number 10 represents the connectional passage, the drawing number 11 represents the sealing sleeve, the drawing number 12 represents the sealing brush, the drawing number 13 represents the grease injection hole, the drawing number 14 represents the receiving end cover, the drawing number 15 represents the pressure maintaining system, the drawing number 16 represents the terminal connecting plate, the drawing number 17 represents the sealing ring, the drawing number 18 represents the supporting duct piece for the connectional passage, the drawing number 19 represents the butt supporting frame, the drawing number 20 represents the stable supporting boot, the drawing number 21 represents the hydraulic system, the drawing number 22 represents the electrical system, the drawing number 23 represents the control system, the drawing number 24 represents the slag improving system, the drawing number 25 represents the slagging system, the drawing number 26 represents the main tunnel.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0041] Specific embodiments of the present invention will be described in detail below with reference to the accompanying drawings.

[0042] Embodiment 1:

[0043] Referring to Figs. 1 to 11, a shield tunneling machine for a tunnel connectional passage includes a start end supporting walking platform 1 and a receive end supporting walking platform 2 which are respectively disposed on material transport rails in two main tunnels 26, a main body 3 of the shield tunneling machine, the counterforce supporting frame 4 and the main tunnel supporting assembly 5 respectively disposed on the start end supporting walking platform 1 and the corresponding main tunnel duct piece, a start end terminal sealing assembly 6 and a receive end terminal sealing assembly 7 and respectively disposed at the start end and the receive end of the connectional passage 10, a duct piece hanging assembly 8 provided with the start end supporting walking platform 1, a jacking tunneling assembly provided between the counterforce supporting frame 4 and the main body 3 of the shield tunneling machine, wherein the jacking tunneling assembly is a plurality of jacking cylinders 9 disposed on the counterforce supporting frame 4.

[0044] Further, both of the start end supporting walking platform 1 and the receive end supporting walking platform 2 are defined by connecting a plurality of platform units end to end, stable supporting boots are respectively provided at two sides of each of the start end supporting walking platform 1 and the receive end supporting walking platform 2, and the start end supporting walking platform 1 further comprises a hydraulic system 21, an electric system 22, a control system 23, a slag improving system 24 and a slag discharging system 25 arranged thereat, wherein the start end supporting walking platform 1 and the receive end supporting walking platform 2 can flexibly walk along the transport curve of the material track of the main tunnel.

[0045] Each of the start end terminal sealing assembly 6 and the receive end terminal sealing assembly 7 arranged at two ends of the connectional passage 10 comprises a sealing sleeve 11 fixed on the main tunnel duct piece at the end of the connectional passage 10, two annular sealing brush 12 disposed on an inner wall of the sealing sleeve 11, and a grease injection hole 13 formed on the wall of the sealing sleeve 11 between the two sealing brushes 12, wherein the receive end sealing assembly 7 further comprises a receiving end cover 14 and a pressure maintaining system 15 provided at and

communicated with the sealing sleeve 11, and a terminal connecting plate 16 and a sealing ring 17 are provided between an inner end portion of the sealing sleeve 11 and the main tunnel duct piece 51.

[0046] The start end terminal sealing assembly can keep the excavation position of the cutter head consistent with the formation pressure when the shield tunneling machine starts to enter into the formation and excavate the ground, so as to prevent the excavation surface from collapsing and watering to the main tunnel. The start end sealing assembly is connected with the duct piece of the main tunnel, and two sealing brushes 12 are arranged at a position close to the rear of the sealing sleeve 11, and the grease injection hole is axially arranged between the two sealing brushes 12. The main body 3 of the shield tunneling machine is propelled, and after the sealing brush 12 wraps the shield body, the grease is injected between the sealing brushes 12 to meet the requirements of the end seal. The receive end terminal sealing assembly 7 is similar to the start end terminal sealing assembly 6, but the rear part thereof is closed. Before the main body 3 of the shield tunneling machine is driven out, a certain amount of muck is injected into the seal of the receiving end to meet the host of the shield tunneling machine, After excavation, the front pressure is consistent with the formation pressure to maintain the stability of the formation.

[0047] The main body 3 of the shield tunneling machine in this embodiment comprises a shield body 31, a shield front partition 32, a main drive system 33 and a drive motor 34 disposed in the shield body 31, and a cutter head 35 disposed at a front end of the shield body 31 connected with the main drive system 33 and a slag screw conveyor 36 disposed in the shield body are matched and connected with supporting duct piece 18 for the connectional passage at a rear end portion of the shield body 31, and the jacking tunneling assembly finishes the excavation and excavation operation by jacking the supporting duct piece 18 for the connectional passage at the rear end portion of the shield body 31, wherein the jacking tunneling assembly is a plurality of sets of jacking cylinders 9 disposed on the counterforce supporting frame in this embodiment, the cutter head 35 of the present application has a spoke-type structure and a corresponding excavation tool

37 is disposed on the blade beam at the front of the cutter head 35. The drive motor directly drives the cutter head 35 to excavate without a reducer, which reduces the length of the main body 3 to a certain extent, and providing conditions for the lateral arrangement of the shield tunneling machine in the main tunnel; by providing an independent slagging system and a screw conveyor at the bottom of the shield partition to finish the slag discharging of the muck by driving the spiral blade by the motor. The length of the screw conveyor is designed to be short to meet the requirements of the arrangement of the main body of the shield tunneling machine in the tunnel. The pipeline is connected at the end of the screw slag end, and the discharged muck is guided to a side of the main body of the shield tunneling machine, and the muck is pumped into a slag car. The rotation speed of the screw conveyor and the flow rate of the slag discharge pump are controlled to control the pressure of the earthen tank.

[0048] The main tunnel supporting assembly 5 comprises a main tunnel duct piece 51, a force grid frame 52 which is grid-like and staggered disposed in parallel with the counterforce supporting frame 4, the annular rib beam 53 provided between the main tunnel duct piece 51 and the force grid frame 52, wherein the counterforce supporting frame 4 and the force grid frame 52 corresponding to the counterforce supporting frame 4 are matched and supported with each other fittedly, and the force grid frame 52 corresponding to the counterforce supporting frame 4 has a uniform force bearing panel 54 provided thereon, wherein the main tunnel supporting assembly in the embodiment strengthens supporting and protecting the duct piece at a position where the connectional passage is excavated, and combining the rear stratum reinforcement of the duct piece to meet the need for the counterforce of the main body of the shield tunneling machine during the excavation. The supporting and protecting assembly defines a distributed support on the inner ring of the duct piece, so that the stress force applied at the rear portion of the duct piece by the main body of the shield tunneling machine is dispersed on the plurality of duct piece rings, thereby ensuring that the shield tunneling machine provides sufficient counterforce when the excavation is performed.

[0049] Each of the start end supporting walking platform 1 and the receive end supporting walking platform 2 has a docking support frame 19 for limiting and supporting the main body of the shield tunneling machine, wherein the duct piece hanging assembly 8 comprises a hanging frame 85, a duct piece conveying track 81 disposed on the start end supporting walking platform 1, a duct piece conveying device 82 disposed on the duct piece conveying track 81, and a duct piece hanging assembly 8 disposed at the top of the counterforce supporting frame, wherein the duct piece conveying track disposed on the start end supporting walking platform 1 has a track turnout 84 which is docked with the ground, wherein when the main body of the shield tunneling machine completes a stroke, the pushing cylinder is retracted and passed, and the supporting duct piece 18 for the connectional passage is hung and assembled, so as to start the next stroke by the jacking tunneling assembly.

[0050] Embodiment 2:

[0051] Referring to Figs. 1 to 11, A connectional passage tunneling method using the above shield tunneling machine, for excavating a connectional passage between two adjacent main tunnels, comprising the following steps:

[0052] (A) stabilizing the start end and the receiving end: stabilizing the start end and the receiving end of the connectional passage, and the main tunnel wall and the duct piece surrounding the start end and the receiving end to meet the requirement of the tunneling of the shield tunneling machine, wherein a main tunnel supporting assembly is provided on a rear side wall of the main tunnel corresponding to the start end of the connectional passage, to meet the equipment of pushing during the tunneling process of the shield tunneling machine;

[0053] (B) fixing and supporting the whole device: installing the shield tunneling machine and its accessory equipment on the start end supporting walking platform, and pulling the start end supporting walking platform through a tractor to an excavation position of the connectional passage, supporting and fixing the whole equipment completely, and when the equipment is about to pass through, pulling the receive end

supporting walking platform by a tractor to a receiving position corresponding to the connectional passage, to complete fixation;

[0054] (C) installing the start end terminal sealing assembly and excavating: firstly installing the start end terminal sealing assembly, achieving the docking through the end connecting plate and the sealing ring at the connectional passage, and make the shield body of the shield tunneling machine and the sealing sleeve of the start end terminal sealing assembly be docked, and injecting the sealing grease between the shield body and the sealing sleeve through the grease injection hole to achieve the sealing and pressure maintaining of the start end, and when the shield tunneling machine and its accessory equipment are supplied with the power source, and the joint debugging is performed, wherein the jacking tunneling assembly provided on the counterforce supporting frame controls the excavation process and the excavation posture of the shield tunneling machine; after completing an excavation of one stroke, assembling the supporting tube piece for the connectional passage at the rear of the shield body of the shield tunneling machine by a duct piece hanging assembly, and continuing to tunnel by jacking the supporting tube piece for the connectional passage through the jacking tunneling assembly, repeating the above stroke boring until the receiving end of the connectional passage is to be reached;

[0055] (D) sealing the receiving end: installing the receive end terminal sealing assembly at the main tunnel duct piece of the receiving end of the connectional passage, and filling the slag into the sealing sleeve of the receive end terminal sealing assembly by the pressure maintaining system to maintain the stability of the stratum and the duct piece after the cutter head of the shield tunneling machine passes through the receiving end of the connectional passage, and when the sealing and forcing of the receiving end is finished, the shield tunneling machine and its accessory equipment continue to tunnel until the tunneling is through the connectional passage and the receiving end are supported and finished;

[0056] (E) removing the receive end terminal sealing assembly: loading the shield body of the shield tunneling machine on the receive end supporting walking platform and

pulling it by a tractor out of the tunnel, and detaching the start end supporting walking platform, the auxiliary equipment and the tunnel supporting assembly and pulling it by a tractor out of the tunnel to complete the tunneling of a connectional passage.

[0057] In the present application, the accessory device is convenient for disassembly and transportation and transportation turnover. If multiple connectional passages need to be excavated between the two main tunnels, after completing the tunneling of one connectional passage, the excavation multiple connectional passages can be quickly and cyclically realized.

[0058] The basic principles, main features, and advantages of the present invention are shown and described above. It should be understood by those skilled in the art that the present invention is not limited by the foregoing embodiments, and that the present invention is described in the foregoing embodiments and the description of the present invention. Variations and modifications are intended to fall within the scope of the invention as claimed. The protection scope of the invention is defined by the appended claims and their equivalents.

WHAT IS CLAIMED IS:

1. A shield tunneling machine for a tunnel connectional passage, characterized in that, comprising:

a start end supporting walking platform and a receive end supporting walking platform disposed at material transport rails in two main tunnels;

a main body;

a counterforce supporting frame and a main tunnel supporting assembly respectively disposed at the start end supporting walking platform and the corresponding main tunnel duct piece;

a start end terminal sealing assembly and a receive end terminal sealing assembly disposed at a start end and a receiving end of the connectional passage;

a duct piece hanging assembly provided at the start end supporting walking platform; and

a jacking tunneling assembly disposed between the counterforce supporting frame and the main body of the shield tunneling machine.

2. The shield tunneling machine according to claim 1, wherein each of the start end terminal sealing assembly and the receive end terminal sealing assembly comprises a sealing sleeve fixed on the main tunnel duct piece at an end of the connectional passage, two annular sealing brushes disposed on an inner wall of the sealing sleeve, and a grease injection hole formed on a wall of the sealing sleeve between the two sealing brushes, wherein the receive end terminal sealing assembly further comprises a receiving end cover and a pressure maintaining system provided at and communicated with the sealing sleeve, wherein an end connecting plate and a sealing ring is provided between an inner end portion of the sealing sleeve and the main tunnel duct piece.

3. The shield tunneling machine according to claim 1, wherein the main body of the shield tunneling machine comprises a shield body, a shield front partition, a main drive system and a drive motor disposed in the shield body, a cutter head provided at a front end of the shield body and connected with the main drive system, and a slag screw conveyor disposed in the shield body, wherein the slag screw conveyor is matched and communicated with a supporting duct piece of the connectional passage, and the jacking tunneling assembly achieves the excavation by jacking the supporting duct piece of the connectional passage communicated with a rear end of the shield body, wherein the cutter head has a spoke-type structure, and a corresponding excavation cutter is arranged on a cutter beam at the front part of the cutter head.

4. The shield tunneling machine according to claim 1, wherein the jacking tunneling assembly is a plurality of sets of jacking cylinders disposed on the counterforce supporting frame.

5. The shield tunneling machine according to claim 1, wherein the main tunnel supporting assembly comprises a main tunnel duct piece, a force grid frame which is grid-like staggered disposed parallel to the counterforce supporting frame, an annular reinforcing rib beam disposed between the force grid frame and the main tunnel duct piece, wherein the counterforce supporting frame and the force grid frame are attached and supported with each other, and a force bearing panel is arranged on the force grid frame corresponding to the counterforce supporting frame.

6. The shield tunneling machine according to claim 1, wherein each of the start end supporting walking platform and the receive end supporting walking platform has a docking support frame for positioning and supporting the main body of the shield tunneling machine, wherein the duct piece hanging assembly comprises a hanging frame, a duct piece transporting track arranged at the start end supporting walking platform, a duct piece transporting device arranged on the duct piece transporting track and a duct piece hanging device disposed on the top of the counterforce supporting frame and the hanging frame, wherein the duct piece transporting track provided on the start end supporting walking platform has a track turnout that docks with the ground.

7. The shield tunneling machine according to claim 1, wherein both of the start end supporting walking platform and the receive end supporting walking platform are defined by connecting a plurality of platform units end to end, and each of platform units has a running mechanism provided at a bottom thereof, wherein stable supporting boots are respectively provided at two sides of each of the start end supporting walking platform and the receive end supporting walking platform, and the start end supporting walking platform further comprises a hydraulic system, an electric system, a control system, a slag improving system and a slag discharging system arranged thereat.

8. A connectional passage tunneling method using shield tunneling machines according to claim 1, for excavating a connectional passage between two adjacent main tunnels, comprising the following steps:

(A) stabilizing the start end and the receiving end: stabilizing the start end and the receiving end of the connectional passage, and the main tunnel wall and the duct piece surrounding the start end and the receiving end to meet the requirement of the tunneling of the shield tunneling machine, wherein the main tunnel supporting assembly is provided on a rear side wall of the main tunnel corresponding to the start end of the connectional passage, to meet the equipment of pushing during the tunneling process of the shield tunneling machine;

(B) fixing and supporting the whole device: installing the shield tunneling machine and its accessory equipment on the start end supporting walking platform, and pulling the start end supporting walking platform through a tractor to an excavation position of the connectional passage, supporting and fixing the whole equipment completely, and when the equipment is about to pass through, pulling the receive end supporting walking platform by a tractor to a receiving position corresponding to the connectional passage, to complete fixation;

(C) installing the start end terminal sealing assembly and excavating: firstly installing the start end terminal sealing assembly, achieving the docking through an end connecting plate and a sealing ring at the connectional passage, and make a shield body

of the shield tunneling machine and a sealing sleeve of the start end terminal sealing assembly be docked, and injecting the sealing grease between the shield body and the sealing sleeve through a grease injection hole to achieve the sealing and pressure maintaining of the start end, and when the shield tunneling machine and its accessory equipment are supplied with the power source, and the joint debugging is performed, wherein the jacking tunneling assembly provided on the counterforce supporting frame controls the excavation process and the excavation posture of the shield tunneling machine; after completing an excavation of one stroke, assembling a supporting duct piece for the connectional passage at the rear of the shield body of the shield tunneling machine by the duct piece hanging assembly, and continuing to tunnel by jacking the supporting duct piece for the connectional passage through the jacking tunneling assembly, repeating the above stroke boring until the receiving end of the connectional passage is to be reached;

(D) sealing the receiving end: installing the receive end terminal sealing assembly at the main tunnel duct piece of the receiving end of the connectional passage, and filling the slag into the sealing sleeve of the receive end terminal sealing assembly by a pressure maintaining system to maintain the stability of the stratum after a cutter head of the shield tunneling machine passes through the receiving end of the connectional passage, and when the sealing and forcing of the receiving end is finished, the shield tunneling machine and its accessory equipment continue to tunnel until the tunneling is through the connectional passage and the receiving end are supported and finished;

(E) removing the receive end terminal sealing assembly: loading the shield body of the shield tunneling machine on the receive end supporting walking platform and pulling it by a tractor out of the tunnel, and detaching the start end supporting walking platform, the auxiliary equipment and the tunnel supporting assembly and pulling it by a tractor out of the tunnel to complete the tunneling of a connectional passage.